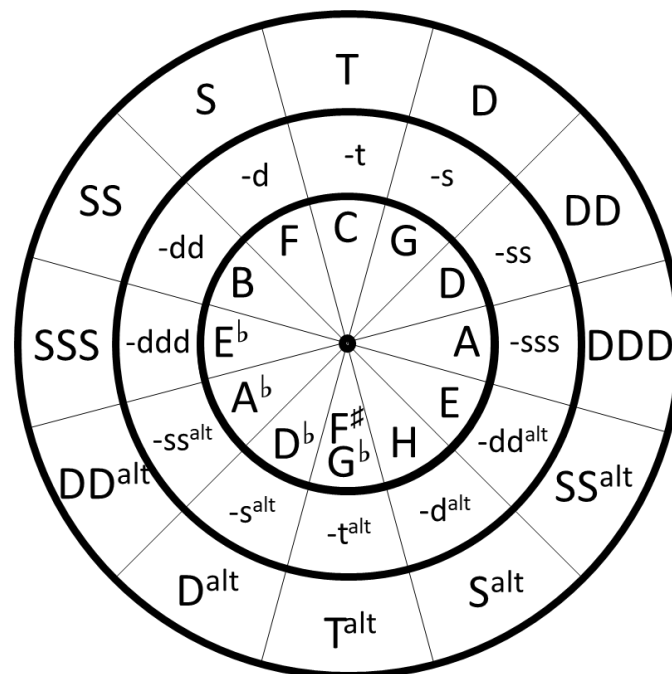


Chromatic Function Analysis

An instrument for improvisation

Joel Bergström



Degree Project, 30 higher education credits

Master of Fine Arts in Music, Organ and related keyboard instruments

Academy of Music and Drama, University of Gothenburg

Spring Semester 2020

Author: Joel Bergström

Title: Chromatic Function analysis.

Subtitel: An instrument for improvisation

Supervisor: Professor Hans Davidsson and Professor Joel Speerstra

Examiner: Dr. Joel Eriksson

Key words:

Organ, Improvisation, Chromatic Function Analysis, Function Analysis, An instrument for function analysis, improvisation and composition, Girolamo Frescobaldi, Franz Tunder, Dieterich Buxtehude, Johann Sebastian Bach, Max Reger, Philippe Lefebvre, Olivier Messiaen, Bergström's Chromatic Function Analysis Circle, Dr. Pamela Ruiten-Feenstra, Dr. Karin Nelson, Dr Hans Davidsson, Dr. Joel Speerstra. Dr. Joel Eriksson, Senior lecture Mikael Wahlin, Dr. Tilman Skowroneck, Dr Jörgen Jersild, Dr. Ernst Levy, Dr. Valdemar Söderholm, Dr. Sten Ingelf, Baroque improvisation, Romantic improvisation, French romantic improvisation, Joel Bergström, Patterns, Harmony, Chords, Triads, Music, Theory, Music theory, Statistics, Improvisation pedagogy, Improvisation model, Dr. Ikujiro Nonaka, Dr. Hirotaka Takeuchi, Academy of Music and Drama, University of Gothenburg, Högskolan för Scen och Musik, HSM, Sweden

Abstract

The purpose of this investigation is to become a better improviser at the organ. I will use, *The Chromatic Function Analysis Model*, abbreviated as TCFAM, as a method to deconstruct material and later reconstruct material, on which I will make improvisations. I want to see how well TCFAM can support improvisation and, in the process, become a better improviser. The method is applied to describe harmonic relations in music, music that is built on harmony. By using this method, that works with describing harmony, it's possible to make statistics. The statistics will show how common certain chord progressions are, how often chords are applied and what relations chords have to each other. A limitation is that this method is only intended to address harmony.

The method will be applied on various organ music, organ repertoire, that is strongly linked to improvisation and transcribed improvisations. The repertoire is chosen from different epochs and to cover different usage of harmony from different time eras. This will show how well the method applies to different genres depending on the certain time era.

Apart from existing repertoire, the method will also be applied on transcribed improvisations to explore how various organists work with improvisation. To me, improvisation could be thought of as live composition, like a game of chess in which sometimes a progression of moves is custom but depending on what game you play; you must change your move within the structure. The method allows me to create the many structures, that will be applied for improvisation.

TCFAM will be one possible way to approach improvisation and I will investigate if the method can support me in improving my artistic improvisation skills by addressing following questions:

1. Will the data collected and processed through TCFAM support my creativity in the process of improvising?
2. By using this method what do I learn?
3. Can TCFAM be an instrument for analysis of transcribed improvisations or compositions to work as a generating principle/tool for improvisation?

In this thesis TCFAM will be used to study what harmonies improvisers and composers use and from the collected data construct blueprints, allowing me to approach improvisation. By using this method, I made fourteen improvisations in different styles, which demonstrate how the method can work as a tool to approach improvisation. The intent is not to copy someone else but to be able to deconstruct a style of music and be able to generate a musical language that I can use in my own artistic practice. I learned that this method can work as a method to support improvisation. Other affordances that this method can give is its possibility to find patterns. By patterns I mean a harmonic sequence of any sort that is repeated somehow throughout the piece. An analogy would be the jazz pianist improvising at the piano. He uses the same chords as an underlying structure but by using scales, motives and other concepts the improviser hides the harmonic structure, so even though much is going on, the framework being the harmony, is the same.

Another affordance is the method's possibility of collecting data on harmony. The data could be applied to verify music which author is unknown to known material, showing the content's probability of being by the same author. In this case the method could be applied as a tool to show probability.

Acknowledgements

First and foremost, I want to thank my supervisor's professor Hans Davidsson and professor Joel Speerstra, whose guidance have been most valuable. Your well of knowledge has been a most valuable asset, to refill, be engulfed and to learn from.

I wish to express my special thanks of gratitude to my family and especially to my parents Inger and Dick. Thank you for encouraging me to study, learn and to work hard on my goals. For endless discussions regarding improvisation, structures, theory, listening and proofreading my thesis. It would not have been possible for the thesis to take form without your support.

To my brothers, Einar and Herman, thank you for acting as registrants when needed and for relieving me from this thesis every now and then to play games, watch movies, play football, etc so that I would be able to come back with more energy.

To my sisters, Signe and Märta, thank you for staying up late nights setting up the recordings and to help me as registrants.

-To my family, my love for you is eternal

My gratitude to my friend Hugo von Horn, whose ears are most reliable, thank you for transcribing Lefebvre's improvisation and my own improvisation.

The combination of education in the three fields of instrument, music theory, conducting and choir have improved and developed my musical understanding and skills. I would like to take this opportunity to extend a vote of thanks to all my teachers at Gothenburg University who have especially helped me over the course of my studies and my explorations of music. I am very thankful to my teacher in improvisation professor Karin Nelson whose comments to the improvisations constitute a most essential response in creating a dialogue on my improvisations. I also wish to thank my teacher in repertoire, senior lecturer Mikael Wahlin, whose input has been greatly appreciated and in addition thank senior lecturer Joel Speerstra and senior lecturer Tilman Skowronek in Harpsichord, and to my music theory teachers senior lecturer Dag Hallberg and senior lecturer Joel Eriksson and to my conducting and choir teacher professor Jan Yngwe and head of program Christina Ekström. Finally, thank you to my fellow students and friends.

Tempore plagae, anno Domini MMXX

Joel Bergström

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1. Introduction

The art of improvisation has historically been a necessity in the education of a church musician. Over time there has been a shift in focus from improvisation to repertoire, thus reflecting the decline of the organist having the ability to improvise or having the pedagogy together with the “know how” to teach others. Today, as an organist it is vital to learn the craft of improvisation and it is an expected know how, when working in a congregation. For the final exam in the master’s program in organ and related keyboard instruments, we must include an improvisation in our final concert program in order to graduate. In our studies we frequently have classes, studying different genres and styles of improvisation depending what purpose the improvisation should serve.

Learning improvisation usually takes the traditional form of apprenticeship of tacit knowledge exchange. The teaching is based on the relationship between the student, who wants to learn improvisation, and the master who possesses the tacit knowledge. Therefore, I realise the importance of knowing a method that makes tacit knowledge explicit, equipping oneself with a theory that serves as a teacher. I believe this is also the point of the master program, when you are supposed to become your own teacher.

This thesis aims to investigate how to approach improvisation, and how to improve my own improvisation skills. During my bachelor studies, I developed a theory based on function analysis enhanced with added concepts. The theory, *Chromatic Function Analysis*, will be applied in this master’s thesis as a method, to approach improvisation.¹ This method describes harmony and their different relations. By using this method, it’s possible to make statistics on what harmony other improvisers use. In turn, I will use collected statistics making blueprints which I base my own improvisations on. This method can generate statistics without corrupting the data as traditional function analysis would have a hard time not doing. The method has also been equipped with concepts that make it more flexible in terms of data gathering. Therefore, this method is the most suitable for this thesis, as a generating principle for improvisation. Apart from existing repertoire, the method will also be applied on transcribed improvisations to explore how various organists work with improvisation. To me, improvisation could be thought of as live composition, like a game of chess in which sometimes a progression of moves is custom but depending on what game you play, you must change your move within the structure. The method allows me to create the many structures, that will be applied for improvisation

I have decided to study four epochs, with a respective genre linked to a person who has had an influence on the organ. By looking into these different epochs, I will cover many styles and genres depending on what purpose the improvisation is intended to serve. This will challenge the method to see how well it can differentiate between genres. The intention is not to make a style-based improvisation but rather find a way to approach a musical language.

This thesis is constructed so that my study subjects are placed in a chronological order. The four epochs are the Renaissance, the Baroque, the German romantic period, the late French organ tradition and the persons I choose linked to these genres are Girolamo Frescobaldi, Johann Sebastian Bach, Max Reger and Philippe Lefebvre. As an extra material I also attach an improvisation on Olivier Messiaen which falls into the category of the French organ tradition.

It is difficult to know how music, and especially improvisations from older times, have sounded, since we have no recordings, but we do have printed music which we know usually was intended for studying improvisation.

1. Joel Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*. (Bachelor of Music, with specialization in Church Music Performance, University of Gothenburg, Sweden, 2018). Retrieved from <http://hdl.handle.net/2077/57200>

2. Investigation

I am going to investigate the art of improvisation by using, *The Chromatic Function Analysis Model*, abbreviated as *TCFAM*.² It will be tried on compositions and transcribed material from different eras to show its variability by operating in different genres. Improvisation has become tacit knowledge and its methods increasingly forgotten; it is only now in recent times that it has received a boost. I feel the need to make this method available. *TCFAM* is a model with added concepts that originates from traditional function analysis, which is the most taught analysis model at music schools and universities in Scandinavia. Knowing function analysis helps in the possibility of accessing *TCFAM* to those who would like to learn improvisation but have no teacher.

2.1. How to read this thesis

In this thesis we get to explore composers and improvisers from four different epochs. The material that has been selected will be processed by the model, *TCFAM*. The compositions and transcriptions will be processed through following three phases:

- Deconstruction, in which the method deconstructs the music into chords and functions and analyses it statistically. Deconstruction is not to be associated with the post-structuralist analysis by Derrida
- Reconstruction, in which the deconstructed material is applied to recreate harmony and generate blueprints
- Construction, an improvisation is made from the blueprints and we have a result that will be reflected on, commented on by my improvisation teacher professor Karin Nelson

In this thesis I will use nomenclature by Sten Ingelf in his book *Lär av mästarna*, which means that when talking about harmony, lowercased letters represent minor chords and uppercased letters represent Major chords, unless major or minor are being stated.³ I will also use nomenclature from *The Bergström's Chromatic Function Analysis Circle* opted and transformed to numbers, see p. 15.⁴ In this thesis I use German and Scandinavian convention to let the letters B and H represent the pitch class in the data gathering, tables, appendixes, the reflection by Karin Nelson. In the text and the translated reflection, I will use Anglo-Saxon convention with B and B flat represent the pitch class. For better understanding of the Terminology applied in this thesis, see Appendix J

2.2. Purpose

The purpose of this thesis is to become a better improviser at the organ. I have selected well respected organists who are associated with the craft of improvisation. By approaching these selected musicians, I wish to extract and understand their musical language so that I can improve my artistic improvisation skills. By doing this I hope to develop my own musical improvisation language.

2. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*.

3. Sten Ingelf, *Lär av mästarna*. (Lund: Grahns Boktryckeri, 2008).

4. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*.

2.3. Questions

The research questions are:

1. Will the data collected and processed through *TCFAM* support my creativity in the process of improvising?⁵
2. By using this method what do I learn?
3. Can *TCFAM* be an instrument for analysis of transcribed improvisations or compositions to work as a generating principle/tool for improvisation?

2.4. Limitation

I limited this study by choosing to only study the **harmony** in the **material** by the **composers** I have selected using *TCFAM*. In this thesis Harmony is commonly referred to chords built on triads.

2.5. Methods

2.5.1. Knowledge Management model

As mentioned, previous learning improvisations usually take the traditional form of apprenticeship of tacit knowledge exchange. The teaching is based on the relationship between the student, who wants to learn improvisation, and the master who possesses the tacit knowledge. Nonaka & Takeuchi's classification of knowledge is very interesting, from a Knowledge Management perspective in the "knowledge matrix" in their book, *The Knowledge-Creating Company – How Japanese Companies Create the Dynamics of Innovation*.⁶ Their matrix classifies knowledge as either explicit or tacit, and either individual or collective, see *figure 2.1*. In addition, they outline a knowledge process of how to transform knowledge from one form to another:

- Socialization, the apprenticeship model, transforms knowledge from tacit to tacit, whereby an individual acquires tacit knowledge directly from others through shared experience, observation, imitation and so on.
- Externalization transforms knowledge from tacit to explicit, through articulation of tacit knowledge into explicit concepts.
- Combination transforms knowledge from explicit to explicit, through a systematization of concepts drawing on different bodies of explicit knowledge.
- Internalization transforms knowledge from explicit to tacit, through a process of "learning by doing" and through a verbalization and documentation of experiences.

5. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*.

6. Ikujiro Nonaka & Hirotaka Takeuchi, *The Knowledge-Creating Company – How Japanese Companies Create the Dynamics of Innovation*. (New York: Oxford University Press. 1995).

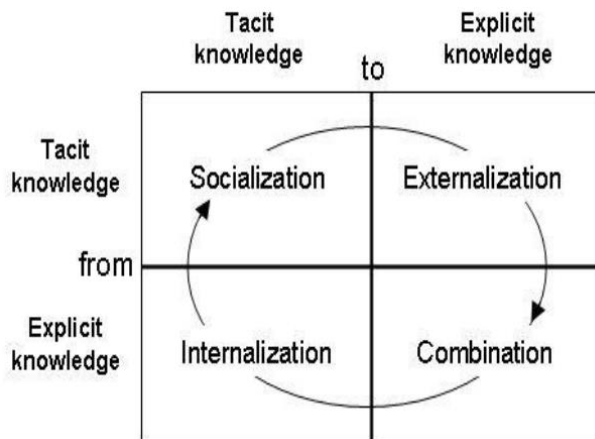


Figure 2.1 Nonaka & Takeuchi Knowledge Management model.⁷

In the thesis will I explore the possibility to approach improvisation to transform tacit knowledge to explicit knowledge and back to tacit knowledge in my own improvisations.

2.5.2. Cycle of improvisation

Dr. Pamela Ruiter-Feenstra works at the University of Michigan and she was as a Senior Researcher at the Göteborg Organ Art Center in Sweden. In her book *Bach and the art of improvisation Volume two*, see p. vii, she introduces a method to show how Bach’s relation to improvisation might have been to be and what we can learn from this process, see *figure 2.2*:⁸

I articulated the need for the study, the pedagogical mindset of learning to improvise, and the multidisciplinary connections of improvisation that lead to consummate musicianship. I discussed the dynamic relation between construction (existing compositions), deconstruction (analyse compositions to discover tools of invention), and reconstruction (use tools of invention to improvise and compose) concepts defined and visualised in Figure P.1. In Volume Two, the construction, deconstruction and reconstruction play out not only in improvisation, but also in the pedagogy of improvisation. My goal has been to discern Bach’s improvisation pedagogy, and to translate it into an improvisation pedagogy approach that serious students and professionals can own. After studying and practicing *Bach and the art of improvisation*, musicians can apply the same improvisation pedagogy to teach themselves how to improvise in styles common to Baroque practice and beyond, cycling back through compositions and descriptions, as diagrammed in Figure P.1.

7. Nonaka & Takeuchi, *The Knowledge-Creating Company – How Japanese Companies Create the Dynamics of Innovation*.
 8. Pamela Ruiter-Feenstra, *Bach and the art of improvisation Volume two* (Michigan: Chicago Press, 2017), vii.

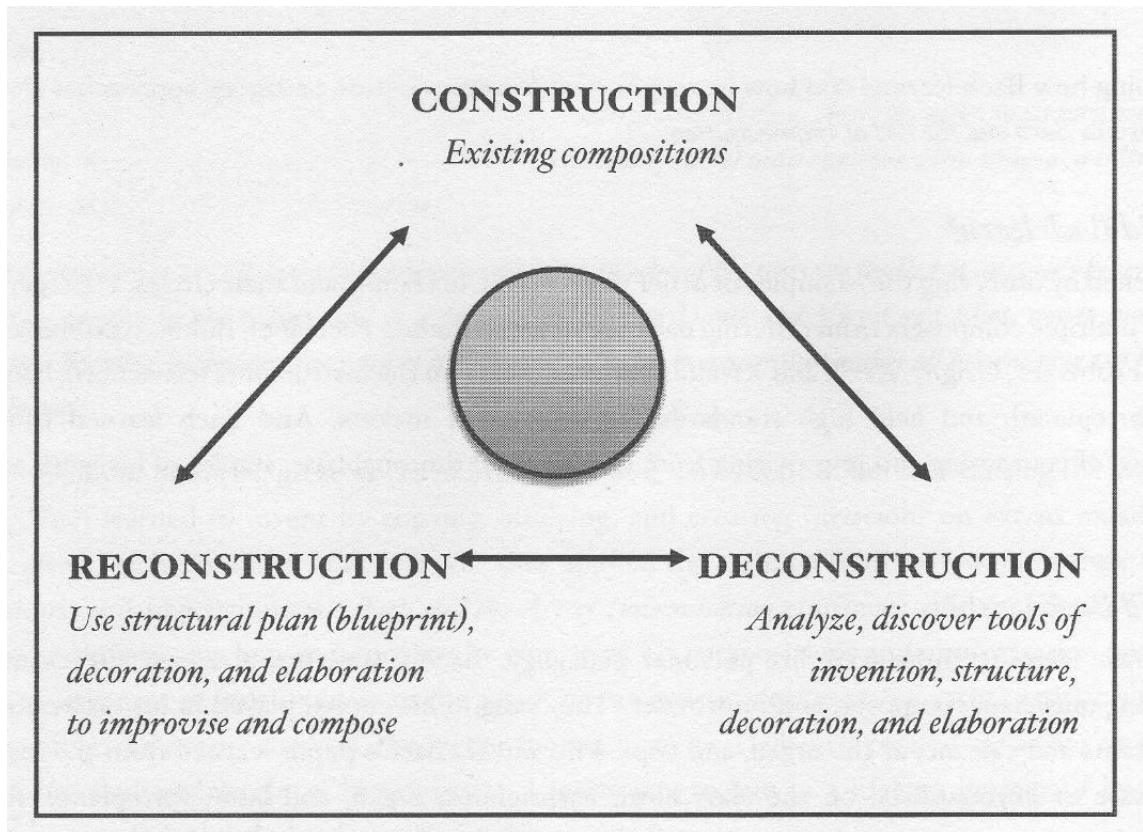


Figure 2.2 Construction – Deconstruction – Reconstruction cycle of improvisation⁹.

In Dr. Ruiter-Feenstra’s book *Bach and the art of improvisation Volume two*⁹, see p. viii, she depicts the model above how existing material “construction” can be applied by being “deconstructed” and then reconstructed in order to make an improvisation. In this thesis Deconstruction is not to be associated with the post-structuralist analysis by Derrida but as a term used to bridge the construction phase with the reconstruction phase.

9. Ruiter-Feenstra, *Bach and the art of improvisation Volume two*, viii.

2.5.3. Using Chromatic Function Analysis for Deconstruction

I will make use of her method and contribute by adding my theory *TCFAM* addressing the way how to Deconstruct music.¹⁰ During my bachelor studies, I wrote a thesis, creating a theory by combining the works of music theorists. The theory, which I call, *TCFAM* is a system which describes monotonicity, drawing from the established principles of function harmony and further contributions by Jörgen Jersild, *Romantikens Harmonik*¹¹, and Ernst Levy, *A Theory of Harmony*¹².

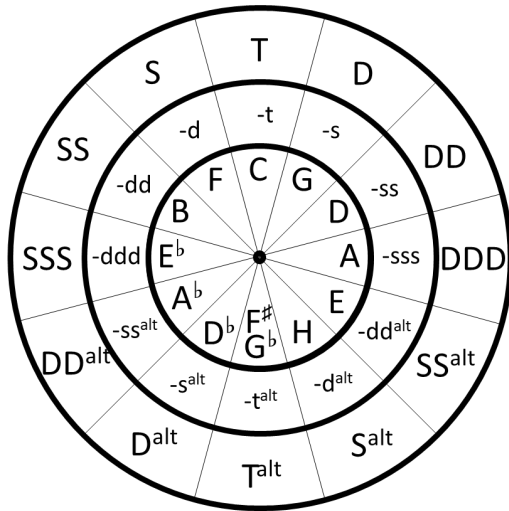


Figure 2.3 Bergström's Chromatic Function Analysis Circle¹³

This system is built with the intent of a progressional hierarchal order, in which a chord has a unique function in relation to one reference point, the tonic, see *figure 2.3*. Having the ability to describe harmony without having to change the tonic is a benefit when collecting data since each harmony is matched with a unique function. This in turn gives a more detailed information and decides more precisely what is observed and takes away interpretations of the result. *TCFAM* enable us several important features that ordinary function analysis has a hard time dealing with. In this case concerning Deconstruction it supports the following important functions:

- Being able to take all harmony into account and addressing them with functions, without having to change the tonic nor corrupting the data gathering and enabling an easier way to collect the data.
- This allow the system to make statistics from which blueprints can be made.

10. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*
 11. Jörgen Jersild, *Romantikens Harmonik*. (Köpenhamn: Wilhelm Hansen, 1970).
 12. Ernst Levy, *A Theory of Harmony*. (Albany: State University of New York Press, 1985)
 13. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*

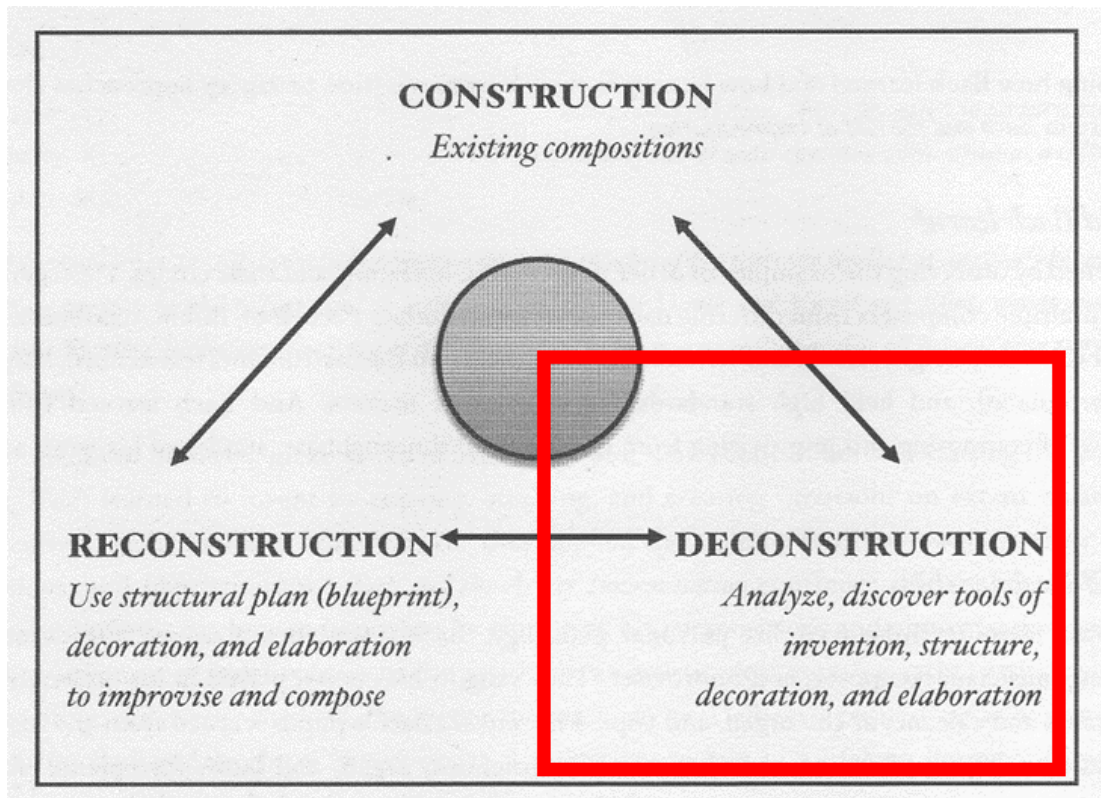


Figure 2.4 Deconstruction.¹⁴

Combining the two methods we can place *TCFAM* to work as a tool to deconstruct compositions and/or recorded improvisation and bridge between the areas of Construction and Reconstruction, as shown in figure 2.4.¹⁵

When collecting the data, that is based on previous compositions, study material and/or transcriptions, I use a chart that will be found in the many appendixes. First, I collect data for each of the study material, deconstructing the material by using *TCFAM*. In the chart we can see how many chords there are and how often they move from one chord to another, showing the probability in harmonic relations for each composition. Secondly, I make a master chart compiling all the gathered data into one chart. There is one master chart for each of the composers that I am investigating. From this master chart I can now Reconstruct material and make blueprints for my improvisations. This will show us what harmonic material, most likely applied to form a musical language.

14. Ruiten-Feenstra, *Bach and the art of improvisation Volume two*. p. viii.

15. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*

I have applied the terminology from *TCFAM* and here is how the transformation will turn out.¹⁶

Major chords	E	F	F#	G	G#	A	B	H	C	C#	D	D#
Minor chords	e	f	f#	g	g#	a	b	h	c	c#	d	d#
Terminology	T	Dalt	DD	SSS	SSalt	S	Talt	D	DDalt	DDD	SS	Salt
Terminology	-t	-salt	-ss	-ddd	-ddalt	-d	-talt	-s	-ssalt	-sss	-dd	-dalt
Numbers	1	2	3	4	5	6	7	8	9	10	11	12
Numbers	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12

Table 2.1. Transformation table

I have the twelve major and minor chords and each one will get a number from 1-12 the major chords will just have the number while all minor chords will have the sign – in front of them. In the transformation table, we have the set of nomenclature from *the Bergström's Chromatic Function Analysis Circle* to the left and vertically beginning with E major and under it a e minor. These represent the chords and they go on, horizontally all the way up to D# and d# minor. Under the chords we have the section “terminology” associating to the chords related terminology. The last section “numbers” is including a positive and negative number series that stand for Major respective minor chords. When deriving data from the material, I will first write down the chords and then give the chords a number from this series. It's important to note that depending on what key the piece is set in the starting chord will differ from piece to piece but not the terminology or the number series. The terminology is based on function analysis and the intention has been not to refrain from original terminology, therefore all new relations have been given functions that do not abbreviate too much and could be understood or learned by those whom have studied function analysis. The chromatic system is now equipped with the features to understand all the harmonic relations and brings us to the next step that this enables us to do statistics.

When doing the deconstruction and reconstruction phase, I have decided to let all the chords be associated with the numbers in the transformation table, but they all derive from the terminology from *TCFAM*. This is to be done so that even those who do not understand function analysis can follow the process. Since *TCFAM* is adaptable to either work as a direction or a position-based system. In this thesis *TCFAM* will primarily be used as a position based system, meaning all chords are given a specific function that is non determined by previous or next coming chord, it can work collecting the data where function analysis cannot. Not jeopardizing the statistics, I am not going to count chords more than once and I will have the chords ranked from 1-12 based on what chord they are. So, the chord that is both tonic and dominant will only be counted once, and it will be counted in the way what notes it contain. It will be neither looked as a tonic nor a dominant but as 1 respective 8.

To try this method, I had to make a pilot test, this thesis in a miniature scale, showing that the theory works and that I can proceed with the intentions of this thesis.

16. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*

2.6. Material

As material, I will use written compositions that either have started out as improvisation material or existing compositions which can generate data. In the chapter regarding Lefebvre, the music is on YouTube and had to be transcribed.

2.6.1. Pilot study

As preparations before launching this thesis to full operation, I conducted a pilot study to try out many of my ideas and to see if they could fit together. Therefore, this pilot stands out in comparison to rest of the documents, since it does not share the same structure. Currently, I was also preparing for examination in improvisation, which also reflect, the structure of this chapter. We usually get the assignments a few days before examination, having time to consider the structure of the improvisation. I looked at two pieces by Bach, one of them was deconstructed and looked upon according to harmony, and the other one, according to the figurations. This resulted in two improvisations.

2.6.2. Girolamo Frescobaldi (1583-1643)

Starting in a chronological order, with the oldest music in this thesis (1635) *Fiori Musicali* that I intend to study, contain the three elevation toccatas by Girolamo Frescobaldi. The three elevation toccatas are part of a liturgical collection, known as the *Fiori musicali*, Op. 12. This collection is written for church services and the elevation toccatas for communion. The toccatas are ideal since they are in nature improvisatory but preserved in a printed format. They are written in a very vocal way and use colourful ways to treat dissonances. I have been told that there are most certainly no places where Frescobaldi would repeat harmony since he is improvising in a free style. I intend to explore and research if there are patterns in this unintentional state of improvising, since I believe that most music is based on repeated patterns intentionally or unintentionally.

The three elevation toccatas are:

- *Toccata No. 31 from Messa delli Apostoli*.¹⁷
- *Toccata No. 45 from Messa della Madonna*.¹⁸
- *Toccata No. 16 from Messa della Domenica*.¹⁹

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17. Girolamo Frescobaldi, *Fiori musicali, Op. 12. Toccata No. 31 from Messa delli Apostoli*, In P. Gouin (Restitution). (Montreal: Les Éditions Outremontaises 2013.). Retrieved October 10, 2018, from <https://imslp.org/wiki/Special:ImagefromIndex/288046/frb>
 18. Girolamo Frescobaldi, *Fiori musicali, Op. 12. Toccata No. 45 from Messa della Madonna*, In P. Gouin (Restitution). (Montreal: Les Éditions Outremontaises 2013.) Retrieved October 10, 2018, from <https://imslp.org/wiki/Special:ImagefromIndex/288191/frb>
 19. Girolamo Frescobaldi, *Fiori musicali, Op. 12. Toccata No. 16 from Messa della Domenica*, In P. Gouin (Restitution). (Montreal: Les Éditions Outremontaises 2013.) Retrieved October 10, 2018, from <https://imslp.org/wiki/Special:ImagefromIndex/288185/frb>

2.6.3. Johann Sebastian Bach (1685-1750)

Writing about improvisation and being an organ scholar, it is inevitable not to have a chapter regarding Johann Sebastian Bach. It is sometimes stated that with Bach the Baroque period reached a culmination which also ended with his passing. To us organists there is a collection of liturgical music known as *Das Orgelbüchlein BWV 599-644* or the liturgical year. In this book J.S Bach reworks and refines chorale melodies to use for service. I have selected three pieces and their respective chorales, they are:²⁰

- *Nun komm der Heiden Heiland BWV 599*^{21,22}, Now come, Saviour of the heathen, hymn 112 Världens frälsare kom här in the Swedish hymn book. It is one of our oldest hymns and is usually the first hymn sung on the first Sunday in advent. The chorale setting is from 1524 with words by Martin Luther. The melody is based on the old Gregorian chant *Veni redemptor gentium*.
- *Ich ruf zu dir, Herr Jesu Christ BWV 639*^{23,24}, I call to You, Lord Jesus Christ, hymn 564 Till dig jag ropar, Herre Krist in the Swedish hymn book. It is an old German hymn written in 1526/1527 Johann Agricola but set to music 1529.
- *O Lamm Gottes, unschuldig BWV 618*^{25,26}, O Lamb of God, innocent, hymn 143 Guds rena lamm, oskyldig, in the Swedish hymn book. A German hymn based on the *Agnus Dei* and commonly played during Passiontide and for communion. The melody comes from a plainchant *Agnus Dei* from the 1200s but have been reworked by Nikolaus Decius.

20. Johann Sebastian Bach, *Das Orgelbüchlein BWV 599-644*. In R. Clark and J.D. Peterson (Ed. and Trans.) (Saint Louise: Concordia Publishing House, 1984).

21. Bach. *Das Orgelbüchlein BWV 599-644*.

22. Bach. *Das Orgelbüchlein BWV 599-644*.

23. Bach. *Das Orgelbüchlein BWV 599-644*.

24. Bach. *Das Orgelbüchlein BWV 599-644*.

25. Bach. *Das Orgelbüchlein BWV 599-644*.

26. Bach. *Das Orgelbüchlein BWV 599-644*.

2.6.4. Max Reger (1873-1916)

Between 1900-1903 Max Reger published *Op.67. 52 Choral Vorspiele Für Orgel* which is a collection of 52 protestant hymns.²⁷ He is supposed to have said- “I can surely say without any arrogance that since J. S. Bach, no such collection has been published!” It’s clear that he had Johann Sebastian Bach in mind while writing these preludes. Having analysed Bach’s collection, I made up my mind to analyse the collection Op. 67 by Reger. The three pieces that I have chosen are:

- *Herzlich thut mich verlangen No 14*, I do desire dearly, or Hymn 144 O, Huvud, blodigt, sårat in the Swedish Hymn book.²⁸ It was first written as a secular melody but later adapted as a German hymn by its composer Hans Leo Hassler. This hymn is intended for Lent.
- *Nun Danket alle Gott No 27*, Now thank ye all our God or Nu tacka Gud allt folk, hymn 5 in the Swedish hymn book.²⁹ It was written around 1636 by the protestant minister Martin Rinkart. Johann Crüger is known as the author of the melody. It is a hymn of praise and it is suitable for most of the liturgical year.
- *Wie Schön leuchtet der Morgenstern No 49*, how lovely shines the morning star, or hymn 119 in the Swedish hymn book, Var hälsad, sköna morgonstund.³⁰ It is a Christmas hymn or more precisely intended for early service on Christmas Day. Known as the queen of hymns, the text was written by Philipp Nicolai 1597. The melody is supposed to have been constructed through combining other hymns into the one we know.

2.6.5. Philippe Lefebvre (1949-)

Philippe Lefebvre 1949- former organist-titular of Notre Dame Cathedral in Paris and today regarded as one of leading authorities associated to improvisation in the French organ school. He has won several prizes and amongst them the prestigious Chartres Cathedral international competition. He has made several improvisations on YouTube and I have selected one of his Entrée improvisations to transcribe.³¹ The entrée is played in the beginning of the service to a procession, in which the cross is carried and placed in the front of the church.

2.6.6. Olivier Messiaen (1908-1992)

Olivier Messiaen 1908 -1992 is regarded as one of the leading composers of the 20th century and was also organist in Église de la Sainte-Trinité, Paris. He is known as a great organ improviser and there are many recordings of him on Youtube. Today it is unthinkable to have lessons in improvisation and leave him out. Since he was a very structured person, he published a system he called modes of limited transposition, which gives us the harmonical structure to improvise in his tonal language. Therefore, I will not make an analysis but just an improvisation based on his chart with his mode 2.³²

27. Max Reger, *Op.67. 52 Choral Vorspiele Für Orgel*. (Leipzig: Leuterbach & Kuhn, 1903).

28. Reger, *Op.67. 52 Choral Vorspiele Für Orgel*, Heft I.

29. Reger, *Op.67. 52 Choral Vorspiele Für Orgel*, Heft II.

30. Reger, *Op.67. 52 Choral Vorspiele Für Orgel*, Heft III.

31. YouTube. *Philippe Lefebvre's Entree improvisation*, Accessed September 10, 2019, from <https://www.youtube.com/watch?v=hZ-pZp1FQPE>

32. Olivier Messiaen, *The technique of my musical language*. (Paris: Alphonse Leduc, 1944)

3. Pilot Study

For the Pilot study I have selected two pieces by Johann Sebastian Bach to analyse. The pieces are the *Great Fantasia in g minor BWV 542*³³, the *Chaconne BWV 1004 for violin*³⁴, rearranged for harpsichord and transposed to g minor. For the fantasia it will be interesting to look at the harmony and therefore apply *TCFAM*.³⁵ By applying the model, I expect to find repeated patterns that will allow me to see the placement of these patterns in the composition and how they are structured in relation to one another. The other piece is not as interesting as the fantasia in terms of harmonic structure. The other piece is a Chaconne, a composition with a reoccurring bassline throughout the piece, which gives little variation in harmony, since it is repeated. It is more interesting to see how Bach varies the intensity of the composition with figures and movement. I have therefore added a subchapter looking at figures as a generating principle, to use in improvisation. I selected the Chaconne because it shows a broad spectrum of variations in figuration. The two are set in g minor which makes it easier understanding Bach's orientation on the keyboard but also to recognize patterns in movement.

3.1. Chords and functions as generating principle in BWV 542 Fantasia in g minor

We will look at what harmonies Johann Sebastian Bach apply, to see what functions are involved and if we can derive certain patterns that are frequent to Bach, see *example 1*.



Example 1. Chords in BWV 542, measure 1-2.³⁶

From the harmony we can now derive the functions and the chords relations to each another. I have done this in the following chapter. Here we go through the functions that we can find in the fantasia so that we later can derive patterns, see *example 2*.

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33. Johann Sebastian Bach, *Organ Works, Volume 5, Preludes, Toccatas, Fantasias and Fugues I*. (Kassel: Bärenreiter-Verlag, 2015)
 34. Johann Sebastian Bach, *Suites, Partitas, Sonatas transcribed for Harpsichord by Gustav Leonhardt*. (Kassel: Bärenreiter-Verlag, 2017)
 35. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*.
 36. Bach, *Organ Works, Volume 5, Preludes, Toccatas, Fantasias and Fugues I*.



Example 2. Functions in BWV 542, measure 1-2.³⁷

Chords and Functions				
Measure	1	2	3	4
Chord	gm a dim/g	G ^{<9} Cm/g	a dim/g	
Functions	-t D	T S ₄	D	
Measure	5	6	7	8
Chord				A dim/d
Functions				D _d
Measure	9	10	11	12
Chord	D G ^{<9} cm/g G cm D ^{<9} +5 gm A ^{<9} +5			dm E ^b /B
Functions	D T s T-d D -t D _b			-s D _b ^{alt}
Measure	13	14	15	16
Chord	A E dim/a	A	hm	G ^{<9} cm/e ^b
Functions	D _b 3D	D _b	D _p	T s
Measure	17	18	19	20
Chord	F ^{<9} B D ⁷ gm D ⁷ E ^b	D	dim A dim	D
Functions	SS ³ S ³ D-t D D _b ^{alt}	D D D _b		D F ^{<9} SS
Measure	21	22	23	24
Chord	e ^b m/b a ^b m/b B ⁷	e ^b m fm/b G ^{<9} C	bm/g ^{<9} E ^b S C ^{<9}	fm/a ^b D ⁷
Functions	-SS ^{alt} -S ^{alt} 3S	-SS ^{alt} -dd T S	-3d T _b ^{alt} S	-dd D
Measure	25	26	27	28
Chord	G C ^{<9}	fm G	cm D ⁷	gm C/e gm cm D ⁷
Functions	T S	-dd T	-d D	-t S -t -d D
Measure	29	30	31	32
Chord	gm B E ^b	D	gm G	cm C fm F
Functions	-t 3S D _b ^{alt}	D	-t T	-d S -dd SS
Measure	33	34	35	36
Chord	bm B e ^b m E ^b	a ^b m A ^b c ^b m C ^b	f ^b dim e ^{tt} <9 F [#] 7	em/h H em H
Functions	-3d 3S -SS ^{alt} D _b ^{alt}	-S ^{alt} D ^{alt} -dd ^{alt} SS ^{alt}	3D T ^{alt} S ^{alt}	-3s SS ^{alt} -3s SS ^{alt}
Measure	37	38	39	40
Chord	em H ^{<9} A ⁷	D ⁷ G ⁷ H ^{<9} E ⁷ E ⁷ dim	G cm	D ^{<9} gm E ^b cm
Functions	-3s SS ^{alt} D _b	D ⁷ T ⁷ SS ^{alt} 3D T ^{alt}	T -d	D -t D _b ^{alt} -d
Measure	41	42	43	44
Chord	D gm cm A ^b	D ⁷ gm A ⁷ E ^b	D ⁷ gm A D	G ⁷ g ^d m E ^{<9}
Functions	D -t -d D ^{alt}	D -t D _b D _b ^{alt}	D -t D _b D	T → S
Measure	45	46	47	48
Chord	fm/c	fm ⁶ cm G cm G fm cm	D gm D gm D E ^b	A ^{<9} D
Functions	-dd	-dd-d T-d T-dd -d	D -t D-t D D _b ^{alt}	D _b D
Measure	49			
Chord	G			
Functions	T			

Table 3.1. Chords and functions for BWV 542 Fantasia in g minor.

37. Bach, *Organ Works, Volume 5, Preludes, Toccatas, Fantasias and Fugues I*.

By doing this analysis, we can see where chords reoccur and how Johann Sebastian Bach places patterns within the composition. If we look at just the movement, we can see that the end and the beginning are similar in virtuosic figurations. Another thing we can notice is that the measures 9-13 and 25-30 have similar structure in figures and harmony, we can call it pattern 1. It is the same thing with measures 20-24 and 35-39 which also match in figures and harmony, we can call it pattern 2. In the middle between the other sections we find a very curious harmonic modulation. The sections 1 and 2 with their respective parallel places are transposed material and I have coloured pattern 1 blue and pattern 2 red and their respective transposed pattern. The curious modulation is coloured in green. From the harmony we can continue and look at the overarching structure how motives and themes are set up in this composition. Below is the harmonic analysis of *The fantasia in g minor*, with coloured patterns.

3.2. Identified patterns in BWV 542 Fantasia in g minor

Here is the version with patterns. From the functions, I have been able to find patterns and transposed structures. I have coloured pattern 1 and its respective transposed version in blue. Pattern 2 has been coloured red with its respective transposed version. I found a harmonic progression in the middle which I thought was very grasping and decided to colour it green.



Example 3. Identified patterns in *BWV 542*, measure 23-25.³⁸

38. Bach. *Organ Works, Volume 5, Preludes, Toccatas, Fantasias and Fugues I.*

Chords and Functions				
Measure	1	2	3	4
Chord	gm a dim/g	gm ^{<9} cm/g	a dim/g	→
Functions	-t D	-t s ₄	D	→
Measure	5	6	7	8
Chord	→	→	→	→ A dim/d
Functions	→	→	→	→ D _d
Measure	9	10	11	12
Chord	D G ^{<9}	cm/g G cm D ^{<9} +s	gm A ^{<9} +s	dm E ^b /B
Functions	D T	s T -d D	-t D	-s D ^{alt}
Measure	13	14	15	16
Chord	A E dim/a	A → ^{<9}	hm G ^{<9}	cm/eb
Functions	D ₃ 3D	D	Dp T	s
Measure	17	18	19	20
Chord	F ^{<9} B D ⁷ gm D ⁷ E ^b	D → dim A dim	→	D
Functions	SS 3S D -t D D ^{alt}	D D D		D SS
Measure	21	22	23	24
Chord	em/b a ^b m/b B ⁷	em fm/b G ^{<9} C	bm G ^{<9} E ^b C ⁹	fm/a D ⁷
Functions	-SS ^{alt} -s ^{alt} 3S	-SS ^{alt} -d T S	-3d T D ^{alt} S	-dd D
Measure	25	26	27	28
Chord	G C ^{<9}	fm G	cm D ⁷	gm C ⁹ gm cm D ⁷
Functions	T S	-dd T	-d D	-t S -t -d D
Measure	29	30	31	32
Chord	gm B E ^b	D →	gm G	cm C fm F
Functions	-t 3S D ^{alt}	D	-t T	-d S -dd SS
Measure	33	34	35	36
Chord	bm B e ^b m E ^b	a ^b m A ^b c ^b m C ^b	f ^b dim e ^b t ^{<9} F ^{#7}	em/b H em H
Functions	-3d 3S -SS ^{alt} D ^{alt}	-s ^{alt} D ^{alt} -d ^{alt} SS ^{alt}	3D T ^{alt} S ^{alt}	-3s SS ^{alt} -3s SS ^{alt}
Measure	37	38	39	40
Chord	em H ^{<9} A ⁷	D G ⁷ H ^{<9} E ⁷ C ^{dim}	G cm	D ^{<9} gm E ^b cm
Functions	-3s SS ^{alt} D	D T SS ^{alt} 3D T ^{alt}	T -d	D -t D ^{alt} -d
Measure	41	42	43	44
Chord	D gm cm Ab	D ⁷ gm A ⁷ E ^b	D ⁷ gm A D	G ⁷ g ^{dim} C ^{<9}
Functions	D -t -d D ^{alt}	D -t D ^{alt} D ^{alt}	D -t D D	T → -s
Measure	45	46	47	48
Chord	fm/c	fm ⁶ cm G cm G fm cm	D gm D gm D E ^b	A ^{<9} D
Functions	-dd	-dd -d T -d T -dd -d	D -t D -t D D ^{alt}	D D
Measure	49			
Chord	G			
Functions	T			

Table 3.2. Identified patterns for BWV 542 Fantasia in g minor.

3.3. Analysis - Johann Sebastian Bach BWV 542

With the colours it is now easy to follow Johann Sebastian Bach in his music and see where he repeats a pattern. From the harmony we can continue and look at the overarching structure to how motives and themes are set up in this composition. We can see that Bach is highly structured and have chosen transposition as a key element in the structure of the composition. The first pattern, in blue, shows a more polyphonic vocal texture with imitation between the voices. The second pattern, in red, is more based on harmony and shows chromatic and denser chord with dissonances and resolutions. Bach switches between the two patterns. When we expect to get into the last of the second pattern Bach places the harmonic progression, that I have coloured green, creating a surprise, resulting in a culmination within the composition. He then continues and move into the 2:nd pattern and into the figurations that are like the beginning and the piece is ended.

3.4. Figurations as generating principle in the Chaconne BWV 1004

The Chaconne BWV 1004 was composed sometime in the late 1710th or early 1720th.³⁹ At this time Johann Sebastian Bach was employed at the court in Köthen. The Chaconne is the last piece in the partita in d minor for violin. It is a Baroque dance and Johann Sebastian Bach uses a 4-measure theme on which he makes 64 variations. Looking at the variations, we can see that it is most frequent that the variations go together in pairs, the second variation being slightly altered in comparison to the previous. The piece gradually increases in complexity and starts in grand manor but as it develops, we are introduced to shorter note values and soon we are in the middle of rapid, flourishing sections. I have marked the variations that are paired with a bracket. The figurations are also marked out but when a figuration is repeated, I have marked it with the sign — • • —

I also leave comments to the variations as a guide through the music.

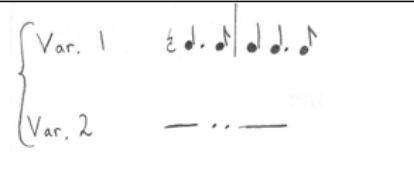

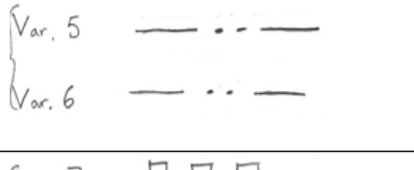
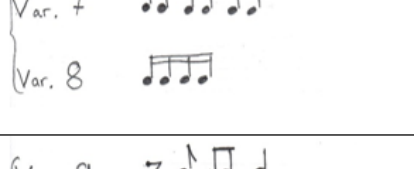
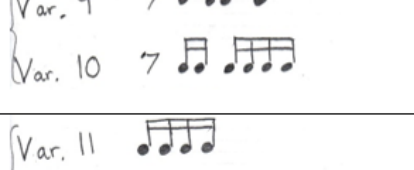
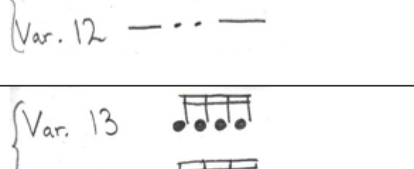

	The main theme with its pairing variation
	In these variations the tenor has the melody
	In the variation the melody comes back in the soprano line. The bassline moves up into the tenor part and for the 6 th variation, the base starts making octave leaps.
	We come back to a straight figuration and in variation 8 a dialogue is forming between the different voices. Many suspensions are incorporated, and we get a Style <u>brisé</u> character.
	Arpeggio-like figurations
	Both hands have intense figurations simultaneously. The once prominent bassline is now hidden within the figurations of the bassline. Although hidden, still present.
	In these variations the hands alternate arpeggio's between hands.

Table 3.3. Figurations in the *Chaconne BWV 1004*.

39. Bach, *Suites, Partitas, Sonatas transcribed for Harpsichord* by Gustav Leonhardt.






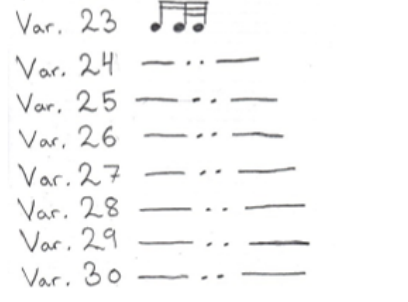




	<p>Here the hands separate and go different ways. The tenor has a figuration and the right-hand support by making a complementary figuration</p>
	<p>We now reach the virtuosic figurations in the right hand while the left hand is not as intense. We can also see a sequence by falling fifths. In variation 18 the left hand is also active with the fast figurations</p>
	<p>We reach a culmination in this piece with the smallest note value. Both hands are active with flourishing cascades of arpeggio and scale runs. The left-hand switches from fast figurations to solid chords. At this point it's a very physical intensity in the playing but Bach changes the atmosphere of the piece by making a sequence of falling tritones. In the 20th variation Bach takes the piece into a more serious state of mind and creates gravity and reflection.</p>
	<p>Bach continues and develops previous series making the hands playing parallel sixths, creating diminished chords over the bassline.</p>
	<p>From these lamenting variations Bach plunges into the quicker note values giving the sentiment a short moment of despair that turns into rage and action.</p>
	<p>We arrive into a long passage of violinlike texture. In variation 24 Bach inserts a theme in the bass. In variation 25 the theme enters in the soprano and in variation 26 its inserted in the tenor. The variations turn more intense and faster values like quintuplets and sextuplets are added. In variation 29 we start to get many dissonances and we come to a highpoint and Bach breaks out of this texture into new figurations</p>
	<p>This figuration creates momentum and grandeur, that leads into the next variation.</p>
	<p>We are now exactly halfway through the piece and now we get Back to the main theme.</p>
	<p>We have the same figuration as in the beginning, but we slowly modulate to G major</p>
	<p>This variation is calmer and very serene and light.</p>

Table 3.4. Figurations in the *Chaconne BWV 1004*.

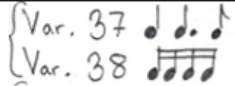

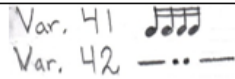


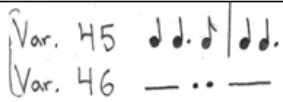
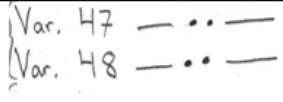
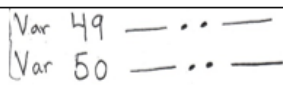

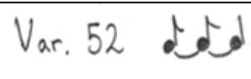
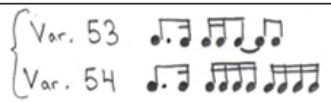


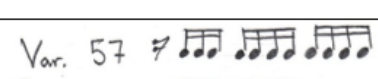
	The main figuration is stated but is soon starting to pick up movement with new figurations.
	In these variations the arpeggio's come back. In variation 39 the right hand has sixteenth notes all the way until the last beat where the left hand is taking over. In variation 40 it is the opposite with the left hand starting and the right hand coming in at the end with the last notes.
	In variation 41 the arpeggio's go from down and up. In variation 42 the arpeggio's go from up to down
	For each variation the music becomes more intense and grander. It is very joyful as it is playful.
	This variation is quite powerful and carries us back to the main theme.
	The main theme and figuration
	The main figuration is here but also many suspensions in the other voices inducing a longing feeling. The low seventh is present in the tonic making the tonality to shift more towards the subdominant, making these passages less tense.
	Bach continue the figuration making a climax in between the two variations 49 and 50, gradually fading into variation 51.
	This variation with its sweet and innocent arpeggios creates such a beauty. Its tearful.
	Style <u>brisé</u>
	Main theme, modulating to g minor. A new figuration that is modified for the few coming variations. We are picking up shorter note values for each variation.
	Movement with suspensions.
	Arpeggios
	Flourishing scales

Table 3.5. Figurations in the *Chaconne BWV 1004*.

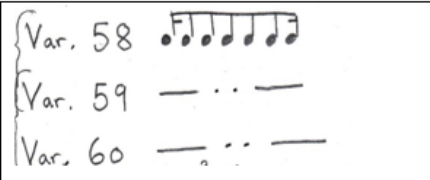



	<p>This part breaks the previous flow, having the right hand playing on the off beats. The variation is not moulded from the previous, like the other variations, so it feels we end up somewhere we are not supposed to be. The left hand plays a descending line.</p>
	<p>The left hand is now playing descending chromaticism.</p>
	<p>A last noble gesture with a swift upbeat enters and launches into the last two variations.</p>
	<p>The last two variations express the main theme a last time before we reach a cadence.</p>

Table 3.6. Figurations in the *Chaconne BWV 1004*.

3.5. Analysis - Johann Sebastian Bach Chaconne BWV 1004

The conclusions that we can draw from these charts are that Johann Sebastian Bach gradually works his way down to the lower note values and that it takes about 4-6 variations until he changes the figure completely. We can find different styles in the two variations 8 and 52 in Style brisé and the long violinlike figurations in variation 23-30. If we look at where Bach swaps into shorter note values, it is often on the last beat working his way forward to the first and an example of this could be var. 15 and 16 or var. 35 and var. 36.

3.6. Setting up the improvisation/ Pilot study spring 2019

As Pilot study I have recorded two improvisations by me, playing the *Gustavsson & Kjersgaard Organ* in Bergersalen, Höskolan för Scen och Musik, Göteborg, see appendix F for specifications.

The first improvisation is in the north German style with Franz Tunder (1614-1667) as preference. I made this improvisation for the autumn 2018 for my improvisation class. Professor Nelson, who is my improvisation teacher, gave me a fragment of a piece by Tunder, lacking the rest of the composition.⁴⁰ I was supposed to continue and end the piece. Looking at the provided material, I had to derive patterns within the material to complete the music.

The second improvisation is also in North German style but with Dieterich Buxtehude (1637-1707) as preference. Professor Nelson gave me Buxtehude's *Ciacona in e minor BuxWV 160*⁴¹ as a model to continue improvising. Even though it is not close to Buxtehude in style, I applied the patterns from the *Chaconne, BWV 1004*⁴² by Bach, that I had analysed. It is from this analysis I have made the design elements that are shown in the recording.

40. Franz Tunder, *Nr. 5 Praeludium (Fragment)*. In Klaus Beckmann (Ed. *Nr 6718 Franz Tunder, Sämtliche Orgelwerke*) (Wiesbaden: Breitkopf & Härtel, 2012).

41. Dieterich Buxtehude, *Keyboard Works, Part 1: Free Organ Works. Präludien, Toccaten und Ciaconas for Organ Pedaliter*. In Michael Belotti (Ed.) (New York: Broude, 2001).

42. Bach, *Suites, Partitas, Sonatas transcribed for Harpsichord by Gustav Leonhardt*.

I want briefly to point out that the idea is not to make an improvisation in Bach's style, even though it is influenced by the patterns. This is an attempt to see how we can approach improvisation using *TCFAM*, to derive patterns that we can use in our own manner, improvising.⁴³

3.6.1. Improvisation Blueprint - Audio 1 - Praeludium

In my course in improvisation, I made an improvisation in the manor of Franz Tunder (*Audio 1*). He was an organist who linked the early German Baroque with the later Baroque style. I was handed a fragment, see *figure 3.1*, that was left by Tunder but not the rest of the piece, since it has been lost. This piece could have been a north German prelude and therefore I decided to use that as a structure for an improvisation.



Figure 3.1. Franz Tunder *Nr.5 Praeludium (Fragment)*.⁴⁴

Being given the introduction, I have the character, figuration and tonality. It starts quite upbeat with flourishing sixteenth notes moving together in thirds and sixths over a pedal point. I decided that I would partly take inspiration from both Dieterich Buxtehude and Johann Sebastian Bach. At this time, it was common to study the art of Rhetoric and it is shown in the structure of many pieces from this time that the placement in structure is like that of a speech:

- Opening section (Stylus phantasticus) with cascading scales, very convincing character
- Fugue- a withdrawn fugue with character of disbelief
- Modulation (free section)
- Imitation more convincing and escalades go directly into the coda with a culmination
- Ending with coda, pedal solo and highpoint in the piece

Since Franz Tunder lived before Bach, he is more modal than tonal. I have tried to replicate this atmosphere in harmonic choices. In this context modal refers to harmony derived from the church modes unlike in the context of Messiaen in which modal harmony is derived from his Modes of limited transposition.

43. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*.

44. Tunder, *Nr. 5 Praeludium (Fragment)*.

3.6.2. Improvisation Blueprint - Audio 2 - Passacaglia

In my course in improvisation, I had to make an improvisation, a Ciacona in the style of Dieterich Buxtehude (*Audio 2*). This north German Baroque organist had a big influence on Bach, and I apply the information I have gathered on Bach *Chaconne BWV 1004*⁴⁵ to make this improvisation. I was given the first page on Buxtehude's *Ciacona in e minor*.⁴⁶ A Passacaglia, same as a Chaconne or Ciacona, applies a repetitive bassline. I apply the figurations that I have studied from Bach's *Chaconne* and apply them together with the harmony and the structure that exists in Buxtehude's *Ciacona*.⁴⁷



Figure 3.2. Dieterich Buxtehude *Ciacona in e minor*.⁴⁸

I decided to apply quite the *Style Brisé* figuration, see *figure 3.2*. Just like Bach to make shorter note values and doing one thing in one hand at a time before doing figurations in both. I repeat what I have played with a slight alteration the second time, just like Bach does in his variations. I intend to go from quarter notes to eighth notes to triplets and then to sixteenth notes before making a new figuration. The first section should be lamenting before taking off and being more upset in character. When I reach a highpoint in music, I change figuration making arpeggios, just like Bach and then I make a modulation to F-Major. Having rested a bit in the calmness of F major and when this section is complete, I try to make an *accelerando* into a coda with a pedal solo, just like Buxtehude, see *figure 3.3*.



Figure 3.3. Dieterich Buxtehude *Passacaglia in e minor* pedal solo.⁴⁹

45. Bach, *Suites, Partitas, Sonatas transcribed for Harpsichord* by Gustav Leonhardt.

46. Buxtehude, *Keyboard Works, Part 1: Free Organ Works. Präludien, Toccaten und Ciaconas for Organ Pedaliter*.

47. Bach, *Suites, Partitas, Sonatas transcribed for Harpsichord* by Gustav Leonhardt.

48. Buxtehude, *Keyboard Works, Part 1: Free Organ Works. Präludien, Toccaten und Ciaconas for Organ Pedaliter*.

At this point I make a sequence following the circle of fifths, just like Bach and Buxtehude do in their respective pieces, at the end of the pedal solo. The improvisation will be set in d minor since it sounds better on the organ, because of its unequal temperament.

3.7. Reflection and Conclusions of Pilot Study

To prepare for the examinations, I collected a large number of different data on harmony and figurations, since I think both skills are required to be able to carry out an improvisation. Although I collected the data and the figurations and applied them to the best of my abilities, it was difficult to improvise music with freer sections, so I put down the effort to study many of the components needed, like structure, harmony and figurations. For the recordings I had the *Gustavsson & Kjersgaard Organ* in Bergersalen, Högskolan för scen och music at my disposal, see appendix F for specifications. It is Baroque influenced and that is why I found it so suitable for my improvisations. It is intended to sound Baroque, in which epoch I am making these improvisations.

My improvisation teacher, Professor Nelson, wrote the following comments about the two improvisations, see appendix E:

Improvisation 1, Praeludium:

Lovely sense of style, inspired by Buxtehude's preludes. Good reuse of the theme in the beginning, however, it takes a few seconds before I understand the theme's placement to the beat, clearer emphasis in the introduction could help this. Good balance between the free and strict parts, sounds 'Buxtehude'. Some cadence in the fugue stands out, feels a bit modern in the context, even some modulations (a quick octave parallel and an unexpected second inversion). But that is how it is, we have the whole music history after Buxtehude and up to our days, in our consciousness. We know twists and turns that Buxtehude could never have dreamt of. Lacks a little more freedom in breathing between the different sections, 'Have more fun!' and trust your musicality. Otherwise, there is a risk that the theoretical perspective will take over and may become a somewhat controlled and predetermined game.

Improvisation 2, Passacaglia in d:

Ciaconne/improvisation

The chord sequence, beginning calmly and meditatively, feels very organic. After a few turns, there is a tendency for the stability to break and there will be some concern in the pulse when there are shorter note values. Nice arpeggios, although the transition is not completely natural in breathing. The modulation from d-m to F-major with an F-sus as the link (in the specific position) breaks off the sense of style for a moment. The different parts vary in both registration and strength, which means that the transitions can be a little difficult to master. For an organist, this is always a sensitive situation, especially if you register yourself. Then further sections, broken chords on weaker registration followed by pedal solo with chords in the hands. The difficulty is, despite the different ideas, still holding the thread. In the coda a freer part with pedals solo, here it would have been good with more freedom to enhance the contrast between the stable and free, especially the last notes and the long g-sharp in the pedal. The risk is otherwise that it otherwise sounds too well directed. In general, you show that you have a convincing sense of style!

I agree with what professor Nelson has to say, and I am happy that she seemed convinced of my improvisations. I learned that when improvising I must be able to do two things simultaneously. One is to be able to think ahead of what harmonic direction the music should take and the second

is to physically translate the current harmony to the next with figurations. This process is very difficult to control, one could say that for most people there is an information overflow, making an attempt bound to fail. I think this is one of two reasons why the ability to improvise has declined but that is not the primary problem. The primary problem is one that has not happened overnight but the shift that has happened over the centuries switching from having improvisation at the core of education to repertoire. Over time many of the old methods and teachings have been lost and the teachers do not have the tools to the same extent to approach improvisation, if it is even understood as a problem.

Isolating the two difficulties of being able to think ahead and translating thought to physical movement, I realised that if I separate the two problems it might be easier, as there is less information to process. I realised that I needed a bigger theory holding together the process to deconstruct, reconstruct, construct the material and I found that *TCFAM*⁴⁹ could be a part of that model. I found that Dr. Feenstra's method⁵⁰ would be suitable for my approach.

Understanding this I decided to collect data on harmony only and then process it by deconstructing it and then reconstruct it to a blueprint. This blueprint would then keep track of the harmonic direction, leaving me one thing less to think of. I decided to just briefly look at figurations as a generating principle but not to make any data collection.

To improvise in free style, it is very important to have structures and it has been very useful to look at both Dieterich Buxtehude's and Johann Sebastian Bach's works to understand structure. It is important to take structure into account, as well as figurations but this would make this thesis far too large, so I have decided to address only harmony. I still find it very helpful to look at the literature for inspiration.

I also decided that to really investigate the method properly, I would look at four different epochs to showcase the capability of the method.

I also reflected on what approach I should have to the persons and the eras that I am investigating. I wish to limit the margin of error to be able to tackle the problems I faced in the pilot study, so that I can isolate the harmony from physical gestures and see if *TCFAM* can work for addressing harmony, thus helping me to minimize the information overflow. To help myself make an ideal approach, I decided to try to imitate the situation that the composers had, for example the choice of instrument, whether I should use the pedals or not, how dense the four part texture should be and what figurations, structures, and material to study. Otherwise I might experience other problems that I have not intended to address.

49. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*.

50. Ruiter-Feenstra, *Bach and the art of improvisation Volume two*, viii.

4. Girolamo Frescobaldi (1583-1643)

I have chosen to study the three elevation toccatas found in the work *Fiori Musicali*, Op. 12, 1635 by Girolamo Frescobaldi. The Opus 12, *Fiori Musicali*, is at large a collection of liturgical organ music. It contains music from three masses but also a few secular pieces. The work was published in 1635 and had a great status among musicians as music of high value. It's known that it reached the composers of Henry Purcell (1659-1695) and Johann Sebastian Bach (1685-1750), who had the entire work copied. The work was also included in the famous work *Gradus ad Parnassum* a book about counterpoint treatise by Johann Fux (1660-1741).⁵¹ Why did I select these three elevation toccatas? They are all written for the same purpose, for communion. They are all set in the same phrygian of E, the Phrygian church mode. What makes these toccatas interesting is that they differ from the contemporary music of its time. Harsh dissonances and a very special way to treat several voices characterize these pieces. Frescobaldi lived in a time of transition between *prima pratica*, where counterpoint treatise was very important and *la seconda pratica*, the idea of looking at music more vertically in harmony, for example the start of using thorough bass for accompaniment. In this chapter I will analyse the three elevation toccatas by Girolamo Frescobaldi by looking at their harmony using *TCFAM* as method.⁵² I extract harmonic patterns and show statistics of the chords applied. I also debate the use of method, difficulties and other aspects in the conclusion.

One of the direct influences that Frescobaldi had was his teacher, Luzzasco Luzzaschi (1545-1607), a noted composer of madrigals and one of the few who could perform on Nicola Vicentino's Archicembalo. This gave Frescobaldi a solid musical ground to stand on. In his twenties he travelled to Rome and later to the Netherlands, before coming back and staying in Italy. Learning about the rapid changing Italian musical environment with modern and old influences, that Frescobaldi probably was exposed to, the *Fiori Musicali*, published 1635 are most likely; a meeting between old and new practise.

Robert Judd states in *Italy, in Keyboard Music Before 1700* following:

farther south at the court of the Este family in Ferrara, a different style with lasting ramifications emerged, evidenced in the work of Luzzasco Luzzaschi and Ercole Pasquini (with the probable influence of masters of the madrigal like Cipriano de Rore). Carlo Gesualdo, prince of Venosa (near Spanish-dominated Naples) and megalomaniac, found the Ferraran musical scene immensely stimulating during his sojourn and marriage there in 1594; in his retinue were composers with Spanish-oriented training who must have both shared their own music and taken with them features of Luzzaschi and Pasquini's "experimental" style, exemplified most clearly in pieces called *stravaganze* (extravagances) or *durezze e ligature* (harshnesses and suspensions). Thus, the 'Neapolitan school' was established. p. 237.⁵³

and

51. Johann Joseph Fux, *Gradus Ad Parnassum*, (Wien: Nabu Press, 1867).

52. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*.

53. Robert Judd, *Italy, in Keyboard Music Before 1700*, (In A. SilbigerEd.). (New York: Routledge, 2004.).

FERRARA Sixty miles southwest of Venice, in the heart of the Po valley, lies Ferrara, a city with a long and distinguished history of music making and the arts, thanks to the patronage of the ruling family, the Este. During the sixteenth century it was the home of several renowned keyboard musicians, who established a tradition related to but distinct from that of Venice. The first organist to leave his mark on Ferrara was the French emigre Jacques Brumel, who served as court organist from 1532 to a few years before his death in 1564. He was succeeded by Luzzasco Luzzaschi, who served until the departure of the Este court in 1598 (Ferrara reverted to the papacy upon the death of Duke Alfonso II, who left no suitable heir). The last generation of Ferrarese organists, Ercole Pasquini and the young Girolamo Frescobaldi, p.268.⁵⁴

In Appendix A – *Girolamo Frescobaldi*, the three toccatas No. 31⁵⁵, 45⁵⁶ and 16⁵⁷ are deconstructed with the help of *TCFAM*⁵⁸ and the statistics on how a chord moves to another chord. The statistics from each piece is compiled into one master chart that shows how Frescobaldi in overall moves from one chord to another.

This gives a good overview concerning how to understand Frescobaldi's harmony movement and I will use it to create my blueprints.

By compiling all the deconstructed data, we get a master chart from where we can reconstruct data. It is from this data that I can go into the reconstruction phase and make blueprints. Making the deconstruction I find that Frescobaldi repeats harmonic sequences and places these sequences/patterns throughout the compositions. I have not found any studies that suggests that Frescobaldi structured his music in such a way, which makes it an interesting finding.

In the master chart we can see that some harmonies are never applied, f minor, F# Major, G# Major, h minor, C# Major, D# Major and d# minor. We can also see some general tendencies in where harmonies most likely go and from them, we can make general rules for free improvisation.

Rules that we now can apply, in the tonality of e Phrygian:

1. We treat the minor sixth scale degree, which is c minor to resolve to g minor
2. We treat the major sixth scale degree, which is c# minor resolving to either g minor, E major7, d minor
3. We treat the diminished fifth scale degree B flat major to resolve to D major
4. We treat the fifth scale degree B major to resolve to a minor, b minor or e minor

54. Judd. *Italy, in Keyboard Music Before 1700*.

55. Frescobaldi. *Fiori musicali, Op. 12. Toccata No. 31 from Messa delli Apostoli*.

56. Frescobaldi. *Fiori musicali, Op. 12. Toccata No. 45 from Messa della Madonna*.

57. Frescobaldi. *Fiori musicali, Op. 12. Toccata No. 16 from Messa della Domenica*.

58. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*.

4.1. Deconstruction

4.1.1. Deconstruction – Toccata No.31 per le levatione

4.1.1.1. Chords and functions – Toccata No.31 per le levatione

Below is an excerpt of the deconstruction phase depicting the data collection on chords and then transforming the chords into functions which is seen in *example 4* and *example 5*.

Fiori Musicali di Diverse Compositioni...
Venetia (1635)
- *Messa delli Apostoli* -

31. Toccata per le levatione

Girolamo Frescobaldi
(1583-1643)
Restitution: P. Gouin
am/c

Example 4. Chords in *Toccata No.31 per le levatione*, measure 1-5.⁵⁹

Fiori Musicali di Diverse Compositioni...
Venetia (1635)
- *Messa delli Apostoli* -

31. Toccata per le levatione

Girolamo Frescobaldi
(1583-1643)
Restitution: P. Gouin

Example 5. Functions in *Toccata No.31 per le levatione*, measure 1-5.⁵⁹

All collected chords and functions for Toccata No. 31 are compiled into the *table 4.1*.

59. Frescobaldi. *Fiori musicali*, Op. 12. *Toccata No. 31* from *Messa delli Apostoli*.

Chords and Functions				
Measure	1	2	3	4
Chord	E		F ^Δ D/f [#]	hm G
Functions	1		2 11	-8 4
Measure	5	6	7	8
Chord	C ⁹ am/c	A/c [#]	D ⁴⁻³	B ^Δ gm/d
Functions	9 -6	6	11	7 -4
Measure	9	10	11	12
Chord	D ⁴⁻³	hm/d D	E am/e	E
Functions	11	-8 11	I -6	1
Measure	13	14	15	16
Chord	F ^Δ dm/f	gm ⁷ A ⁷ /e	dm ⁴⁻³	A ⁷ am
Functions	2 -11	-4 6	-11	6 -6
Measure	17	18	19	20
Chord	hm ⁷ g ^{#m-5}	am A dm	A dm	A C em
Functions	-8 -5	-6 6 -11	6 -11	6 9 -1
Measure	21	22	23	24
Chord	A ⁷ E ⁷ am/c	E am/e em	E	F ^Δ G ⁷ C E
Functions	6 1 -6	1 -6 -1	1	2 4 9 1
Measure	25	26	27	28
Chord	F ^Δ dm/f G ⁷ C/g	G ⁴⁻³ C ^Δ am	D ⁷ E	am G
Functions	2 -11 4 9	4 9 -6	11 1	-6 4
Measure	29	30	31	32
Chord	E ⁷ 5	A/c [#]	dm gm	D A/c [#] dm/a
Functions	1	6	-11 -4	11
Measure	33	34	35	36
Chord	G	c ^{#m-5} dm/f	E F	dm A/c [#] dm/a
Functions	4	-10 -11	1 2	-11 6 -11
Measure	37	38	39	40
Chord	gm ⁷ A/c [#]	D E C	F G em/g	G
Functions	-4 6	11 1 9	2 4 -9	4
Measure	41	42	43	44
Chord	C ^Δ E ⁷ 5 am	H ⁷ em/h hm	G ⁷ C/g G	c ^{#m-5} E ⁷ am/e
Functions	9 1 -6	8 -1 -8	4 9 4	-10 1 -6
Measure	45	46	47	
Chord	E am/e E	F ^Δ dm	am/e E	→
Functions	1 -6 1	2 -11	-6 1	→

Table 4.1. Chords and functions for *Tocatta No.31 per le levatione*.

The chords and functions in table 4.1 are statistically handled in Appendix A.

4.1.1.2. Identified patterns for Toccata No.31 per le levatione

I found two patterns that works as a harmonic framework, they are placed around the composition. The first pattern is coloured blue and sometimes the entire theme is stated but sometimes Frescobaldi changes chords within the structure. The functions and chords are orange coloured below, in *table 4.2*. The blue pattern:

1	2	11	-8	4	9
E	F	D/f#	hm	G	C
		-11	4 or -4	6	-11
		Dm	G or gm	A	dm
			6 or -6		
			A or am		

Table 4.2. Identified blue pattern for *Toccata No.31 per le levatione*.

The second pattern is coloured red and consist of the chords shown in the *table 4.3* below.

6	-11	6	-11
A	dm	A	dm

Table 4.3. Identified patterns for *Toccata No.31 per le levatione*.

What we can clearly see is that Frescobaldi has a preferred choice of harmony which results in two patterns. Examining the data, it becomes clear that some choices are more frequently applied by Frescobaldi. Most of the E major chords, the 1, go to either 2, F major or -6, a minor. It's noticeable that these are two preferred choices that create patterns throughout the composition. We can see that Frescobaldi makes use of these moves between E major to F major and going from E major to a minor, because he has separated these moves into different sections within the music. I have coloured the first pattern blue and second the pattern red. In the blue pattern, Frescobaldi substitutes a few chords and they are highlighted by showing the alternative chords under the patter, that can be seen in table 4.2. The place where Frescobaldi moves back and forth between E major and a minor, 1 to -6 in red, could be looked at as some form of cadence, making the harmony come to a still. In the 1 pattern that moves from E major to F major, 1 to 2, the first chords are always the same. The beginning with E-F-d minor is always the same but then the chords following differ, taking new directions in the music before going the red pattern. I coloured the patterns in the score. In the *example 6* we can see how the blue pattern is placed.

Example 6. Identified blue pattern in *Toccata No.31 per le levatione*, measure 12-15.⁶⁰

If we look at the *table 4.4*. below we can see the placement of the patterns and how they are structured to hold the composition together.

60. Frescobaldi. *Fiori musicali*, Op. 12. *Toccata No. 31 from Messa delli Apostoli*.

Chords and Functions				
Measure	1	2	3	4
Chord	E		F ^Δ D/♯	hm G
Functions	1		2 11	-8 4
Measure	5	6	7	8
Chord	C ⁹ am/c	A/c [♯]	D ⁴⁻³	B ^Δ gm/d
Functions	9 -6	6	11	7 -4
Measure	9	10	11	12
Chord	D ⁴⁻³	hm/d D	E am/e	E
Functions	11	-8 11	I -6	1
Measure	13	14	15	16
Chord	F ^Δ dm/f	gm ⁷ A ⁷ /e	dm ⁴⁻³	A ⁷ am
Functions	2 -11	-4 6	-11	6 -6
Measure	17	18	19	20
Chord	hm ⁷ g ^{♯m-5}	am A dm	A dm	A C em
Functions	-8 -5	-6 6 -11	6 -11	6 9 -1
Measure	21	22	23	24
Chord	A ⁷ E ⁷ am/c	E am/e em	F	F ^Δ G ⁷ C E
Functions	6 1 -6	1 -6 -1		2 4 9 1
Measure	25	26	27	28
Chord	F ^Δ dm/f G ⁷ C/g	G ⁴⁻³ C ^Δ am	D ⁷ E	am G
Functions	2 -11 4 9	4 9 -6	11 1	-6 4
Measure	29	30	31	32
Chord	E ⁺⁵	A/c [♯]	dm gm	D A [♯] dm/a
Functions	1	6	-11 -4	11
Measure	33	34	35	36
Chord	G	c ^{♯m-5} dm/f	E F	dm A/c [♯] dm/a
Functions	4	-10 -11	1 2	-11 6 -11
Measure	37	38	39	40
Chord	gm ⁷ A/c [♯]	D E C	F G cm/g	G
Functions	-4 6	11 1 9	2 4 -9	4
Measure	41	42	43	44
Chord	C ^Δ E ⁺⁵ am	H ⁷ em/h hm	G ⁷ C/g G	c ^{♯m-5} E ⁷ am/e
Functions	9 1 -6	8 -1 -8	4 9 4	-10 1 -6
Measure	45	46	47	
Chord	E am/e	E	F ^Δ dm	am/e E →
Functions	1 -6 1		2 -11	-6 1 →

Table 4.4. Identified patterns for Toccata No.31 per le levation.

4.1.2. Deconstruction – Toccata No.45 per le levatione

4.1.2.1. Chords and functions – Toccata No.45 per le levatione

To continue, I use the same method on the next elevation toccata from *Messa della Madonna No. 45*.⁶¹ Example 7 shows the deconstruction phase with chords.

Fiori Musicali di Diverse Compositioni...
Venetia (1635)

-Messa della Madonna-

45. Toccata per le levatione

Girolamo Frescobaldi
(1583-1643)
Restitution : P. Gouin

Example 7. Chords in *Toccata No.45 per le levatione*, measure 1-4.⁶²

In *example 8*, below, we can see the functions provided from the chords

Fiori Musicali di Diverse Compositioni...
Venetia (1635)

-Messa della Madonna-

45. Toccata per le levatione

Girolamo Frescobaldi
(1583-1643)
Restitution : P. Gouin

Example 8. Functions in *Toccata No.45 per le levatione*, measure 1-4.⁶²

61. Frescobaldi. *Fiori musicali*, Op. 12. Toccata No. 45 from *Messa della Madonna*.

62. Frescobaldi. *Fiori musicali*, Op. 12. Toccata No. 45 from *Messa della Madonna*.

All collected chords and functions for Toccata No. 45 are compiled into *table 4.5* below.

Chords and Functions				
Measure	1	2	3	4
Chord	E	am E ⁷	F D	→ G
Functions	1	-6 1	2 11	4
Measure	5	6	7	8
Chord	A ⁷ dm	G A	H em H hm	→ A
Functions	6 -11	4 6	8-1 8-8	6
Measure	9	10	11	12
Chord	am em	A dm am	E	
Functions	-6 -1	6 -11 -6	1	
Measure	13	14	15	16
Chord		am FA B ^{9m} B G E	A D	A E
Functions		-6 2 6 7-4 7 4 1	6 11	6 1
Measure	17	18	19	20
Chord	F D hm	g ^{#m} s am	F B	G D hm
Functions	2 11 -8	-5 -6	2 7	4 11 -8
Measure	21	22	23	24
Chord	D A	D	→ G em	A D hm
Functions	11 6	11	4 -1	6 11 -8
Measure	25	26	27	28
Chord	EC	E am D	EAD	A → dm
Functions	1 9	1 -6 11	1 6 11	6 -11
Measure	29	30	31	
Chord	A dm em	A dm am	E	
Functions	6 -11 -1	6 -11 -6	1	

Table 4.5. Chords and functions for *Toccata No.45 per le levatione*.

The table 4.5 is statistically processed in Appendix A.

4.1.2.2. Identified patterns for Toccata No.45 per le levatione

From the compiled data I found three patterns in Toccata No.45.

The blue pattern:

-6	1	2	11
am	E	F	D

Table 4.6. Identified blue pattern for *Toccata No.45 per le levatione*

The red pattern:

-1	6	-11	-6	1
em	A	dm	am	E

Table 4.7. Identified green pattern for *Toccata No.45 per le levatione*

The green pattern:

6	2	7	4
am	F	B	G

Table 4.8. Identified green pattern for *Toccata No.45 per le levatione*

In this composition we can also find patterns that Frescobaldi use as different contrasting sections. In this composition I could find three such patterns. I started by looking at the collected data. The 7, B flat major chord moves two times and both times it goes to the 4, G major. I noticed that this was a part of a pattern and that the patterns were identical but

placed apart from each other. I have highlighted this first pattern in green. I found the next pattern when I looked at the ending and in the middle section. This pattern occurs a few more times than the others. It is highlighted in red. I found the last pattern in the beginning of the piece. It has been coloured blue. You can see all patterns below interacting in *example 9*.



Example 9. Identified patterns in *Toccata No.45 per le levatione*, measure 14-17.⁶³

In the *table 4.9* we can now see the placement of all the patterns throughout the *Toccata No.45 per le levatione*

Chords and Functions				
Measure	1	2	3	4
Chord	E	am E ⁷	F D	→ G
Functions	1	-6 1	2 11	4
Measure	5	6	7	8
Chord	A ⁷ dm	G A	H em H hm	→ A
Functions	6 -11	4 6	8-1 8-8	6
Measure	9	10	11	12
Chord	am em	A dm am	E	
Functions	-6 -1	6 -11 -6	1	
Measure	13	14	15	16
Chord	am FA	B ⁹ m B G E	A D	A E
Functions	-6 2 6	7-4 7 4 1	6 11	6 1
Measure	17	18	19	20
Chord	F D hm	g [#] m ⁵ am	F B	G D hm
Functions	2 11 -8	-5 -6	2 7	4 11 -8
Measure	21	22	23	24
Chord	D A	D	→ G em	A D hm
Functions	11 6	11	4 -1	6 11 -8
Measure	25	26	27	28
Chord	E C	E am D	E A D	A → dm
Functions	1 9	1 -6 11	1 6 11	6 -11
Measure	29	30	31	
Chord	A dm em	A dm am	E	
Functions	6 -11 -1	6 -11 -6	1	

Table 4.9. Identified patterns for *Toccata No.45 per le levatione*.

63. Frescobaldi. *Fiori musicali*, Op. 12. *Toccata No. 45 from Messa della Madonna*.

4.1.3. Deconstruction – Toccata No.16 Cromatica per le levatione

4.1.3.1. Chords and functions for Toccata No.16 Cromatica per le levatione

In the *example 10* we can see how the chords are derived from the note material.

Fiori Musicali di Diverse Compositioni...

Venetia (1635)

- *Messa della Domenica* -

16. Toccata Cromatica per le levatione

Girolamo Frescobaldi

(1583-1643)

Tocata Adasi(o) E hm #m f#m hm em G A dm em am Restitution : P. Gouin

The image shows a musical score for the first six measures of Toccata No. 16. Above the notes, handwritten chord symbols are provided: E, hm, #m, f#m, hm, em, G, A, dm, em, and am. The score is in C major, 4/4 time, and features a chromatic descending line in the right hand.

Example 10. Chords in *Toccata No.16 Cromatica per le levatione*, measure 1-6.⁶⁴

In the following *example 11* we can see how the functions can be derived from the chords.

Fiori Musicali di Diverse Compositioni...

Venetia (1635)

- *Messa della Domenica* -

16. Toccata Cromatica per le levatione

Girolamo Frescobaldi

(1583-1643)

Tocata Adasi(o) -1 -8 -10 -3 -8 -1 4 6 -11 Restitution : P. Gouin

The image shows the same musical score as Example 10, but with handwritten Roman numeral functions above the notes: -1, -8, -10, -3, -8, -1, 4, 6, and -11. The function -6 is also written below the final measure.

Example 11. Functions in *Toccata No.16 Cromatica per le levatione*, measure 1-6.⁶⁴

In the *table 4.10* below the first chords and functions of the *Toccata No.16 Cromatica per le levatione* are shown. The *table 4.10* is statistically processed in Appendix A.

64. Frescobaldi. *Fiori musicali*, Op. 12. *Toccata No.16* from *Messa della Domenica*.

Chords and Functions				
Measure	1	2	3	4
Chord	em	hm	c#m f#m	hm em G
Functions	-1	-8	-10 -3	-8 -1 4
Measure	5	6	7	8
Chord	A dm	em am	D G	A D
Functions	6 -11	-1 -6	11 4	6 11
Measure	9	10	11	12
Chord	dm F am em/a	F hm ⁵ dm	C am	E
Functions	-11 2 -6 -1	2 -8 -11	9 -6	1
Measure	13	14	15	16
Chord	A	am	x	x
Functions	6	-6		
Measure	17	18	19	20
Chord	x	em G gm	em ⁷ C am F	hm ⁷ E
Functions		-1 4 -4	-1 9 -6 2	-8 1
Measure	21	22	23	24
Chord	A am	em G gm	am f#m ⁵	G gm
Functions	6 -6	-1 4 -4	-6 -3	4 -4
Measure	25	26	27	28
Chord	D dm hm ⁵	C am	D ⁷ hm gm	am ⁷ f#m ⁵
Functions	11 -11 -8	9 -6	11 -8 -4	-6 -3
Measure	29	30	31	32
Chord	gm	dm		gm
Functions	-4	-11		-4
Measure	33	34	35	36
Chord	D dm	em em	dm hm ⁵	dm
Functions	11 -11			-11
Measure	37	38	39	40
Chord	D dm	em cm	dm hm ⁵	C
Functions	11 -11	-1 -9	-11 -8	9
Measure	41	42	43	44
Chord	F D	A am	hm ⁵ G gm	A dm
Functions	2 11	6 -6	-8 4 -4	6 -11
Measure	45	46	47	48
Chord	A am	gm	dm F am	G em
Functions	6 -6	-4	-11 2 -6	4 -1
Measure	49	50	51	52
Chord	A ⁷ dm	A C	gm	A dm
Functions	6 -11	6 9	-4	6 -11
Measure	53	54	55	56
Chord	G C	F dm hm ⁵	am A	f#m ⁷ hm
Functions	4 9	2 -11 -8	-6 6	-3 -8
Measure	57	58	59	60
Chord	em am C	D G	C cm	F dm F
Functions	-1 6 9	11 4	9 -9	2 -11 2

Table 4.10. Chords and functions for *Toccata No.16 Cromatica per le levatione*

In table 4.11 the rest of the chords and functions of the *Toccata No.16 Cromatica per le levatione* are shown. The table 4.11 below is statistically handled in Appendix A.

Chords and Functions				
Measure	61	62	63	64
Chord	G A	G D	$g^{\#m-5}$	D A
Functions	4 6	4 11	-5	11 6
Measure	65	66	67	68
Chord	D dm		E	A am
Functions	11 -11		1	6 -6
Measure	69	70	71	72
Chord		E hm	A	D dm
Functions		1 -8	6	11 -11
Measure	73	74	75	76
Chord	x		dm	E em
Functions			-11	1 -1
Measure	77	78	79	80
Chord	A am	hm $g^{\#m-5}$ G	D A	G E
Functions	6 -6	-8 -5 4	11 6	4 1
Measure	81	82	83	84
Chord	A am	E		am E
Functions	6 -6	1		-6 1
Measure	85	86	87	88
Chord		am E	A am	E
Functions		-6 1	6 -6	1
Measure	89	90	91	92
Chord		A	D dm	A
Functions		6	11 -11	6
Measure	93	94	95	96
Chord	am em		am	E
Functions	-6 -1		-6	1
Measure	97	98	99	100
Chord	A am	D	A am	E
Functions	6 -6	11	6 -6	1
Measure	101	102	103	104
Chord		am E		am E
Functions		-6 1		-6 1
Measure	105			
Chord	→			
Functions				

Table 4.11. Chords and functions for *Toccata No.16 Cromatica per le levatione*

4.1.3.2. Identified patterns for Toccata No. 16 Cromatica per le levatione

From the compiled data I could find four patterns. The red pattern has been divided into two. They are similar in structure but are portrayed in the compositions as two independent patterns. The green pattern:

10	-3	-8	-1
c#m	f#m	hm	em

Table 4.12. Identified green pattern for *Toccata No.16 Cromatica per le levatione*

The red pattern 1:

1	6	-6	-1	4	-4
E	A	am	em	G	gm

Table 4.13. Identified red pattern 1 for *Toccata No.16 Cromatica per le levatione*

The red pattern 2:

1	6	-6	1
E	A	am	E

Table 4.14. Identified red pattern 2 for *Toccata No. 16 Cromatica per le levatione*

The blue pattern:

-8	-4	-6	-3	-4
hm	gm	am	f#m	gm

Table 4.15. Identified blue pattern for *Toccata No.16 Cromatica per le levatione*

In this composition we can also find patterns that Frescobaldi use as different contrasting sections. In this composition I could find three such patterns and I started by looking at the collected data. The chromatic theme is coloured red and I make no exception if the theme is placed in any other key. The second pattern is a sequence, it's coloured green. The third pattern is a sequence but not the same as the second pattern. The third pattern moves more by falling thirds than by falling fifths. This third pattern, moving by thirds is coloured blue.

In the *example 12*, below, we can see the placement of the red pattern 1.



Example 12. Patterns in *Toccata No.16 Cromatica per le levatione*, measure 20-22.⁶⁵

Table 4.16 and 4.17 show how all patterns are placed in the *Toccata No. 16 Cromatica per le levatione*.

65. Frescobaldi. *Fiori musicali*, Op. 12. *Toccata No. 16* from *Messa della Domenica*.

Chords and Functions				
Measure	1	2	3	4
Chord	em	hm	c ^{#m} f ^{#m}	hm em G
Functions	-1	-8	-10 -3	-8 -1 4
Measure	5	6	7	8
Chord	A dm	em am	D G	A D
Functions	6 -11	-1 -6	11 4	6 11
Measure	9	10	11	12
Chord	dm F am em/a	F hm ⁵ dm	C am	E
Functions	-11 2 -6 -1	2 -8 -11	9 -6	1
Measure	13	14	15	16
Chord	A	am	/	x
Functions	6	-6		
Measure	17	18	19	20
Chord	x	em G gm	em ⁷ C am F	hm ⁷ E
Functions		-1 4 -4	-1 9 -6 2	-8 1
Measure	21	22	23	24
Chord	A am	em G gm	am f ^{#m-5}	G gm
Functions	6 -6	-1 4 -4	-6 -3	4 -4
Measure	25	26	27	28
Chord	D dm hm ⁵	C am	D ⁷ hm gm	am ⁷ f ^{#m-5}
Functions	11 -11 -8	9 -6	11 -8 -4	-6 -3
Measure	29	30	31	32
Chord	gm	dm		gm
Functions	-4	-11		-4
Measure	33	34	35	36
Chord	D dm	em cm	dm hm ⁵	dm
Functions	11 -11			-11
Measure	37	38	39	40
Chord	D dm	em cm	dm hm ⁵	C
Functions	11 -11	-1 -9	-11 -8	9
Measure	41	42	43	44
Chord	F D	A am	hm ⁵ G gm	A dm
Functions	2 11	6 -6	-8 4 -4	6 11
Measure	45	46	47	48
Chord	A am	gm	dm F am	G em
Functions	6 -6	-4	-11 2 -6	4 -1
Measure	49	50	51	52
Chord	A ⁷ dm	A C	gm	A dm
Functions	6 -11	6 9	-4	6 -11
Measure	53	54	55	56
Chord	G C	F dm hm ⁵	am A	f ^{#m-7} hm
Functions	4 9	2 -11 -8	-6 6	-3 -8
Measure	57	58	59	60
Chord	em am C	D G	C cm	F dm F
Functions	-1 6 9	11 4	9 -9	2 -11 2


Table 4.16. Patterns for Toccata No.16 Cromatica per le levatione.

Chords and Functions				
Measure	61	62	63	64
Chord	G A	G D	$g^{\#m5}$	D A
Functions	4 6	4 11	-5	11 6
Measure	65	66	67	68
Chord	D dm		E	A am
Functions	11 -11		1	6 -6
Measure	69	70	71	72
Chord	E	hm	A	D dm
Functions	1	-8	6	11 -11
Measure	73	74	75	76
Chord	x			E em
Functions		dm -11		1 -1
Measure	77	78	79	80
Chord	A am	hm $g^{\#m5}$ G	D A	G E
Functions	6 -6	-8 -5 4	11 6	4 1
Measure	81	82	83	84
Chord	A am	E		am E
Functions	6 -6	1		-6 1
Measure	85	86	87	88
Chord		E	A am	E
Functions		1	6 -6	1
Measure	89	90	91	92
Chord		A	D dm	A
Functions		6	11 -11	6
Measure	93	94	95	96
Chord	am em		am	E
Functions	-6 -1	am -6	-6	1
Measure	97	98	99	100
Chord	A am	D	A am	F
Functions	6 -6	11	6 -6	1
Measure	101	102	103	104
Chord		E	am	E
Functions		-6 1	-6	1
Measure	105			
Chord	→			
Functions				

Table 4.17. Patterns for Toccata No.16 Cromaticha per le levatione.


4.1.4. Analysis - Girolamo Frescobaldi Fiori Musicali, Op.12

With the collected data we can now make an analysis and see how common certain chords are. We can also see the shifts between chords, to see how Frescobaldi transitions from one chord to another. We can also look at where the chords are being placed and how they are placed in relation to each other. The *tables 4.18, 4.19* and *4.20* have been coloured in red, green and blue. These colours are not associated any longer with the patterns in Frescobaldi's music. Their new meaning will be explained in the following text.




Numbers symbolising major chords	1 E	2 F	3 F#	4 G	5 G#	6 A	7 B	8 H	9 C	10 C#	11 D	12 D#
The number of the certain major chords in the piece	16	7	0	10	0	10	1	1	8	0	7	0
Numbers symbolising minor chords	-1 e	-2 f	-3 f#	-4 g	-5 g#	-6 a	-7 b	-8 h	-9 c	-10 c#	-11 d	-12 d#
The number of the certain minor chords in the piece	3	0	0	4	1	12	0	4	1	2	0	0

Table 4.18. Chart of the chords applied in *Tocatta No.31* from *Fiori Musicali*.



Numbers symbolising major chords	1 E	2 F	3 F#	4 G	5 G#	6 A	7 B	8 H	9 C	10 C#	11 D	12 D#
The number of the certain major chords in the piece	7	4	0	5	0	12	2	2	1	0	9	0
Numbers symbolising minor chords	-1 e	-2 f	-3 f#	-4 g	-5 g#	-6 a	-7 b	-8 h	-9 c	-10 c#	-11 d	-12 d#
The number of the certain minor chords in the piece	4	0	0	0	0	6	0	4	0	0	5	0

Table 4.19. Chart of the chords applied in *Tocatta No.45* from *Fiori Musicali*.



Numbers symbolising major chords	1 E	2 F	3 F#	4 G	5 G#	6 A	7 B	8 H	9 C	10 C#	11 D	12 D#
The number of the certain major chords in the piece	14	9	0	13	0	22	0	0	8	0	15	0
Numbers symbolising minor chords	-1 e	-2 f	-3 f#	-4 g	-5 g#	-6 a	-7 b	-8 h	-9 c	-10 c#	-11 d	-12 d#
The number of the certain minor chords in the piece	12	0	4	9	2	27	0	2	2	1	19	0

Table 4.20. Chart of the chords applied in *Toccata No.16 from Fiori Musicali*

Looking at the three charts, that provides the applied chords, we can compare data and see which chords are not applied. These cells are coloured red. The chords that occurred few times and only in two of the pieces have green coloured cells. The last cell is coloured blue, for chords that have only been applied in one of the three pieces.

I have also made two symbols and those are the blue dots, indicating that these are so seldom applied that they very close being blue cells. The other symbol has a blue inner dot and red circle surrounding it, letting us know that these cells are very close to being coloured blue or red.

To make this practical knowledge I need to make some kind of structured plan to carry out the improvisations. From the data, I can make the following rules.

The red chords mean that I can exclude the chords when I make my improvisations later.

The seldom applied chords, cells coloured in blue or green need to have a decided treatise. What do I do when I have these chords? We can look at how Frescobaldi treats these seldom applied chords and when he applies them, how are they being applied in terms of resolution? What we can see in the collected data is that:

The c-minor chord is applied three times altogether. It serves as a transition chord between G major-c minor-G major and the other two times it is a part of a pattern.

The c# minor chord is applied three times as well. Two times in Toccata No. 31 and both times it goes from a G major- c# minor but land in d minor respective E major. One time it is applied in toccata 16 and is then resolved to f# minor.

The B flat major chord is also applied three times. Two times it's a part of a pattern and one time it serves as a transition, alternating between D major- B flat- D major.

The B major chord is applied three times. It once goes from a minor- b minor- a minor. The other two times it's part of a progression that looks like this; A major-B major-e minor-B major-b minor.

Now when we know how these unusual chords behave, we can see that they tend to alternate between another chord back and forth. They move between either a major third away, for example the B flat major chord. a fourth, example c minor going to G major, and even a fifth, example B major going to e minor. Sometimes the chord changes from major to minor, example B major going to b minor. It is also applied in stepwise motion, example c#-minor to d minor.

Easy rules that we can apply based on the master chart is that we treat the different degree of chords following in the tonality of e Phrygian:

1. We treat the minor sixth scale degree, which is c minor to resolve to g minor
2. We treat the major sixth scale degree, which is c# minor resolving to either g minor, E major7, d minor
3. We treat the diminished fifth scale degree B flat major to resolve to D major
4. We treat the fifth scale degree B major to resolve to a minor, b minor or e minor

4.1.5. Analysing the patterns in the Toccata No.31

The first pattern is coloured blue and is stated 5 times

The second pattern is coloured red and is stated 3 times

The pattern is stated two times before the second pattern enters and is stated twice. At the end the first pattern is stated 2 times and the piece finish with the second pattern being stated. See *table 4.21*.

In between the patterns the music moves very much like we saw with seldom applied chords. The tools for these sections are falling fifths, shift between major, minor. Alternating between chords.

Pattern 1	7 measure	Pattern 1	3 measure	Pattern 2	Pattern 2	1 measure	Pattern 1	8 measure	Pattern 1	7 measure	Pattern 2	Pattern 1
--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

Table 4.21. Chart of placement of patterns in the *Toccata No.31* from *Fiori Musicali*.

4.1.6. Analysing the patterns in the in the Toccata No. 45

The first pattern coloured blue is stated 2 times

The second pattern is coloured red and is stated 4 times

The third pattern is coloured green and is stated 2 times

They can be seen in this order, *see table 4.22*.

1 measure	Pattern 1	5 measure	Pattern 2	1 measure	Pattern 3	Pattern 2	Pattern 1	1 measure	Pattern 3	7 measure	Pattern 2	1 measure
--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

Pattern 2

Table 4.22. Chart of placement of patterns in the *Toccata No.45* from *Fiori Musicali*.

4.1.7. Analysing the patterns in the in the Toccata No.16

The first pattern, coloured blue, is stated 4 times

The second pattern is coloured red and is stated 12 times, some of which could be seen as variations on themselves

The third pattern is coloured green and is stated 2 times

They can be seen in this order. *Table 4.23.*

2 measure	Pattern 1	Pattern 1	Pattern 2	2 measure	Pattern 2	3 measure	Pattern 2	1 measure	Pattern 2	1 measure	Pattern 2	1 measure
--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

Pattern 3	3 measure	Pattern 2	3 measure	Pattern 2	Pattern 3	Pattern 2	Pattern 2	6 measure	Pattern 1	Pattern 2	Pattern 1	1 measure
--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

Pattern 2	4 measure	Pattern 2	1 measure	Pattern 2	1 measure	Pattern 2	3 measure	Pattern 2	3 measure	Pattern 2	3 measure	Pattern 2
--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

1 measure	Pattern 2	1 measure	Pattern 2	6 measure
--------------	--------------	--------------	--------------	--------------

Table 4.23. Chart of placement of patterns in the *Toccata No.16* from *Fiori Musicali*.

The patterns are each unique. We can see tendencies of consecutive falling fifths, like the first pattern in *Toccata No.16*. We can see falling thirds, the first pattern in *Toccata No.31*. A combination of the two structures can be seen in the third pattern of *Toccata No.45*.

By comparing patterns, looking what the pieces have in common and they do not have in common. We have collected data that will help us set up blueprints for improvisation.

4.2. Reconstruction - Girolamo Frescobaldi

To create my blueprints, I first had to know the harmony Girolamo Frescobaldi applies, which we now have in the master chart. Observing the harmony, I found underlying harmonic structures that are placed as structures or patterns throughout his compositions. By analysing the placement of these patterns, I could construct a blueprint that follows his structure. See *tables 4.21, 4.22, and 4.23*. Having the structure in place, I then proceeded to choose three patterns to work within the structure that I had chosen. I decided that I would keep the same structure for all three improvisations but switch places of the patterns. I also wanted to experiment with what types of patterns to use. The three patterns selected were one by Frescobaldi from his *Toccata No.45* and the other two were reworked versions on Kyrie Eleison. Both have been adapted to the Phrygian mode and had to be equipped with harmony from the master chart. (See appendix A)

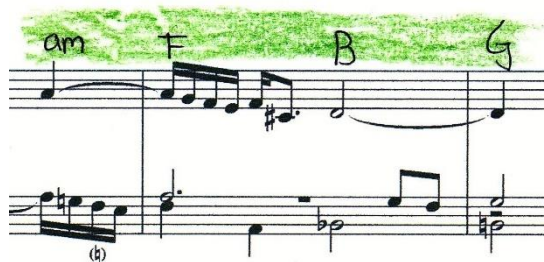
During the implementation of my improvisations I had to set some restrictions in what kind of framework to improvise within. I decided to use the structure from *Toccata No.45* by Frescobaldi. See *table 4.24*.

1 measure	Pattern 1	5 measure	Pattern 2	1 measure	Pattern 3	Pattern 2	Pattern 1	1 measure	Pattern 3	7 measure	Pattern 2	1 measure
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Table 4.24. Chart of placement of patterns in the *Toccata No.45*.

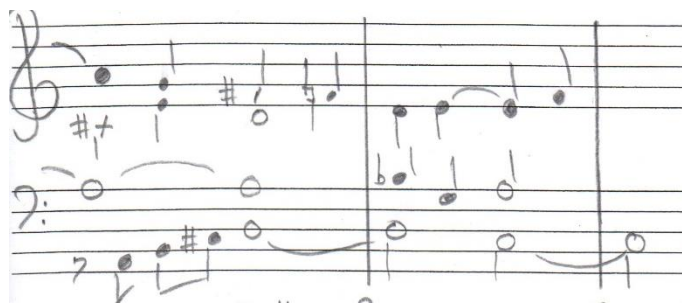
As instrument for the recordings I have chosen the north German Baroque organ at Örgryte Nya Kyrka. See appendix G. Its meantone temperament gives the improvisation a quality that Frescobaldi would have been accustomed to. I have also chosen to make these recordings, using a principal 8 stop. This lovely, sweet, timbre is well suited for these vocal textures.

I will be using three patterns. I will place them in the structure but rotate them for each of the three improvisations, to add variation. The first pattern is from Girolamo Frescobaldi's *Toccata No.45*. See *example 13*.



Example 13. Pattern A is Frescobaldi's *Toccata No.45*.⁶⁶

The second patterns melody is a *Kyrie Eleison No.6* section D from *Handbok för Svenska kyrkan* altered to fit the Phrygian tonality with added chords from the master chart.⁶⁷ See *example 14*.

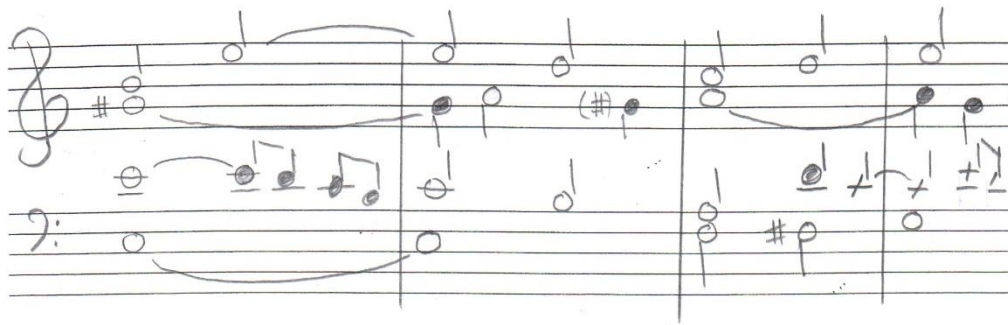


Example 14. Pattern B is *Kyrie Eleison No.6* with harmony from Frescobaldi statistics

The third patterns melody is *Kyrie Eleison No.5* section C from *Handbok för Svenska kyrkan* combined with Frescobaldi's blue pattern from *Toccata No. 45*.⁶⁷ The pattern has been altered to fit the Phrygian mode with added chords from the master chart. See *example 15*.

66. Frescobaldi. *Fiori musicali*, Op. 12. *Toccata No. 45* from *Messa della Madonna*.

67. Verbum AB, *Kyrkohandbok för Svenska Kyrkan, Del 1 Musikvolym*. (Mölnlycke: Elanders, 2016).



Example 15. Pattern C is *Kyrie Eleison No.5* section C combined with Frescobaldi's blue pattern from *toccata No. 45* with statistics from the master chart.

Each of the patterns have been given harmony according to the statistics and for each of the sections, where I am not using the patterns, I have chosen harmony from the statistics. The purpose is not to imitate Frescobaldi but, instead I want to create my own improvisation, using his and my own patterns, choice of harmony, to evolve my own improvising skills.

4.2.1. Improvisation Blueprint – Audio 3 – Frescobaldi 1

In following improvisation pattern 1 is pattern C and pattern 2 is pattern B and pattern 3 is pattern A (*Audio 3*). Below, you can see the blueprint for the improvisation, see *example 16*.

Notenpapier

Example 16. Improvisation blueprint for improvisation Frescobaldi 1

4.2.2. Improvisation Blueprint - Audio 4 – Frescobaldi 2

In following improvisation, I alternated the patterns so that pattern 1 is pattern A and pattern 2 is pattern C and pattern 3 is patterns B (Audio 4). Below, you can see the blueprint on improvisation 2, see *example 17*.

Notenpapier

The image shows a handwritten musical score on a single staff with a 7/8 time signature. The notation includes guitar chord diagrams and improvisation patterns. The score is organized as follows:

- Line 1:** Starts with a chord diagram for C (x02321) and the text "1 takit". This is followed by "pattern 1" with notes b_0 and g_0 . Chords C , am , E , am , $f^\#$, hm , D , and E are written above the staff.
- Line 2:** Chords am , F , dm , and am are written above. "pattern 2" is indicated with a bracket over a sequence of notes.
- Line 3:** Chords am and E are written above. "pattern 3" is indicated with a bracket over a sequence of notes, including $\#f$ and $\#f^\#$.
- Line 4:** "pattern 2" is indicated with a bracket over a sequence of notes, including $\#b$ and b .
- Line 5:** Chords E , F , am , D , A , dm , G , and C are written above. A circled "4" is written to the left of the first note.
- Line 6:** Chords am , E , A , dm , E , and am are written above. "pattern ?" is indicated with a bracket over a sequence of notes.
- Line 7:** A final sequence of notes is written on the staff.

Example 17. Improvisation blueprint for improvisation Frescobaldi 2

4.3. Construction - Result and Discussions Girolamo Frescobaldi

A problem that could be argued with in the use of this method:

Can we use a modern system that describes functions that is made for functional music, since Frescobaldi's music is not functional and is based on the church modes and therefore it falls outside the system? Is this relevant for church modes?

The answer is both yes and no. The functions won't be given their proper value, but the relations will still be the same and that is the important advantage, and therefore *TCFAM* could be a very neutral tool to describe the relations of harmony. This means that we can see when there is a recurring pattern in music. The functions themselves are not interesting and cannot be applied to show Frescobaldi's approach to music but the model can show patterns and probability in the music.

It is important that when we use a tool like this to structure the music, we leave the functions functionality to a mere position-based system. This means that the terms are no longer charged with the meaning it once had. The term just shows the position where the chord is located in relation to the tonic. The advantage we get by using this system is that we can categorize all chords and put them in a hierarchal order from their relation to each other.

Another aspect that we have not addressed is the use of church modes and their functionality. Christopher Stemberge states in *Italian Organ Music to Frescobaldi. in The Cambridge Companion to the Organ* that:

The modes There is today an unfortunate tendency to disregard the importance of the modes. Through overuse of hindsight all modes tend to be perceived as simply either major or minor, albeit with some antiquated characteristics that they were soon to lose. In this one-ended view of progress a notable dimension of the music becomes lost. The Frescobaldi who wrote innovatory toccatas was the same Frescobaldi who composed sets of fantasias and ricercars in the twelve modes codified by Glareanus and Zarlino or who, in his last publication, the *Fiori musicali* (1635), adhered to the tradition of using only the third and fourth modes for elevation toccatas. We can appreciate the full significance and musical effect of innovatory modulations- not only in Neapolitan stravaganze but also in the much earlier *Recerchari* of Marc'Antonio Cavazzoni - or the extended voice-ranges (as in, for example, Giovanni Gabrieli's *Ricercar del VIIo e VIIIo* to no) only if we have some inkling of how the modes functioned. Virtually all polyphonic music, whether canzonas or ricercars, as well as most toccatas, is composed in a particular mode; this is of considerable help to the performer in understanding the character of a particular composition. Vocal music, sacred and secular alike, normally shows a very clear correlation between text and choice of mode. For a summary of the modes and their attributes, see the Appendix, pp. 316-18 below, p.156.⁶⁸

68. Christopher Stemberge, *Italian Organ Music to Frescobaldi*. (In *The Cambridge Companion to the Organ*, ed. Nicholas Thistlethwaite and Geoffrey Webber). (New York: Cambridge University Press, 1998).

Frescobaldi lived in a time where the church modes with their highly individual characters were frequently applied, and it's important to not disregard these modes. Unfortunately, we can't tell for sure how these modes were applied but looking how the harmonies relate we can get a glimpse of what harmonies have been applied. According to the quote, we are told that the music is often reduced to only Major and minor. The statement is a good indication why we should not use common function analysis, since we don't know how these modes were put together in a way to show functionality. The unique possibility that *The Chromatic function analysis*⁶⁹ provides is that it does not only to classify major and minor chords but also shows the statistical probability of which chord go to which. Thus, we can imitate a sense of harmonic direction that Frescobaldi portrays in his music. This approach can be viewed as using a tool that can understand a 3d picture applied on a picture in 2d. In this way we do not lose any information.

Why should we use *TCFAM* as a method instead of common function systems?⁶⁹ The two things that come out quite clear are that *TCFAM* is a well-developed function system but more important is that it is a position-based system. Most systems are either one of these two. A functional system cannot describe this music with proper terminology that would do justice to Frescobaldi, since it be less impartial with the statistics. *TCFAM* is more well developed than common analysis since it's based on common function analysis but also that it is more compatible, using a compilation of more modern solutions, making it more adaptable. For example, when modulations appear, and we move to different keys, it is not required to change the tonality centre using *TCFAM*. This means that we can keep a single key as a reference for all the functions. This is an advantage, having a system being able to show all functions and the categorisation of the chords. Letting *TCFAM* have the role as a position-based system, there can be confusion with the new terminology that goes with it. Therefore, I change the terminology from the different major and minor chords to respective numbers 1-12 and + describing major and – describing minor. It also makes it possible for someone who does not know functions to recreate the process easier. As stated in the text the music is more than minor and major chords but from them, we can see tendencies how all the chords relate to one another. By doing this we can make statistics and replicate the harmonic progressions that reside within the music.

By applying the functions to make statistics, I found something that I call a pattern. By that I mean a harmonic sequence of any sort that is repeated somehow throughout the piece. An analogy would be the jazz pianist improvising at the piano. He uses the same chords as an underlying structure but by using scales, motives and other concepts the improviser hides the harmonic structure, so even though much is going on, the framework being the harmony, is the same.

In the making of these improvisations, I had to set the blueprints and in what framework they should be. I decided to use three patterns, one by Frescobaldi and two altered liturgical melodies but with the added harmony from the master chart. I also decided to use one of the structures Frescobaldi uses to place my themes within it. In this structure I alternate the melodies cyclic, so that the pattern one in improvisation one for example is pattern two in the next.

69. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition.*

I imagined myself playing during communion and while playing I tried to let the music reflect the pain of Jesus Christ just the same way Frescobaldi's toccatas do. I looked for sharp dissonances and how to resolve them. Being able to treat dissonances is something that the method is not addressed to do, so I had to concentrate on how to prepare and resolve musical gestures horizontal. This was a good practice in the ability to make longer gestures, thinking in musical lines. I played everything manualiter which is more in the style of playing that would be common in the times of Frescobaldi.

To my help, I have received the following comments on the improvisations by Professor Nelson. She was only allowed to hear the recordings, so she has not been able to see the blueprints or the process in collecting data. The only information she was given was that I wished to have an overall response to my improvisations. The objectivity has been most valuable to see if the harmony works. As she states in Appendix E:

Improvisation 3, Frescobaldi 1:

F major, elevation Toccata - convincing introduction with long chords. A second inversion in C major stands out in the beginning, comes a little abruptly. But a lot works well, including relations that lead to new harmonious paths. Some sections work so convincingly that I really think it is Frescobaldi. It happens that there are some surprises in the style, however, these make everything alive and fresh, so why not? to be touched, it would have required a greater life in the phrases. The code for this is likely to allow the harmonic directions to control the process, that is, to allow the harmonics to affect the linear movement so that there is a direction both forward and back in the phrases. The tempo should be more Tranquillo, in the style of magic in an elevation toccata.

Improvisation 4, Frescobaldi 2:

F major, elevation toccata. Some second inversion stand out. Ideas from the previous toccata, is more homogeneous in the style of this version, sounds more convincing. The first half sounds more 'Frescobaldi' than the last example. On the other hand, I believe that the initial harmonic progression E-am goes a little too fast to be the start of a, which I perceive, elevation toccata. I also appreciate the basic character better than in recording 3. I think you are part of the harmonic process in a different way, everything feels more alive and credible in this example.

Improvisation 5, Frescobaldi 3:

Begins with an E-major chord, good and long chord. Sounds modern in some measure. A little like Arvo Pärt when the pitch c in the bass remains and the other voices change. The result is a chord that Frescobaldi probably could not imagine, but which I find interesting, new and fresh without disturbing the whole! Some movement in the harmonic pulse that I experience positively. Some ideas come back regularly, leaps of sixths and octaves in the soprano (in the second part).

There are many of aspects that she brings up which are interesting. I agree with the comments and find them most valuable. However, the aim of this thesis is address harmony so that will be my focus when reading her comments. Overall, she seems happy with my choices in harmony.

5. Johann Sebastian Bach (1685 -1750)

Writing about improvisation and being an organ scholar, it is inevitable not to have a chapter regarding Johann Sebastian Bach. He is one of the most recognized musicians of all time and it is sometimes stated that with Bach the Baroque period reached a culmination which also ended with his passing. The apprenticeship tradition was strong in this time and was connected to the family work and being born into a family of musicians, it enabled Bach to study music from a young age. Bach did not move outside Germany but learned many styles from the people he met. At the age of ten J.S. Bach became an orphan and moved in with his older brother, Johann Christoph Bach, in Ohrdruf. The brother who was an organist exposed J.S. Bach to many different styles such as the South and North German, with composers such as Johann Jakob Froberger and Johann Pachelbel under whom J.C. Bach had studied. He was also exposed to the music of French composers, like Jean Baptiste Lully, Louis Marchand and Marin Marais and the Italian composer Girolamo Frescobaldi. This period is usually referred to as the early period, in which the many musical styles that he has learned will form a foundation, on which he will continue to build and come back throughout his life. It is said that J.S. Bach 1685-1750 had the unique ability to improvise music on spot. It is from two quotes that I form a case to approach improvisation.

One of these moments that I am a bit more interested in has been described by Johann Nikolaus Forkel, known to be the founder of historical musicology. Forkel wrote the first biography on Bach and had direct contact with J.S. Bach's sons. It's from one of these sources we learn that Bach when playing a trio, would add an extra voice making it a quartet. It is from this source that I realized that if the blueprint/structure is in place we have information that can create another voice. More importantly I realized that if we reduce the music to two voices, there is enough information theoretically to create a third voice and thus create harmony. I learned this from Dr. Ruiter-Feenstra when she cites Forkel⁷⁰.

In the same book she describes Bach as a teacher and that when teaching improvisation, he would let the student play a bass line and gradually add harmonies to it, known as thorough bass and he would also teach them partimento.⁷⁰

Reflecting on the two sources, as a musician quite accustomed to harmonization, I know that if we have a melody and bass line, we have two components needed to make a third voice. Therefore, even though it seems like an impossible task what Bach is doing it should be looked upon as a craft that can be learned by knowing the theory and the rules of counterpoint. The art of improvisation is now more a sudoku where we fill in the missing numbers and for each time, we get better at it. The thing is to stay within a solid framework where we have limited ourselves and in time learnt to solve more cryptic games. I think what made Bach so good, was his complete mastery of this framework and his ability to go beyond the framework when needed.

Dr Ruiter-Feenstra is an organist who has written two books about Bach and the art of improvisation. In her the later book there is a method depicting the construction, deconstruction and reconstruction cycle of musical material. The way I am working is a similar process in the extent that I am looking at written music by Bach and deconstruct and reconstruct it. What is different with my approach is that I use harmony as the generating principle/ method while Dr. Ruiter-Feenstra, depending on what kind of music ea. free work, hymn etc. use either thorough bass, counterpoint and figurations separately or in combination as an approach.

70. Ruiter-Feenstra, *Bach and the art of improvisation Volume two*.

I intend to make a blueprint by using two voices. The blueprints are varying between strict composition techniques and not so strict. To the blueprint I will improvise a third voice. To my help I will need to have suggestions in what harmony, to apply. I will therefore analyse three works by Bach and three chorale settings, that he most likely was familiar with. The settings are from Bach's time so they represent harmony that Bach would have been accustomed to.

For the improvisation pieces, I will use Johann Sebastian Bach's *Das Orgelbüchlein*⁷¹ as a reference. This is a collection of liturgical organ music as well as a treatise in composition, an organ method and a theological statement. The compositions Bach has made are based on hymn settings and then reworked. Some of them are freer and some are based on a four-part harmony, while others follow a strict structure like canons on the octave or on the fifth. Having two voices, as generated in a canon, they work as contours and together they indicate a third voice. To generate this third voice, one must know the rules in counterpoint well and harmony. Therefore, I will analyse the following three chorales and three of Bach's compositions. Altogether they will form the material needed, from which I collect harmony, and later process into data. By collecting the data, I can now start from this Bach master chart and select the most likely harmony that Bach would have chosen and adapt it onto a couple of contours that I have prepared, i.e. two-part skeletons. The very idea is that I miss a third part in order to create harmony. To be able to improvise the third voice I will add the contour with the collected data, which are the components I need to be able to generate this third voice.

The three works, with their respective chorales, I have chosen to study are:

- *Nun komm der Heiden Heiland*, Now come, Saviour of the heathen, hymn 112 *Världens frälsare kom här* in the Swedish hymn book.^{72,73} It is one of our oldest hymns and is usually the first hymn sung on the first Sunday in Advent. The chorale setting is from 1524 with words by Martin Luther. The melody is based on the old Gregorian chant *Veni redemptor gentium*.
- *Ich ruf zu dir, Herr Jesu Christ*, I call to You, Lord Jesus Christ, hymn 564 *Till dig jag ropar, Herre Krist* in the Swedish hymn book.^{74,75} It is an old German verse written in 1526/1527 by Johann Agricola but set to music 1529.
- *O Lamm Gottes, unschuldig*, O Lamb of God, innocent, hymn 143 *Guds rena lamm, oskyldig*, in the Swedish hymn book.^{76,77} A German hymn based on the *Agnus Dei* and commonly played during Passiontide or during communion. The melody comes from a plainchant *Agnus Dei* from the 1200s but have been reworked by Nikolaus Decius.

This gives a good overview concerning how to understand Bach's harmony. By compiling all the deconstructed data, we get a master chart from which we can reconstruct data. It is from this data that I can go into the reconstruction phase and make blueprints.

71. Bach. *Das Orgelbüchlein* BWV 599-644.

72. Bach. *Das Orgelbüchlein* BWV 599-644.

73. Bach. *Das Orgelbüchlein* BWV 599-644.

74. Bach. *Das Orgelbüchlein* BWV 599-644.

75. Bach. *Das Orgelbüchlein* BWV 599-644.

76. Bach. *Das Orgelbüchlein* BWV 599-644.

77. Bach. *Das Orgelbüchlein* BWV 599-644.

5.1. Deconstruction - Johann Sebastian Bach

5.1.1. Chords and functions for Chorale - Nun komm, der Heiden Heiland

In *example 19* we can see the chorale setting depicting the deconstruction phase, provided with chords

NUN KOMM, DER HEIDEN HEILAND

Weissenfels, 1714

Example 19. Chords in Chorale - *Nun komm, der Heiden Heiland*, measure 1-2.⁷⁸

The following *example 20* shows the functions derived from the chords

NUN KOMM, DER HEIDEN HEILAND

Weissenfels, 1714

Example 20. Functions for Chorale - *Nun komm, der Heiden Heiland*, measure 1-2.⁷⁸

All collected chords and functions for Chorale - *Nun komm, der Heiden Heiland* are compiled into the table below. The *table 5.1.* is statistically processed in Appendix B.

Chords and Functions	
Measure	1
Chord	am dm em am hm ⁻⁵ dm E am
Functions	-1 -6 -8 -1 -3 -6 8 -1
Measure	2
Chord	F dm C dm hm ⁻⁵ am dm C em C
Functions	9 -6 4 -6 -3 -1 -6 4 -8 4
Measure	3
Chord	am G C C F F hm ⁻⁵ dm E am
Functions	-1 11 4 9 -3 -6 8 -1
Measure	4
Chord	F am em am hm ⁻⁵ dm E am
Functions	9 -1 -8 -1 -3 -6 8 -1

Table 5.1. Chords and Functions for Chorale - *Nun komm, der Heiden Heiland*.

78. Bach. *Das Orgelbüchlein BWV 599-644*.

5.1.2. Chords and functions for BWV 599 - Nun komm, der Heiden Heiland

In *example 21*, below, we can see setting depicting the deconstruction phase, provided with chords

Musical score for 'NUN KOMM, DER HEIDEN HEILAND' showing chords in measures 1-3. Handwritten annotations above the staff indicate chords: am, H⁹ em, H⁹ E, BWV 599 am, E, am.

Example 21. Chords in BWV 599, measure 1-3.⁷⁹

The following *example 22* shows the functions derived from the chords

Musical score for 'NUN KOMM, DER HEIDEN HEILAND' showing functions in measures 1-3. Handwritten annotations above the staff indicate functions: -1, 3 -8, 3 8, BWV 599 -1 8, -1.

Example 22. Functions in BWV 599, measure 1-3.⁷⁹

All collected chords and functions for BWV 599 - *Nun komm, der Heiden Heiland* are compiled into *table 5.2*. below. The *table 5.2* is statistically processed in Appendix B.

Chords and Functions	
Measure	1
Chord	am H ⁹ em
Functions	-1 3 -8
Measure	2
Chord	H ⁹ E am E
Functions	3 8 -1 8
Measure	3
Chord	am
Functions	-1
Measure	4
Chord	dm G ⁷ C F dm G C
Functions	-6 11 4 9 -6 11 4
Measure	5
Chord	F dm hm G
Functions	9 -6 -3 11
Measure	6
Chord	C E F G E
Functions	4 8 9 11 8
Measure	7
Chord	am F am dm
Functions	-1 9 1 -6
Measure	8
Chord	H em D E am
Functions	3 -8 6 8 -1
Measure	9
Chord	hm em A dm
Functions	-3 -8 1 -6
Measure	10
Chord	A ⁷
Functions	1

Table 5.2. Chords and Functions for BWV 599 - *Nun komm, der Heiden Heiland*.

79. Bach. *Das Orgelbüchlein* BWV 599-644.

5.1.3. Chords and functions for Chorale - Ich ruf' zu dir, Herr Jesu Christ

In *example 23*, below, we can see the chorale setting depicting the deconstruction phase in which it has been provided with chords

ICH RUF ZU DIR, HERR JESU CHRIST

Example 23. Chords in Chorale - *Ich ruf' zu dir, Herr Jesu Christ*, measure 1-2.⁸⁰

The following *example 24* shows the functions derived from the chords

ICH RUF ZU DIR, HERR JESU CHRIST

Example 24. Functions in Chorale - *Ich ruf' zu dir, Herr Jesu Christ*, measure 1-2.⁸⁰

In *table 5.3* all collected chords and functions on the Chorale - *Ich ruf' zu dir, Herr Jesu Christ* are compiled. The *table 5.3* is statistically processed in Appendix B.

Chords and Functions	
Measure	1
Chord	fm bm Ab Db fm bm C
Functions	-1 -6 4 9 -1 -6 8
Measure	2
Chord	Ab Eb Ab fm bm F
Functions	4 11 4 -1 -6 1
Measure	3
Chord	Ab Db Eb Ab Db Ab Eb Ab
Functions	4 9 11 4 9 4 11 4
Measure	4
Chord	Ab C fm C fm gm C fm
Functions	4 8 -1 8 -1 -3 8 -1
Measure	5
Chord	B Eb F B Eb
Functions	6 11 1 6 11
Measure	6
Chord	Eb Ab Db bm Eb Ab
Functions	11 4 9 -6 11 4
Measure	7
Chord	bm F bm Ab Db fm C fm
Functions	-6 1 -6 4 9 -1 8 -1

Table 5.3. Chords and functions for Chorale - *Ich ruf' zu dir, Herr Jesu Christ*.

80. Bach. *Das Orgelbüchlein BWV 599-644*.

5.1.4. Chords and functions for BWV 639 Ich ruf' zu dir, Herr Jesu Christ

In *example 25* we can see setting depicting the deconstruction phase, provided with chords.

Handwritten musical score for BWV 639, measures 1-4. The title "ICH RUF ZU DIR, HERR JESU CHRIST" is written above the staff. Chord symbols are written above the notes: fm, gm, C, fm, Db, Cm, Ab, Db. The score is for two staves (treble and bass clef) and includes the text "à 2 Clav. & Ped. BWV 639".

Example 25. Chords in BWV 639, measure 1-4.⁸¹

The following *example 26* shows the functions derived from the chords.

Handwritten musical score for BWV 639, measures 1-4. The title "ICH RUF ZU DIR, HERR JESU CHRIST" is written above the staff. Function numbers are written above the notes: -1, -3, 8, -1, 9, 8, 1, 9, 8, 1, 4, 8. The score is for two staves (treble and bass clef) and includes the text "à 2 Clav. & Ped. BWV 639".

Example 26. Functions in BWV 639, measure 1-4.⁸¹

In *table 5.4* all collected chords and functions for BWV 639 *Ich ruf' zu dir, Herr Jesu Christ* are compiled. The *table 5.4* is statistically processed in Appendix B.

Chords and Functions	
Measure	1 2
Chord	fm gm C fm
Functions	-1 -3 8 -1
Measure	3 4
Chord	Db C fm Db cm Ab Db C ⁹ F ⁹
Functions	9 8 -1 9 -8 4 9 8 1
Measure	5 6
Chord	bm fm C fm bm C fm Eb Ab
Functions	-6 -1 8 -1 -6 8 -1 11 4
Measure	7 8
Chord	Db bm Eb Ab Eb fm Eb7 Ab bm Eb Ab C
Functions	9 -6 11 4 11 -1 11 4 -6 11 4 8
Measure	9 10
Chord	F bm C ⁷ fm Db bm ⁶ gm C Db
Functions	1 -6 8 -1 9 -6 -3 8 9
Measure	11 12
Chord	B ⁷ Eb F G ⁷ cm Eb Ab Eb
Functions	6 11 1 3 -8 11 4 11
Measure	13 14
Chord	fm B Eb Ab cm ⁷ F ⁷ bm
Functions	-1 6 11 4 -8 1 -6
Measure	15 16
Chord	C fm bm Eb Ab Db bm C ⁹ C ⁹ F
Functions	8 -1 -6 11 4 9 -6 3 8 1

Table 5.4. Chords and functions for BWV 639 *Ich ruf' zu dir, Herr Jesu Christ*.

81. Bach. *Das Orgelbüchlein* BWV 599-644.

5.1.5. Chords and functions for Chorale O Lamm Gottes, unschuldig

In *example 27* we can see the chorale setting depicting the deconstruction phase, provided with chords

O LAMM GOTTES, UNSCHULDIG

Example 27. Chords in Chorale *O Lamm Gottes, unschuldig*, measure 1-2.⁸²

The following *example 28* shows the functions derived from the chords

O LAMM GOTTES, UNSCHULDIG

Example 28. Functions in Chorale *O Lamm Gottes, unschuldig*, measure 1-2.⁸²

In *table 5.5*, all collected chords and functions on the Chorale *O Lamm Gottes, unschuldig* are compiled. The *table 5.5* is statistically processed in Appendix B.

Chords and Functions	
Measure	1
Chord	F C C G C
Functions	1 8 3 8
Measure	2
Chord	C G ⁷ C ⁷ F dm B C F
Functions	8 3 8 1 -10 6 8 1
Measure	3
Chord	F C F ⁷ dm C G C
Functions	1 8 1 -10 3 8
Measure	4
Chord	C F B E ^b cm gm dm
Functions	8 1 6 11 -8 -3 -10
Measure	5
Chord	B F C ⁷ F C B am F gm C F
Functions	6 1 8 1 8 6 -5 1 -3 8 1

Table 5.5. Chords and functions for Chorale *O Lamm Gottes, unschuldig* .

82. Bach. *Das Orgelbüchlein BWV 599-644*.

5.1.6. Chords and functions for BWV 618 O Lamm Gottes, unschuldig

In *example 29* we can see setting depicting the deconstruction phase, provided with chords

The image shows the first three measures of the musical score for 'O Lamm Gottes, unschuldig' (Canon alla quinta BWV 618). The tempo is marked 'Adagio'. Handwritten chord symbols are placed above the notes in the right hand: F in measure 1, am F B gm in measure 2, and am C in measure 3.

Example 29. Chords in *BWV 618*, measure 1-3.⁸³

The following *example 30* shows the functions derived from the chords.

The image shows the first three measures of the musical score for 'O Lamm Gottes, unschuldig' (Canon alla quinta BWV 618). Handwritten function numbers are placed above the notes in the right hand: 1 in measure 1, -5 1 6 -3 in measure 2, and -5 8 in measure 3.

Example 30. Functions in *BWV 618*, measure 1-3.⁸³

In *table 5.5* all collected chords and functions for *BWV 618 O Lamm Gottes, unschuldig* are compiled. The *table 5.5* is statistically processed in Appendix B.

Chords and Functions				
Measure	1	2	3	4
Chord		F	am F B gm	am C
Functions		1	-5 1 6 -3	-5 8
Measure	5	6	7	8
Chord	F C F B	C G ⁷ C G ⁷	-	F
Functions	1 8 1 6	8 3 8 3		1
Measure	9	10	11	12
Chord		am C A	dm E ⁹ am F	C D ⁷
Functions		-5 8 5	-10 12 -5 1	8 10
Measure	13	14	15	16
Chord	cm gm cm C ⁷	F D em A D	A dm	F C
Functions	-8 -3 -8 8	1 10 -12 5 10	5 -10	1 8
Measure	17	18	19	20
Chord	G C G D G	D G	A dm am C am	C ⁷ A ⁷ dm
Functions	3 8 3 10 3	10 3	5 -10 -5 8 -5	8 5 -10
Measure	21	22		
Chord		F		
Functions		1		

Table 5.5. Chords and functions for *BWV 618 O Lamm Gottes, unschuldig*.

83. Bach. *Das Orgelbüchlein BWV 599-644*.

5.2. Reconstruction – Johann Sebastian Bach

By collecting the data, I can now start from this Johann Sebastian Bach master chart, see appendix B, and select the most likely harmony that Bach would have chosen. I adapt it to a couple of contours that I have prepared, i.e. two-part skeletons. The very idea of the implementation is then that I miss a voice. To be able to improvise this voice I will add the contour with the collected data which are the components I need to generate this third voice.

J.S Bach often carried a notebook with him to make compositions on hymns for the church year. This collection, *Orgelbüchlein*, will state a model for the preparation of my improvisations. Like Bach, I retrieve my material from the hymn book, but I use the Swedish hymn book. I have chosen three hymns that have different liturgical character and are scattered throughout the church year. I have then chosen the following three hymns.

113 *Det är en ros utsprungen*, Es ist ein Ros entsprungen, Lo, how a rose e'er blooming.⁸⁴

144 *O Huvud blodigt sårat*, O Haupt voll Blut und Wunden, O Sacred Head, Now Wounded.⁸⁴

491 *Min Gud och fader käre*, Ich dank' dir, lieber Herre, I thank you, dear Lord.⁸⁴

The contours that make up these sketches for the improvisations, have been modified through a variety of composition techniques. Bach often uses canon, and I strive for that in two of mine. The contour of the third improvisation is constructed with more lenient composition technique.

In the first improvisation I use hymn 113 *Det är en ros utsprungen*, Lo, how a rose e'er blooming. This is an Advent hymn and I had Bach's *Nun Komm der Heiden Heiland* as a model. Bach uses a rhetorical figure that symbolizes the hope and expectation of Christ's arrival on earth, see *example 31*. This figure is incorporated in my own improvisation. The contour is designed as a canon to occur on the octave and in total, the sketch becomes 24 measures if you ignore the repeat. The visual measures symbolize the birthday of Jesus Christ.



Example 31. Figuration *Nun Komm der Heiden Heiland* from *BWV 599*.⁸⁵

The second improvisation is based on hymn 144 *O Huvud blodigt sårat*, O Sacred Head, Now Wounded and is a Passion hymn that liturgically portrays the suffering Jesus who takes on the world's sin to die on the cross. I have selected Bach's *O Lamm Gottes, unschuldig* as a model. Bach uses a rhetorical figure, the so-called sigh motif, which symbolizes tears and sobs, see *example 32*. I let the contour be freer and the bass line is taken from the four-part setting found in the Swedish Chorale Book. I have occasionally exchanged some pitches to create variety, which allow for a different harmonic direction.

84. Verbum AB, *Den Svenska Psalmboken*. (Nederländerna: Jongbloeds, 2005).

85. Bach. *Das Orgelbüchlein BWV 599-644*.



Example 32. Figuration *O Lamm Gottes, unschuldig* from *BWV 618*.⁸⁶

The third improvisation is done on hymn 491 *Min Gud och fader käre*, My God and Father dear, which is a morning hymn and is not tied to the liturgical year. The hymn has a melancholy character and I have therefore selected Bach's *Ich ruf zu dir, Herr Jesu Christ* as a model. In Bach's composition it is possible to use the left hand to imitate an accompanying string instrument and he fill in the harmonics in an arpeggiated way, *see example 33*. I will strive for this accompaniment model, if possible. In addition to this, I felt it would be a little fun to make a cannon on the quint but unfortunately the melody is not designed for this. I felt it was more natural on the fourth, although Bach has not done any such construction in the *Orgelbüchlein*.⁸⁶ By extending and shortening the note values on the tune, I was able to construct a cannon that occurs on the fourth instead. This became a little more unnatural than obvious, but finally managed to make it work.



Example 33. Figuration *Ich ruf zu dir, Herr Jesu Christ* from *BWV 639*.⁸⁶

Each of the contours have been given harmony according to the statistics. The purpose is not to imitate a Bach type of playing, instead I want to create my own improvisation, using his, choices of harmony, to evolve my own improvisation skills. Below *example 34*, *example 35* and *example 36* show the three blueprints.

86. Bach. *Das Orgelbüchlein BWV 599-644*.

5.2.1. Improvisation Blueprint – Audio 6 - Hymn 113 Det är en ros utsprungnen

In improvisation, I use the blueprint below, see *example 34* (Audio 6).

Det är en ros utsprungnen 113
Canon at the octave Musik-1400 talet/Köln1599

The image shows a musical score for a canon at the octave in 4/4 time, key of B-flat major. The score is divided into three systems, each with a treble and bass staff. Handwritten chords are placed below the notes to serve as an improvisation blueprint. The first system (measures 1-12) includes chords: B, F B, cm Eb, gm B7, Eb fm, Eb fm, cm dm gm, B, cm7 B, cm B. The second system (measures 13-24) includes chords: gm B7, Eb fm, Eb B7, Eb, Eb, fm/Eb B7, Cm F, B Eb, cm B, B, cm7 B, cm B. The third system (measures 25-28) includes chords: Eb B7, Eb fm B, Eb B7, Eb B7, Eb.

Example 34. Improvisation blueprint for *Hymn 113 Det är en ros utsprungnen*.

5.2.3. Improvisation Blueprint – Audio 8 - Hymn 491 Min Gud och Fader käre

In the improvisation, I use the following blueprint, see example 36 (*Audio 8*).

Min Gud och Fader käre 491

Canon at the fourth

Musik Strassburg 1539

12

Example 36. Improvisation blueprint for Hymn 491 *Min Gud och Fader käre*.

5.3. Construction - Result and Discussions Johann Sebastian Bach

I learned that the preparing contours with harmonic suggestions could be an easy step by step method for a book in which the material gradually reveals less information so as the reader progress, becomes more prolific.

I decided to use the Baroque organ in Örgryte for all the recordings, see appendix G.

The first improvisation, 113 is a Christmas hymn, so I wanted soft flutes to create an atmosphere of stillness and awe in awaiting the arrival of Jesus. I choose the figuration from Bach that represents faith descending into the world. I also wanted the pedal to be present so that it was possible to hear the canon at the octave symbolizing God and the path which is already laid out before him. The stops I decided to use are

Ryggpositif gedackt 8 and blockflute 4

Pedal Principal 16 and octave 8

Professor Nelson's comments to my improvisation on hymn 113, see Appendix E:

Improvisation 6, Bach hymn 113:

Cantus firmus in the soprano part and figured incremental movements in the lower part as well as the pedal part which, through its existence and long notes, set the harmonic foundation. Beautiful and harmonious right in the style, as a performance though a bit fumbling.

The second improvisation, 144 is an Easter hymn depicting the suffering of Jesus Christ. To portrait this I wanted to use a solostop to show that Jesus was utterly alone, left to his fate. The stringy sound of the Quintaden 8 gave me the melancholic sound I was after. I also wished to have to give the solo voice more colour in terms of the overtone spectra but not to take over, so I added the soft, almost unnoticeable Blockflute 4, for the texture to shimmer.

To match the other voices to this solo registration, I had to make an adjustment in balance going against the conventions of the Baroque period not doubling 8-foot stops. I chose Rohrflute 8, Hohlflute 8 and Spitzflute 4 registration so it could match the solovoice but not to take over. I also think that the soft flute combination blended well so it felt like another string instrument that added on to the melancholic texture. This texture was quite soft so for the pedal I chose Subbas 16 and Octave 8 which give a solid foundation but not too present. The stops I decided to use are

Oberpositiv Rohrflute 8, Hohlflute 8 and Spitzflute 4

Ryggpositiv Quintaden 8, Blockflute 4

Pedal Subbas 16 Octave 8

Professor Nelson's comments to my improvisation on hymn 144, see Appendix E:

Improvisation 7, Bach hymn 144:

O Haupt voll Blut und Wunden. Introduction with imitation voices in the hands and with pedal part in the form of continuo bass. The period before the melody is introduced is not entirely organic in pulse. Then cantus firmus in the soprano and in

long note values. The phrase with the melody b-c-c-b-b-a and the harmony E - am - D F# - G - E/G# - am is really in the style of Bach's harmony. In the end, the harmonic pulse changes due to the cantus firmus playing too fast. Overall a very beautiful movement!

The third improvisation, 491 is a hymn that can be applied throughout the liturgical church year. Its melody is very altered so that it could fit with the canon at the fourth in the pedal part. I wanted to express a more present registration in accompaniment on the Hauptwerk with a Principal 8 letting the solo soprano voice be played on the Ryggpositiv with Bahrpfeife 8. For the pedal I chose a Principal 16 and Octave 8. This gave a clear melody, firm accompaniment and a present pedal, in which it was possible to distinguish the melody. The stops I decided to use are

Werck Principal 8

Ryggpositiv Bahrpfeife 8

Pedal Principal 16 and Octave 8

Professor Nelson's comments to my improvisation on hymn 491, see Appendix E:

Improvisation 8, Bach hymn 491:

Cantus firmus in the pedal with a figured middle voice and an ornamented solo voice. A little fumbling, not quite organic in the performance. However, the task is very advanced. It is difficult to find harmonic solutions with the melody in the pedal that sound natural in the style, therefore there are some solutions that stand out.

In overall Professor Nelson seems to accept the harmonies I have selected. Sometimes she hears something strange and points it out but usually it has more to do with me fumbling a little or pressing down the wrong key.

6. Max Reger (1873-1916)

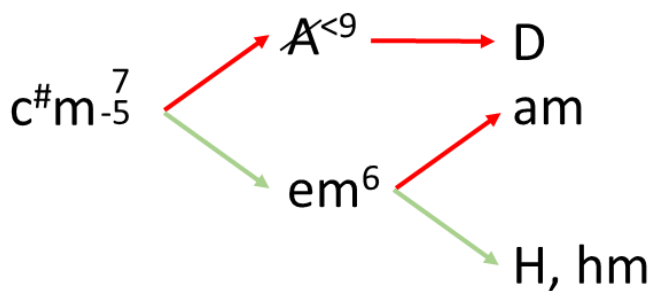
Max Reger was a composer, conductor, pianist, teacher and organist. He holds a special place amongst organists, whose organ repertoire is self-evident for the performer. Between 1900-1903 Reger published Op. 67 which is a collection of 52 protestant hymns.⁸⁷ He is supposed to have said- *I can surely say without any arrogance that since J. S. Bach, no such collection has been published!* It's clear that he had Bach in mind while writing these preludes. Having analysed Bach's collection, I made up my mind for which 19th century German work to analyse.

I will analyse three pieces from the collection Op. 67. Each has a unique place in the liturgical year. The first chorale is *Herzlich thut mich verlangen No. 14*, I do desire dearly, or Hymn 144 O, Huvud, blodigt, sårat in the Swedish Hymn book.⁸⁸ It was first written as a secular melody but then later adapted as a German hymn by its composer Hans Leo Hassler. This hymn is intended for Lent.

The second piece is *Nun Danket alle Gott No. 27*, Now thank ye all our God or Nu tacka Gud allt folk, hymn 5 in the Swedish hymn book.⁸⁹ It was written in 1636 by protestant minister Martin Rinkart. Johann Crüger is known as the author of the melody. It is a hymn of praise and is suitable for most of the liturgical year.

The third piece is *Wie Schön leuchtet der Morgenstern No. 49*, How Lovely Shines the Morning Star, or hymn 119 in the Swedish hymn book, Var hälsad, sköna morgonstund.⁹⁰ It is a Christmas hymn or more precisely intended for early service on Christmas Day. Known as the queen of hymns, the text was written by Philipp Nicolai 1597. The melody is supposed to have been constructed through combining other hymns into the one we know today.

Analysing these chorales, I will study what harmony is applied and make charts over what the most common statistics suggest before attempting to make improvisations based on the gathered data. A problem that occurs in the collection of data is that some of the harmonies can be heavily altered so that they behave like other chords. In terminology we call it *dual representation*⁹¹. An example is shown in *example 37*. It depicts a c#minor 7-5 chord being reinterpreted through dual representation to either A⁹ or em⁶. Why this is important will be explained in the following text



Example 37. Reinter-pretation of a c# minor seventh with diminished fifth

87. Max Reger, *Op.67. 52 Choral Vorspiele Für Orgel*.

88. Reger, *Op.67. 52 Choral Vorspiele Für Orgel*, Heft I.

89. Reger, *Op.67. 52 Choral Vorspiele Für Orgel*, Heft II.

90. Reger, *Op.67. 52 Choral Vorspiele Für Orgel*, Heft III.

91. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*. 39-40.

In *example 38* we are presented with a c-sharp minor chord with a lowered fifth and seventh. This chord can work on its own but can also be respelled to behave either like a Dominant or a Subdominant. This is problematic when dealing with statistics. To solve this, we must come up with a process that deals with how we categorize these different functions. To find the solution, we must look at the next chord to determine the function and this is presented in *example 37*.



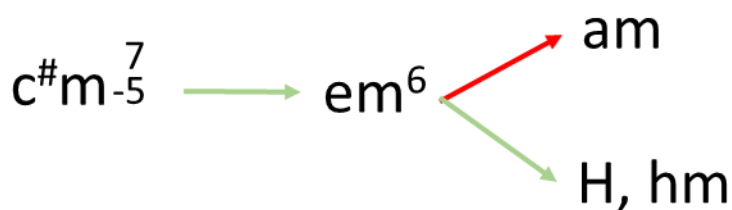
Example 38. No reinterpretation of a c# minor seventh with diminished fifth

If the chord is seen as a Dominant function and classified as such. The A major chord, needs to resolve to D. Look at *example 39*.



Example 39. c# minor seventh with diminished fifth interpreted as a Dominant

If the chord is seen as a Subdominant function, the e-minor sixth chord will resolve to either a minor, B major or b minor. Look at the first green arrow that then divides into one red and another green. See *example 40*.



Example 40. c# minor seventh with diminished fifth interpreted as a Subdominant

If it matches neither the Dominant nor Subdominant and instead resolve to any other chords than mentioned, it should be viewed as a common c# minor-5 low 7th and be categorized as such. This is shown in the figure 6.5. Look at the blue arrow indicating the resolution from a c# minor chord to any of remaining other chords, presented in *example 41*.



Example 41. No reinterpretation of a c# minor seventh with diminished fifth

With this problem solved, we can now gather the data and setup the improvisations.

6.1. Deconstruction - Max Reger

6.1.1. Chords and functions for Herzlich thut mich verlangen No.14 Op. 67

In *example 42* we can see the deconstruction phase, provided with chords

Herzlich thut mich verlangen.
(O Haupt voll Blut und Wunden.)

gm dm em E⁷ am dm em A dm em am B⁹ dm G⁷ hm⁵ dm E⁷ am A

Langsam.
III. Man. (Ch.)
pp
sempre ben legato

Example 42. Chords in *Herzlich thut mich verlangen* No.14 Op.67, measure 2-4.⁹²

The following *example 43* shows the functions derived from the chords.

Herzlich thut mich verlangen.
(O Haupt voll Blut und Wunden.)

-|| -6 -8 8 -1 -6 -8 1 -6 -8 -1 2 -6 || -3 -6 8 -1 |

Langsam.
III. Man. (Ch.)
pp
sempre ben legato

Example 43. Functions in *Herzlich thut mich verlangen* No.14 Op.67, measure 2-4.⁹³

92. Reger, *Op.67. 52 Choral Vorspiele Für Orgel, Heft I.*

All collected chords and functions for *Herzlich thut mich verlangen* are compiled into the table below. The *table 6.1.* is statistically processed in Appendix C.

Chords and Functions			
Measure	1	2	3
Chord		• gm dm em E ⁷	am dm em A dm em am
Functions		• -11 -6 -8 8	-1 -6 -8 1 -6 -8 -1
Measure	5	6	7
Chord	dm C B A dm E	am C F am hm ⁵ Hc#m E	• F dm G ⁷ C
Functions	-6 4 2 1 -6 8	-1 4 9 -1 -3 3 -5 8	• 9 -6 11 4
Measure	9	10	11
Chord	G em C em F dm A hm ⁵ em G	C am G ⁷	A dm G C F am F hm ⁵ E
Functions	11 -8 4 -8 9 -6 1 -3 -8 11	4 -1 11	1 -6 11 4 9 -1 9 -3 8
Measure	13	14	15
Chord	G E am D ⁹ G ⁹ K ⁹	D H ⁷ E am	dm G C F hm ⁵ E
Functions	11 8 -1 6 11 1	6 3 8 -1	-6 11 4 9 -3 8

Table 6.1. Chords and functions for *Herzlich thut mich verlangen* No.14 Op.67.

6.1.2. Chords and functions for Nun danket alle Gott No.27 Op.67

In *example 44* we can see the setting depicting the deconstruction phase, provided with chords.

The image shows a musical score for 'Nun danket alle Gott' by Max Reger, Op. 67, No. 27. The title is centered at the top. The tempo is marked 'Sehr lebhaft.' and the dynamics are 'f' (forte). The score is for guitar, indicated by 'I. Man. (Gt.)'. The music is in 4/4 time and G major. The first three measures are shown. Above the treble clef staff, the chords G, D, G, am, E¹⁵, am, C, and D⁷ are written. The first measure has a 'f' dynamic. The second measure has the instruction 'sempre ben legato'. The third measure has a 'p' dynamic. The bass line is also shown, starting with a 'f' dynamic.

Example 44. Chords in *Nun danket alle Gott* No. 27 Op.67, measure 1-3.⁹⁴

The following *example 45* shows the functions derived from the chords.

The image shows the same musical score as in Example 44, but with functions instead of chords. The title 'Nun danket alle Gott.' is centered at the top. The tempo is 'Sehr lebhaft.' and the dynamics are 'f'. The score is for guitar, 'I. Man. (Gt.)', in 4/4 time and G major. The first three measures are shown. Above the treble clef staff, the functions 1 8, 1, -3 10, -3 6 8 are written. The first measure has a 'f' dynamic. The second measure has the instruction 'sempre ben legato'. The third measure has a 'p' dynamic. The bass line is also shown, starting with a 'f' dynamic.

Example 45. Functions for *Nun danket alle Gott* No.27 Op. 67.⁹⁴

94. Reger, *Op.67. 52 Choral Vorspiele Für Orgel*, Heft II.

In table 6.2 all collected chords and functions for *Nun danket alle Gott* are compiled. The table 6.2 is statistically processed in Appendix C.

Measure	1					2				
Chord						G D G				
Functions	1					8 1				
Measure	3					4				
Chord	am E ⁺⁵ am C D ⁷					G				
Functions	-3 10 -3 6 8					1				
Measure	5					6				
Chord	hm ³ E H E					am D ⁷ E ⁷ am G hm ³ E				
Functions	-5 10 5 10					-3 8 10 -3 7 -5 10				
Measure	7					8				
Chord	am H ⁷ em					A D				
Functions	-3 5 -10					3 8				
Measure	9					10				
Chord	G					A D G am				
Functions	1					3 8 1 -3				
Measure	11					12				
Chord	E ^{<9} dm E					am E D ^{<9} em A				
Functions	10 -8 10					-3 10 8 -10 3				
Measure	13					14				
Chord	D hm G E ⁷ D ⁷					H ⁷ A ⁷				
Functions	8 -5 1 10 8					5 3				
Measure	15					16				
Chord	D ⁷ hm ⁷ f ^{#m} em H ⁷					G ⁷ H ⁷ em E H ⁷ E ^{#m7}				
Functions	8 -5 -12 -10 5					7 5 -10 10 5 10 -7				
Measure	17					18				
Chord	A f ^{#m}					D F A dm				
Functions	3 -12					8 11 3 -8				
Measure	19					20				
Chord	E ⁷ H ⁷ E D G em ⁷ E ^{<9} hm E					D em A ^{<9} F ^{#7}				
Functions	10 5 10 8 1 -10 10 -5 10					8 -10 3 12				
Measure	21					22				
Chord	hm D G D G D					em D G				
Functions	-5 8 1 8 1 8					-10 8 1				
Measure	23					24				
Chord	C em E ⁺⁵ D E ⁷					am dm G em G				
Functions	6 -10 10 8 10					-3 -8 1 -10 1				
Measure	25					26				
Chord	C ⁷ dm F ⁷					gm [#] C am F G A ⁹ G A ^{<9}				
Functions	6 -8 11					-1 6 -3 11 1 3 1 3				
Measure	27					28				
Chord	f ^{#m} D hm ³ E hm em					am f ^{#m} A ⁷ D				
Functions	-12 8 -5 10 -5 -10					-3 -12 3 8				
Measure	29					30				
Chord	em C cm G em C am					G				
Functions	-10 6 -6 1 -10 6 -3					1				

Table 6.2. Chords and functions for *Nun danket alle Gott* No.27 Op. 67.

6.1.3. Chords and functions for Wie schön leuchtet der Morgenstern No.49 Op.67

In *example 46* we can see setting depicting the deconstruction phase in which it has been provided with chords.

Wie schön leuchtet der Morgenstern.

Langsam.

F^{am} F⁷ B F C G⁷ G⁹ F f m G⁷ G⁹ F C D G C F⁷ B A^b A^{<9} dm

pp III. Man. (Ch.)

pp <9

Example 46. Chords in *Wie schön leuchtet der Morgenstern* No.49 Op. 67, measure 1-6.⁹⁵

The following *example 47* shows the functions derived from the chords.

Wie schön leuchtet der Morgenstern.

Langsam.

1 -5 1.6 | 8 3 8 | -1 3 8 1 3 10 3 8 1 6 4 5 -10

pp III. Man. (Ch.)

pp

Example 47. Functions for *Wie schön leuchtet der Morgenstern* No.49 Op. 67, measure 1-6.⁹⁵

95. Reger, *Op.67. 52 Choral Vorspiele Für Orgel, Heft III.*

In table 6.3 and 6.4 all collected chords and functions for *Wie schön leuchtet der Morgenstern* are compiled. Both tables are statistically processed in Appendix C.

Measure	1	2
Chord		F am F B F C
Functions	1	-5 1 6 1 8
Measure	3	4
Chord	G ⁷ C ⁹ F fm	G C ⁹ F C
Functions	3 8 1 -1	3 8 1 3
Measure	5	6
Chord	D G C F ⁷	B A ^b A ^{<9} dm
Functions	10 3 8 1	6 4 5 -10
Measure	7	8
Chord	G C ⁷ F	F ⁷
Functions	3 8 1	1
Measure	9	10
Chord	C ⁷ F C ⁹ A ⁷ dm F ⁷	G ⁷ C dm C ⁷ F
Functions	8 1 8 5 -10 1	3 8 -10 8 1
Measure	11	12
Chord	B D gm dm B	F C ⁹ F C
Functions	6 10 -3 -10 6	1 8 1 8
Measure	13	14
Chord	F C dm C dm C F cm	D gm D gm dm E f ^{#m} EA
Functions	1 8 -10 8 -10 8 1 -8	10 -3 10 -3 -10 12 -2 12 5
Measure	15	16
Chord	dm A dm G am E am	dm D G ⁷
Functions	-10 5 -10 3 -5 12 -5	-10 10 3
Measure	17	18
Chord	C F C ⁷ F dm	C F
Functions	8 1 8 1 -10	8 1
Measure	19	20
Chord	D E am D ⁷ E am	B E ^b C ^{<9} F
Functions	10 12 -5 10 12 -5	6 11 8 1
Measure	21	22
Chord	C ⁹ G C ⁷	F B F B gm F
Functions	8 3 8	1 6 1 6 -3 1
Measure	23	24
Chord	C	A
Functions	8	5
Measure	25	26
Chord	C dm C am F C F ⁷	D A D hm A hm G A D
Functions	8 -10 8 -5 1 8 1	10 5 10 -7 5 -7 3 5 10
Measure	27	28
Chord	gm C D A D gm F	gm F gm E ^b C ⁷ F
Functions	-3 8 10 5 10 -3 1	-3 1 -3 11 8 1
Measure	29	30
Chord	bm ⁶ F gm C	F A dm F
Functions	-6 1 -3 8	1 5 -10 1

Table 6.3. Chords and functions for *Wie schön leuchtet der Morgenstern* No.49 Op.67.

Measure	31	32
Chord	B C F D ^{<9} gm D gm G ^{#m} G	C F B
Functions	6 8 1 10 -3 10 -3 3 -6 3	8 1 6
Measure	33	34
Chord	E ^b gm am gm am dm F -bm ⁶ F gm F gm F B F C ^{<9} F	
Functions	11 -3 -5 -3 -5 -10 1 -6 1	-3 1 6 1 8 1

Table 6.4. Chords and functions for *Wie schön leuchtet der Morgenstern* No. 49 Op. 67.

6.2. Reconstruction – Max Reger

To deal with what alterations to the harmonies, I should choose, I have looked at the sheet music that to analyse it. This should not be taken to heart as the way Reger treats his music. These are mere observations to give me a generating principle, something, that in a short amount of time will make it easier to generate an improvisation. A problem I faced is how to take all the extensions Reger uses into account. Unlike previous chapters, Reger incorporates more harmonies although it is sparsely for being Reger. The harmonies are also more altered with 7ths, 9ths and sometimes 11ths. I have decided to incorporate these when possible, but I have not been able to use my method to show how the extensions should be collected. This must be developed in the future to enhance my model to deal with this problem.

He does not rely solely on earlier rules of counterpoint to make dissonances. This can also generate the debate what a dissonance is and when is it needed to be prepared. I wish to highlight the difference between past improvisers in previous chapters and Reger. It is then viewed that Reger does not follow the same praxis in how he treats the counterpoint. See *example 48* where a B flat is not prepared against the E natural or *example 49* where we can see that the E flat is not prepared against the A natural.



Example 48. Depicting the B flat not prepared against the E natural. Excerpt from measure three from *Hezlich thut mich verlangen No.14 from Op.67*.⁹⁶



Example 49. Depicting the E flat not prepared against the A natural. Excerpt from measure four from *Wie schön leuchtet der Morgenstern No.49 Op.67*.⁹⁷

96. Reger, *Op.67. 52 Choral Vorspiele Für Orgel, Heft I.*

97. Reger, *Op.67. 52 Choral Vorspiele Für Orgel, Heft III.*

When Reger do prepares a dissonance, it mostly has to do with resolving the fourth into a third, making a suspension. See *example 50* showing a C natural resolving to B



Example 50. Depicting the C natural resolving to B in measure sixteen from *Wie schön leuchtet der Morgenstern No.49 Op.67*.⁹⁸

What we also see in *example 50*, is that Reger often carries on the harmonic progression so even though the suspension is resolved, the harmonic progression continues. This process often gradually increases this process until we reach a climatic highpoint. It is not until we reach a climatic low point, i.e. a new section, a phrase ending or the actual end of the piece, that both harmony and a final suspension, jointly come to an end.

Taking a glimpse at the scores, it seems more like Reger uses many subdivided figurations. Sometimes one hand moves more and sometimes both hands work in a conjoined movement while at other times, the opposite with countermovement.

I will therefore in my preparations, choose a slow tempo, making the melody feel the double of its length. I will try to add the moving figurations based on sixteenth notes. In the blueprints, containing melody and harmonies, I will incorporate more rapid harmonic changes as Reger does and try to incorporate his way of counterpoint treatise.

I have chosen the following three melodies from the Swedish hymn book. Two of the three melodies have been made in the 19th century so that they would fit in terms of a time perspective view as an approach, to be improvised upon, in a Reger style. One of these two melodies is from Germany and the other is from Sweden, while the last hymn is from the 20th century and has very little to do in with Reger.

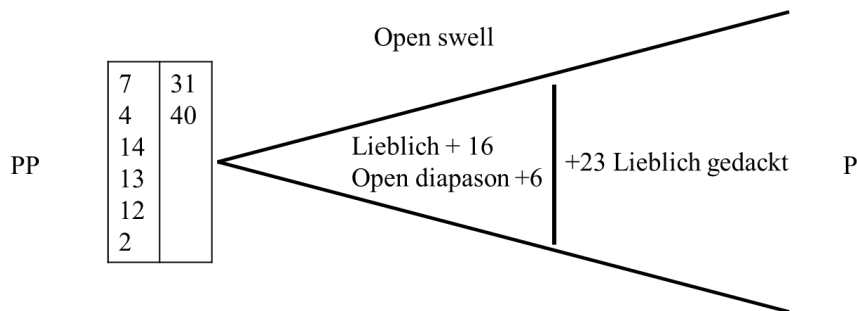
My first choice is a 19th century German folksong, *När juldagsmorgon glimmer*, 121 in the Swedish hymn book, When Christmas Morn is Dawning, *Wir hatten gebauet ein stattliches Haus*.⁹⁹ It is a German folksong which later was adapted as hymn. In Sweden it is associated with Advent and Christmas Day, just like *Wie schön leuchtet der Morgenstern*, that was analysed. My second choice is a Swedish hymn 249, written 1872, *Blott en dag*, Day by day, and with each passing moment.⁹⁹ This hymn is commonly associated with funerals. The text was written by Lina Sandell and the melody by Oscar Ahnfelt. The idea is to take a melody that was written in the same time period but have no connection to Reger and make an improvisation using the data from Reger. Lastly, I have chosen the hymn 155 *Herren lever, våga tro det*, The Lord lives, dare to believe it which was written in the 20 th century with text by Göran Bexell 1971 and the melody by Bedrich Janacek.⁹⁹ This hymn has to do with the resurrection of Christ.

98. Reger, *Op.67. 52 Choral Vorspiele Für Orgel*, Heft III.

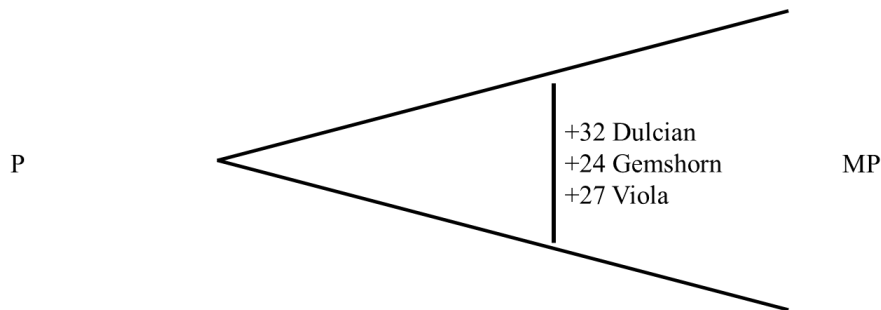
99. Verbum AB, *Den Svenska Psalmboken*.

I decided to make the recordings at the Willis organ which is the closest to a German romantic organ that I can find. See appendix H.

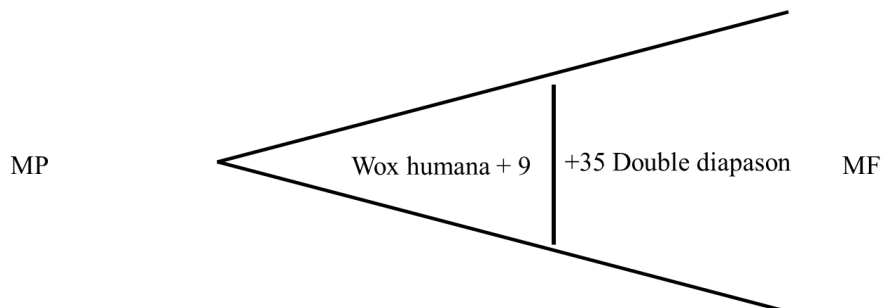
The typical romantic German organ are equipped with a rollschweller, a crescendo pedal that activates and removes stops. This feature, that is especially appropriate for Reger, is not available at this organ. However, it is possible to make a manual crescendo with assistants. The crescendo will follow the motion of the melody and as it reaches a culmination, so will the crescendo, thus increasing the intensity of the phrase. To tackle the rollschweller, or crescendo pedal, I made a chart in which order to draw and put in the stops. See all charts below from *example 51* to *example 55*. How I intend to build crescendos or diminuendos from almost nothing to a strong a forte or vice versa. The numbers in *example 51* suggests a starting registration that can be found in chapter 6.3



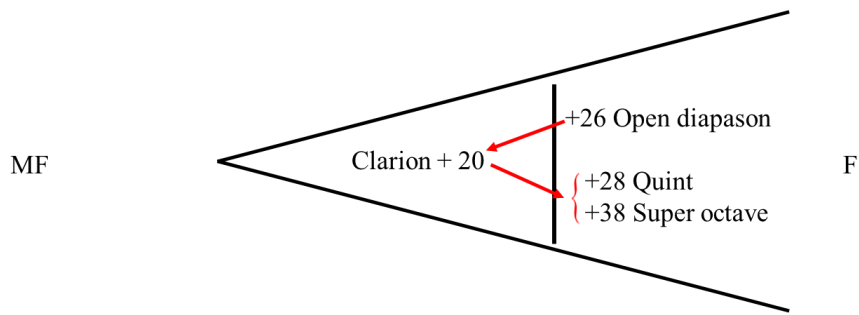
Example 51. Crescendo from PP to P



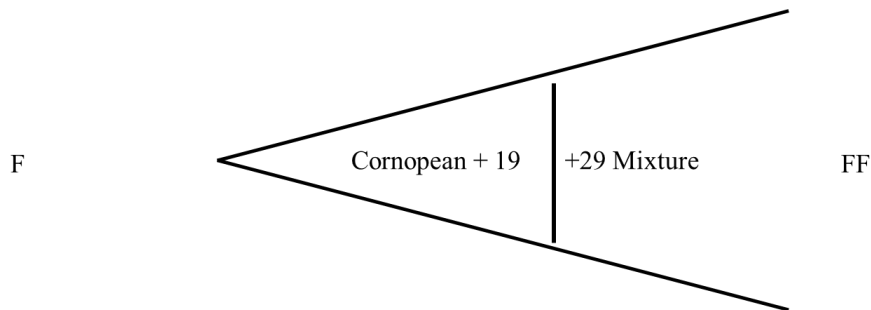
Example 52. Crescendo from P to MP



Example 53. Crescendo from MP to MF



Example 54. Crescendo from MF to F



Example 55. Crescendo from F to FF

Another crescendo effect is how many voices that occur simultaneously. I will try to incorporate this, adding layer of voices and gradually decrease when there is a softer section.

Examining the works, Reger frequently creates a bassline that moves stepwise as a counterpart to the melody. I will do the same with my contours

Reger often changes dynamic characters.

Reger often connects the common notes from one chord to the next.

Following *examples 56, 57, 58, 59, 60, 61* shows the blueprints on how I intend to make my improvisations.

6.2.1. Improvisation Blueprint – Audio 9 -När juldagsmorgon glimmar Hymn 121

In the improvisation, I use the blueprint below, see *example 56* and *example 57* (Audio 9).

Hymn 121
När juldagsmorgon glimmar german folksong

Chord progression for the first system (measures 1-2): D, A, hm, E, A, D, A

Chord progression for the second system (measures 3-4): D, G, A, D, G, gm, D, em

Chord progression for the third system (measures 5-6): A, hm, E, A, f#m, G, A

Chord progression for the fourth system (measures 7-8): D, A, hm, em, H, A, D

Chord progression for the fifth system (measures 9-10): hm, E, E, G, A, F, F#, hm, H

Example 56. Improvisation Blueprint – Audio 9 - När juldagsmorgon glimmar Hymn 121.

Handwritten musical score for piano, measures 11-15. The score is in G major (one sharp) and 4/4 time. The bass clef part includes handwritten chord symbols and melodic lines. The treble clef part shows the melody with some rests.

Measure 11: Bass clef has notes F# (with $f^{\#}m^{-5}$ below), G, A, B, C# (with $c^{\#}m^{-5}$ below), D, E, F# (with $f^{\#}$ below), G, A, B, C# (with $c^{\#}$ below), D. Treble clef has notes G, A, B, C, D, E, F#, G.

Measure 12: Bass clef has notes G (with G below), A (with E below), B (with hm below), C# (with $c^{\#}$ below), D, E (with $f^{\#}m^{-5}$ below), F# (with $c^{\#}$ below), G, A. Treble clef has notes G, A, B, C, D, E, F#, G.

Measure 13: Bass clef has notes D (with D below), G (with G below), A (with A below), D. Treble clef has notes G, A, B, C, D, E, F#, G.

Measure 14: Bass clef has notes G (with G below), A (with A below), D. Treble clef has notes G, A, B, C, D, E, F#, G.

Measure 15: Bass clef has notes G (with G below), A (with A below), D. Treble clef has notes G, A, B, C, D, E, F#, G.

Example 57. Improvisation Blueprint – Audio 9 - När juldagsmorgon glimmar Hymn 121.

6.2.2. Improvisation Blueprint – Audio 10 – Blott en dag Hymn 249

In the improvisation, I use the blueprint below, see *example 58* and *example 59* (Audio 10).

Hymn 249
Blott en dag
Oscar Ahnfelt

3
6
9
11

Example 58. Improvisation Blueprint – Audio 10 – Blott en dag Hymn 249.

13

E A E D G em C em

15

A hm D em F# H

17

E- f# A D hm G gm

19

D E A D f# A H em hm

22

A f#m C# f#m A hm E A D

Example 59. Improvisation Blueprint – Audio 10 – Blott en dag Hymn 249.

6.2.3. Improvisation Blueprint – Audio 11 – Herren lever Hymn 155

In the improvisation, I use the blueprint below, see *example 60* and *example 61* (Audio 11).

Hymn 155
Herren lever Bedrich Janacek

The image displays a piano accompaniment for the hymn 'Herren lever' by Bedrich Janacek. The score is written in 4/4 time with a key signature of two flats (B-flat and E-flat). It consists of five systems of two staves each (treble and bass clef). Handwritten chord symbols are provided below the bass staff of each system. The chords are: System 1: E-flat, A-flat, E-flat, B, G, cm, F, B; System 2: E-flat, C, fm, B, E-flat, cm, B, D, G, cm, gm, B; System 3: E-flat, B, G, cm, B, E-flat, B; System 4: gm, B7, cm, A-flat; System 5: E-flat, A-flat, B, cm, B.

Example 60. Improvisation Blueprint – Audio 11 – Herren lever Hymn 155.

The image shows a handwritten musical score for 'Herren lever Hymn 155'. It consists of four systems of music, each with a treble and bass staff. The key signature is B-flat major (two flats). The systems are numbered 11, 13, 15, and 17.

- System 11:** Treble staff has a whole note chord. Bass staff has a whole note chord. Handwritten notes: E^b and F with a slur connecting them.
- System 13:** Treble staff has a half-note melody. Bass staff has a half-note bass line. Handwritten notes: A^b , g^m , c^m , B , F^b .
- System 15:** Treble staff has a half-note melody. Bass staff has a half-note bass line. Handwritten notes: B , E^b , A^b , E^b , B .
- System 17:** Treble staff has a whole note chord. Bass staff has a whole note chord. Handwritten notes: E^b , A^b , E^b .

Example 61. Improvisation Blueprint – Audio 11 – Herren lever Hymn 155.

6.3. Construction - Result and Discussions Max Reger

I decided to make contours and experiment by using different hymns from different eras and contexts. Finding the solution in how to treat the altered -5 7 th chord was crucial in how to collect the data for analysis. Having solved this problem, it was easy to collect data and make the blueprints. I learned that the system needs to be better equipped for music with extensions, so that the improviser gets information on what extensions should be applied and when and how to collect data.

I decided to couple all the manuals to the main manual, the Great, and to the pedals. The first registration, I use as will be a starting point of departure to which I will return in the end. In between, I follow the chart and depending on the dynamic level wanted, follow the process through the chart.

The first improvisation, on hymn 121 is originally German and was chosen as the ideal setting. To me, the melody sounds German and when the harmony is added onto, I think I get a very genuine approach to that musical language of Reger with a German melody that was written in this period. The common practice with Reger is that he has in general many dynamic markings in his music and crescendos and decrescendos. The music is intended for Christmas day and the birth of Jesus Christ.

I decided to create a mystical atmosphere with a star tinting registration for this queen of hymns, using a soft registration.

No. 7 Gamba 8

No. 2 Choir to great

No. 14 Choir to pedal

No. 4 Swell to great

No. 13 Great to pedal

No. 12 Swell to pedal

No. 31 Violoncello 8

No. 40 Bourdon 16

Professor Nelson's comment to my improvisation on hymn 121, see Appendix E:

Improvisation 9, Reger hymn 121

The short prelude D - A/c# - bm E - A/c# - D - A, would have needed a little more 'finesse' to be perceived as 'Reger'. When the cantus firmus, 'When Christmas Morn is Dawning' is presented, there is a lot of Reger in this version, including the registration with a large crescendo and diminuendo. A diminished chord (at the melody pitch d2 with the text 'night') breaks this feeling, although Reger uses them, something is missing in the context, before and after this chord. The phrases after that I experience really follow in Reger's footsteps!

The second improvisation, on hymn 248 is from Sweden and one of our most beloved hymns that is often associated with funerals. I start out very soft but change the Gamba 8 to Lieblich gedackt 8 which is even softer in volume. The timbre is hollow and empty and it almost unnoticeably soft. From this I will build my crescendo

No. 16 Lieblich gedackt
No. 2 Choir to great
No. 14 Choir to pedal
No. 4 Swell to great
No. 13 Great to pedal
No. 12 Swell to pedal

No. 31 Violoncello 8
No. 40 Bourdon 16

Professor Nelson's comment to my improvisation on hymn 249, see Appendix E:

Improvisation 10, Reger hymn 249

Sounds 'Reger' in harmony and polyphony. To become even more credible, a freer approach to the phrases is needed, more lines and direction in phrases as well as a consistent legato. Also, nice if the length of the melody notes could be more organic, with one homogeneous length of notes.

The third improvisation, on hymn 155 characterize the jubilating triumph of Jesus Christ being victorious over death. I still start out the improvisation soft and in quarter notes. When the melody enters in half notes, I start making my big stepwise crescendo to reach a culmination of euphoria and joy.

No. 7 Gamba 8
No. 2 Choir to great
No. 14 Choir to pedal
No. 4 Swell to great
No. 13 Great to pedal
No. 12 Swell to pedal

No. 31 Violoncello 8
No. 40 Bourdon 16

Professor Nelson's comment to my improvisation on hymn 155, see Appendix E:

Improvisation 11, Reger hymn 155

Sounds 'Reger' both in harmony and polyphony. To become even more credible, a freer approach to the phrases is needed, more lines and direction in phrases as well as a consistent legato. Let the harmony affect the interpretation, think more linear to get a more vivid improvisation. Harmonically, you've really cracked the code! Since the chorale begins with a call: 'The Lord lives, dare to believe it' it might be appropriate to let the music be affected by this character. Perhaps by starting more firmly and in a stronger dynamic.

Professor Nelson is in general positive with my choices of harmony. I also received many valuable comments about phrasing, technique and structure.

7.1.2. Chords and functions for Philippe Lefebvre improvisation

In *table 7.1* below we can see deconstruction phase of the improvisation, provided with chords

D⁺¹¹ dm G B c#m G B c#m G B c#m em c#m A em gm B c#mmaj7
 ? em D# em7 c#m7-5 G F# G F#9 G<9 F# G B dm C9 E74
 B C Bmaj7 em7-5 am f#m g#m hm dm Eb C B C gm7 C gm7
 c#m a#m7-5 c#11 a#m7-5 c#m7 C+11 am7 Bmaj7 F# c#m em gm g#m
 B Db B94—3 C7 B C9 gm B C hm E D9 E ? B11<9 no 3 c#m
 em gmmaj7+9 E Eb A11 C B C G dm C G ---- D (N.C)

Table 7.1. Chords of Philippe Lefebvre improvisation

The following *table 7.2* shows the functions derived from the chords

1 -1 6 9 -12 6 9 -12 -3 -12 8 -3 -6 9
 -12 ? -3 12 -3 -12 6 5 6 5 6
 5 6 9 -1 11 3 9 11 9 -3 -8 -4 -7 -10
 -1 2 11 9 11 -6 11 -6 -12 -9 -12 -9
 -12 11 -8 9 5 -12 -3 -6 -7 9 12 6 9 11
 2 8 5 11 8 5 11 2 4 12 9 11 9 11 -6
 9 11 -10 3 13 ? 9 -12 -3 -6 3 2 8
 11 9 11 6 -1 11 6 1

Table 7.2. Functions of Philippe Lefebvre improvisation

All collected chords and functions for the improvisation are statistically processed in Appendix D

7.2. Reconstruction – Philippe Lefebvre

Phillipe Lefebvre's improvisation is an entrée improvisation in which there is a procession. In the Swedish church it is common to link the music from the procession to the first hymn. The first hymn is almost always a hymn of praise, so I selected hymns of such character. I chose Hymn No.1 in the Swedish hymn Book, *Gud, vår Gud, vi lovar dig*¹⁰¹. God our God, we promise you. The text is modeled on Te Deum by Olov Hartman and the melody is set to 6/4 in F major by (Sagan 1772/[Wien](#) 1774).

The second hymn I chose is No. 18 in the Swedish hymn book, *Allena Gud i himmelrik*, Alone to God the highest be glory.¹⁰¹ The text is rewritten after the Gloria in excelsis Deo. The melody is set to 6/4 in F major and written by Nicolaus Decius.

Analysing the chords, we can now base harmonic progression on the statistics we gathered. If we look at the page that was transcribed, see *Table 7.1*. We can see that Lefebvre usually go back and forth between chords like a pendulum. Listening to the improvisation, the tempo feels rather free and it's more a compilation of controlled gestures that create a sensation of arriving. An example would be his use of accelerando, see *example 63*. This gesture is divided between the hands.



Example 63. Gesture with accelerando

I am not aware if his improvisation is based on liturgical material.

I have decided to make two improvisations and base them on the collected harmonies from the master chart. I have also decided that the phrases will be relocated throughout the improvisation, so that the hymn will not be played through in one go. In between the phrases I will improvise outside the melodic structure by using harmony, selected from the master chart. In the places between different melodies, I will use the pendulum movement, going back and forth between chords, like Lefebvre. See *example 63*. Each time a new phrase enters, I will transpose it either up or down a whole tone or semitone. I am unaware if anyone of the profiles I study use this technique, but it was Wagner's music that inspired me to set up this structure of transposing, trying to create a structure that support vigorously ongoing modulations.

Having decided that each phrase should be in a new key, I had to change which pitch was my key centre for the positions 1-12 in the master chart.

101. Verbum AB, *Den Svenska Psalmboken*.

For the improvisation on hymn No. 1, I used a rhythmic motif from Henri Mulet's *Toccata Tu es Petra*, No. 10 from *Esquisses Byzantines*.¹⁰² See example 64.



Example 64. Rhythmic motif from Henri Mulet's *Toccata Tu es Petra*

For improvisation on hymn No. 18, I used a rhythmic motif from *The Tocatta from Suite Gothique Op.25* by Léon Boëllmann.¹⁰³ See example 65.



Example 65. Rhythmic motif from *The Tocatta from Suite Gothique Op.25* by Léon Boëllmann

102. Henry Mulet, *Esquisses Byzantines*. *Toccata Tu es Petra*, No. 10 (Paris: Alphonse Leduc, 1920).

103. Léon Boëllmann, *Suite Gothique Op. 25 The Tocatta*. (New York: Edwin F. Kalmus, 1951).

7.2.1. Improvisation Blueprint – Audio 12 - Gud vår gud vi lovar dig Hymn 1

In the improvisation, I use the blueprint below, see *example 66* and *example 67* (Audio 12).

Hymn 1 Gud vår Gud, vi lovar dig
Improvisation

Intro

6

9

17

25

Example 66. Hymn 1 Gud vår Gud, vi lovar dig.

accelerando

34

42

49

Accelerando

Accelerando

58

Example 67. Hymn 1 Gud vår Gud, vi lovar dig.

7.2.2. Improvisation Blueprint – Audio 13 – Allena Gud i himmelrik Hymn 18

In the improvisation, I use the blueprint below, *example 68* and *example 69* (Audio 13).

Hymn 18 Allena Gud i himmelrik
Improvisation

The image shows a handwritten musical score for the hymn "Allena Gud i himmelrik". The score is written in G major, 4/4 time, and consists of five systems of music. Each system includes a treble clef staff with notes and a bass clef staff with chords. The chords are written in a shorthand notation (e.g., fm, hm, G# am, am, C# dm E dm, C# G C#, D# G, D# A, D# A, D# A, B, ebm, B a dim B, C fm). The notes in the treble clef are mostly quarter and eighth notes, with some rests. The bass clef staff shows the chord progression for each measure. The score is numbered 7, 15, 23, and 29 at the beginning of each system.

7

15

23

29

Example 68. Hymn 18 Allena Gud i himmelrik.

35 Cresc.

42 dim scales phrygian

49

54

59

62

Example 69. Hymn 18 Allena Gud i himmelrik.

7.3. Construction - Result and Discussions Philippe Lefebvre

I decided to use the French romantic organ at Artisten, Högskolan för scen och music Göteborg for the two improvisations, see appendix I. The improvisations are intended to be entrée improvisations and to show awe for the cross in the procession.

Hymn 1 and 18 are both Hymns of praise and therefore I have chosen the same registrations.

I wanted a very grand and strong registration for both improvisations. The melody is placed in the pedal and above it I am moving between the harmonies and try to vary the intensity of gestures creating high and low points of culminations in the music. This is how I registered the organ, see *table 7.3*.

Recit, manual 3	bourdon 16, flute harmonique 8, viole de gamba 8, flute octaviante 4
Positiv, manual 2	cor de nuit 8, salicional 8, flute traverse 8, prestant 4, nazard 2 2/3, quarte de nazard 2, plein jeu
Grand Orgue, Manual 1	principal 16, montre 8 salicional 8 bourdon 8 flute harmonique 8, prestant 4, quinte 2 2/3, doublette 2, plein jeu, trompette 8
Pedal	Soubbase 16, contrebasse 16, Flute 8, octave 4

Table 7.3 Registration for the improvisation.

I decided to couple all the manuals to the, main manual, Grand Orgue, and to the Pedals. Through couplers I can couple away any of the reed stops or the other manuals being able to control the dynamic of the stops and to the other manuals the Positif and the Récit there are additional swell pedals, allowing me an even greater control over dynamics.

Professor Nelson's comments on my improvisation on hymn 1 and 18, see Appendix E:

Improvisation 12, Lefebvre Hymn 1:

Tocatta playing with mediant, rhythmic and full of energy. I have no specific comments, great to listen to. The end gives a fate-filled attitude with the last minor chords before the final chord. Might be that it does not rhyme with the character of the hymn theme (Te Deum).

Improvisation 13, Lefebvre Hymn 18:

Dramatic start, lots of energy. The start could have been more distinct. Interesting links, the different parts hold together in a natural way. In this version too, there are many minor chords that give a fate-filled attitude, with mediant. However, I understand that this might depend on the musical original. The virtuoso end stands out a bit too much from the context. The end works well in many contexts, but here it becomes a bit pasted because it differs so much from what has happened before.

Professor Nelson does not seem to question my choices in harmony but to which character I portrait them.

8. Olivier Messiaen (1908-1992)

Olivier Messiaen is regarded as one of the leading composers of the 20th century and was organist in Église de la Sainte-Trinité, Paris. He is known as a great organ improviser and there are many recordings of him on You Tube. Today it is unthinkable to have lessons in improvisation and leave him out. Since he was a very structured person, he published a system he called modes of limited transposition, which gives us the harmonically structure to improvise in his tonal language. Therefore, I will not make an analysis but just an improvisation based on his chart with his mode 2.

8.1. Deconstruction – Olivier Messiaen

For Olivier Messiaen I have not done a deconstruction because he has made a chart containing all the necessary steps to create a blueprint.

8.2. Reconstruction – Olivier Messiaen

For one of my last exams in improvisation, I had to interpret a text and from it improvise a piece for five minutes. I was presented a text from the Book of Psalms 19:2 and needed to figure out the meaning of the words and connect them to my music making. See following text with a translation from King James Bible.

Himlen förkunnar Guds härlighet, himlavalvet vittnar om hans verk. Dag talar till dag därom och natt undervisar natt, Det är inte tal, det är inte ljud, deras röster kan inte höras, men över hela jorden når de ut, till världens ände deras ord.¹⁰⁴

Day unto day uttereth speech, and night unto night sheweth knowledge. There is no speech nor language, where their voice is not heard. Their line is gone out through all the earth, and their words to the end of the world.¹⁰⁵

Messiaen discusses Mode 2 in his work *The technique of my musical language*, that was given to me as input for the improvisation, see example 312, 313 and 314 in figure 8.1.¹⁰⁶



Figure 8.1. Mode 2 with transpositions.

104. Bibeln. *Bibeln 2000* (Turnhout: Splichal, 2000).

105. The Holy Bible: *King James Version*. (Iowa: World Bible Publishers, 2001).

106. Olivier Messiaen, *The technique of my musical language*.

8.2.1. Improvisation Blueprint – Audio 14 – Messiaen mode 2

In the improvisation, I use the blueprint below, see *example 70* (Audio 14).

The image displays a musical score for a piano improvisation. It consists of five systems of music, each with a treble and bass staff. The key signature is one flat (B-flat), and the time signature is 4/4. The score is divided into measures, with measure numbers 11, 22, 33, and 44 indicated at the start of their respective systems. The music is composed of chords and arpeggiated figures, primarily in the right hand, while the left hand remains mostly silent, indicated by rests. The chords are built from the notes of Messiaen's mode 2 (D-flat major with a lowered second degree, E-flat major with a lowered second degree, and F major with a lowered second degree).

Example 70. Improvisation Blueprint – Audio 14 – Messiaen's mode 2.

I was also instructed to include certain organ registrations that we had been shown, in a previous master class given by Mr Thomas Lacote. One of his suggestion was to use half drawn registers, which I decided to elaborate on for this improvisation.

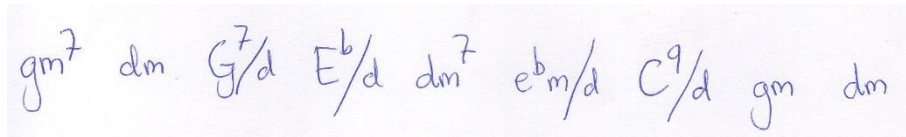
Mr Lacote is currently organist in L'église de la Sainte-Trinité de Paris, former church of Olivier Messiaen's. Mr Lacote has been awarded five times by the National Conservatory of Music and Dance in Paris. He has also studied with numerous teachers and amongst them

notably Olivier Latry, Michel Bouvard and Philippe Lefebvre. The last who is one of the main chapters in this Master thesis.

At the time of this improvisation I also had to prepare the improvisations on Lefebvre for exams, so I had little time to prepare this improvisation. I have the chart of Messiaen's mode 2 and the text from the Book of Psalms. From the text, I decided to start the improvisation in style of Lefebvre. This means that, I had no blueprint for the first two minutes but my own experience from approaching the other improvisations that I was preparing. For the reminder three minutes, I had the chart of Messiaen to build on. I recorded this improvisation and have been able to go back and with the help of Hugo von Horn been able to verify what chords, I applied in the first two minutes. In this way it's been possible to do the process backwards deconstructing my own improvisation.

The collected material is quite limited so it's not enough to say that I have copied another style thoroughly or that I have been drawn to be more influenced by a style, even though it's possible to isolate chord changes that are common to the other styles that I have studied. I guess that this improvisation would be closer to the French organ tradition since at the point in time, I was looking for that sound aesthetic and that I intentionally was aiming to improvising in that style.

The following chords that I play are, see *example 71* and *table 8.1*.



Example 71. Chart of the chords applied

gm⁷ dm G⁷/d E^b/d dm⁷ E^bm/d C⁹/d gm dm

Table 8.1. Illustration depicting the transcribed chords from my improvisation

8.3. Construction - Result and Discussions Olivier Messiaen

I selected the French romantic organ at Artisten, Högskolan för scen och music Göteborg, for this improvisation. See appendix I. This organ is a of Arstide Cavaille-Coll's organs, an organ that Messiaen would have had. In this chapter I did not have to do any analysis work which the method would have a hard time to replicate. It is because Messiaen's music has so many extensions, which the method do not take into account. Luckily Messiaen wrote down his way of approaching improvisation so that I could use his chart for an attempt. The beginning of the improvisation is more tonal and in the style of Lefebvre before I start using Messiaen's chart.

With the small amount of material collected, we can see that it's highly modal and at certain times where a dominant function is likely, in this case A major, they are replaced with a tritone substitution, preserving the modality. These phenomena remind us more of the late stages in Romantic period, in Impressionism or in Jazz. We also see tendencies in the decision making of what choices of harmony in being applied. For example, choosing next coming harmony to be either a major fourth scale degree or a minor fifth scale degree which is a contributing factor to the expressed modality. To me the choice of modality was to use a tonal language that would reflect day and night reminding of a language, perceived to listener as an incomprehensible language. I also incorporated the technique of half drawn stops, letting air fluctuate, thus creating an unstable pitch and projection of sound, making the listener unaware of when the language is spoken. In time I would draw more stops chosen to create a crescendo and then reaching a climax, I would then at instant let the sound disappear and underneath the harmony keep a few pitches binding together the two styles of improvisation. At this point I decided to have the two sections contrasting each other. The next stanza in the text is of a rather mystical character "There is neither speech nor language, where their voice is not heard." I decided to address this mystical character by using the Cromorne, a reed stop, depicting an ancient quality. This colourful registration on the second manual, the Positif, granted me the control of expressivity using a swell pedal, allowing me to control the dynamic of loudness, playing the with idea how far this strange sound could reach. On the third manual, the récit, I prepared a solo flute stop as a contrast. This manual was also able to be controlled dynamically through another swell pedal, which allowed me to go between the manuals dynamically. The last section of the text read "Their line is gone out through all the earth, and their words to the end of the world" I decided to create a crescendo on the first manual and stepwise build up and make a decrescendo and go up to the third manual so I could control the loudness and reach a very thin and soft tone using the swell pedal. This would demonstrate the text heard from distance, getting closer as it reaches its climax to later pass by and then disappear into the distance.

Professor Nelson's comments to my improvisations on The Book of Psalms 19.2, see Appendix E:

Improvisation 14, Messiaen, The Book of Psalms 19.2:

Initially large style contrasts. First a deep cluster, then a short theme presentation followed by a very rapid development (including the chord G9). A little too rapid for my taste and chords that are not so characteristic of Messiaen's music. After that, a soft section, only now Messiaen's tone language is recognized. Nice atmosphere, full of feeling with elegant decorations in the soprano part on various solo registers. Then big chords with fast pedal movements and a lot of energy. Sudden transition to a softer section, this works great.

9. Conclusion

I learned through all findings the many affordances *TCFAM*¹⁰⁷ provide apart from being a tool for improvisation. Through these findings and the response from Professor Nelson, I will be able to answer my research questions. The many findings I made include the following:

It allowed me to find patterns in Frescobaldi's music.

It allowed me to see a harmonic course charting the probability of changing chords, making it possible to set up general rules of how to approach a style of playing

I learned that the method easily can interact with contours, two voices, as a stepwise method to become a more prolific improviser.

The method can show statistics in data and could provide a tool to match unidentified music from an unknown author against known music to show the probability, whose music it is.

I learned that the model needs to be enhanced with tools that deal with extensions and especially in music from 19th century til today.

The model itself is a finding. It is a formal method that generates material which is not based on emotion but is impartial.

The method allows for the possibility to approach style improvisations, in which this method could produce blueprints as practice material. Suggested topics could be Buxehude, Bach, Reger, Franck and many more.

I realised that what I have been doing is almost a modern version of Partimento but instead of numbers telling me what harmony to apply, I have applied chords. A big difference is that I can make statistics through *TCFAM*. Partimento has been a hot subject lately and many wishes to focus on its ability to teach counterpoint. I think that that is one of the many affordances it provides but if you wish to study counterpoint you can do that in a strict counterpoint class. A speculation is that Partimento is a formal method trying to make theoretical knowledge practical. Since Partimento has not been able to stand the test of time and with it an approach to the art of improvisation, the result has been a decline of teaching and learning improvisation.

The limitation was to only address harmony and through the comments by Professor Nelson, I get an impartial response where I single out her opinions about my choices of harmony. For example, she states in Frescobaldi *Some sections work so convincingly that I really think it is Frescobaldi*. In Bach she writes: *The phrase with the melody b-c-c-b-b-a and the harmony E - am - D F# - G - E/G# - am is really in the style of Bach's harmony*. Lastly, in Reger: *Harmonically, you've really cracked the code!*

107. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition*.

It is clear, that this method works as a tool to deconstruct, reconstruct and construct improvisations. I have found an impartial way to gather data and thus a way to transform tacit knowledge to explicit and then back again. Since this method is repeatable, it enables an approach to improvisation, available for everyone.

Professor Nelson summarize the overall experience of my improvisations, see Appendix E:

To sum up: Lovely improvisations! Obviously, you know ‘the glosses’ but dare to be inspired by the language and trust that you have a good pronunciation! By this I mean that you in these improvisations find the characteristic features of different styles. What can be developed is to make these different musical languages your own, in order to get away from the feeling of imitation. With these recordings, you show that you are well on your way!

With the 14 improvisations as a result and the impartial response by Professor Nelson, I can now answer my three research questions, stated in the beginning of this thesis.

1. Will the data collected and processed through *TCFAM*¹⁰⁸ support my creativity in the process of improvising?

Through the process I have been successful in approaching the musical languages that I had sought to study. It also seems that I did not entirely copy the music by my selected composers since Professor Nelson in her comments stated that I sometimes do things that are unexpected and, that it in these cases, seems that I am taking steps on verbalizing my own musical language. To answer the question. Yes, it will.

2. By using this method what do I learn from it?

Apart from all the findings, I have learned that the method operates well with the process of deconstruction, reconstruction and construction. I have learned that this is a formal method that can make tacit knowledge explicit and then back again.

3. Can *TCFAM*¹⁰⁸ be an instrument for analysis of transcribed improvisations or compositions to work as a generating principle/tool for improvisation?

By using this formal and impartial way of gathering data and reconstruct it to blueprints, I could make 14 improvisations. Since the model is independent of person it is a method that anyone can use to reach the same output in harmonic structures. Therefore I can answer, Yes, it can.

9.1. Suggestion for further studies in the area

All of the findings provide for further studies in respective fields.

The method works very well addressing harmony but need to be equipped with tools better dealing with extensions.

108. Bergström, *Chromatic Function Analysis. An instrument for function analysis, improvisation and composition.*

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Audio files

Audio 1: Joel Bergström, Praeludium, HSM Berger studio, improviser Joel Bergström, recorded January 11, 2019, mp3 format.

Audio 2: Joel Bergström, Passacaglia in d minor, HSM Berger studio, improviser Joel Bergström, recorded January 11, 2019, mp3 format.

Audio 3: Joel Bergström, Frescobaldi 1, Örgryte new church, improviser Joel Bergström, recorded December 15, 2019, mp3 format.

Audio 4: Joel Bergström, Frescobaldi 2, Örgryte new church, improviser Joel Bergström, recorded December 15, 2019, mp3 format.

Audio 5: Joel Bergström, Frescobaldi 3, Örgryte new church, improviser Joel Bergström, recorded December 15, 2019, mp3 format.

Audio 6: Joel Bergström, Bach Hymn 113, Örgryte new church, improviser Joel Bergström, recorded April 07, 2020, mp3 format.

Audio 7: Joel Bergström, Bach Hymn 144, Örgryte new church, improviser Joel Bergström, recorded April 07, 2020, mp3 format.

Audio 8: Joel Bergström, Bach Hymn 491, Örgryte new church, improviser Joel Bergström, recorded April 07, 2020, mp3 format.

Audio 9: Joel Bergström, Reger Hymn 121, Örgryte new church, improviser Joel Bergström, recorded April 07, 2020, mp3 format.

Audio 10: Joel Bergström, Reger Hymn 249, Örgryte new church, improviser Joel Bergström, recorded April 07, 2020, mp3 format.

Audio 11: Joel Bergström, Reger Hymn 155, Örgryte new church, improviser Joel Bergström, recorded April 07, 2020, mp3 format.

Audio 12: Joel Bergström, Lefebvre Hymn 1, HSM Ohlin hall, improviser Joel Bergström, recorded January 17, 2020, mp3 format.

Audio 13: Joel Bergström, Lefebvre Hymn 18, HSM Ohlin hall, improviser Joel Bergström, recorded January 17, 2020, mp3 format.

Audio 14: Joel Bergström, Messiaen The Book of Psalms 19.2, HSM Ohlin hall, improviser Joel Bergström, recorded January 17, 2020, mp3 format.

Appendix A – Statistics Girolamo Frescobaldi

A.1. Statistics for Toccata No. 31 per le levatione

In the chart below, Table A.1.1. contains the collected data on Tocatta No. 31 Op. 12 Fiori Musicali by Girolamo Frescobaldi.

Numbers symbolising major chords	1 E	2 F	3 F#	4 G	5 G#	6 A	7 B	8 H	9 C	10 C#	11 D	12 D#
The number of the certain major chords in the piece	16	7	0	10	0	10	1	1	8	0	7	0
Numbers symbolising minor chords	-1 e	-2 f	-3 f#	-4 g	-5 g#	-6 a	-7 b	-8 h	-9 c	-10 c#	-11 d	-12 d#
The number of the certain minor chords in the piece	3	0	0	4	1	12	0	4	1	2	0	0

Table A.1.1. Statistics on the chords applied in Toccata No. 31 from Fiori Musicali Op.12

What we can see is that Frescobaldi does not use all chords and exclude the following chords

f minor, F# major and f# minor, G# major, B minor, C# major, d minor and D# major and d# minor.

From this chart we can make another chart of statistics and that is how common Frescobaldi moves from chord to another we then get the following statistics in percent what probability we have that we would choose a certain chord.

Number and starting chord	Number of transitions	Number and ending chord
1 E	6	2 F
	7	-6 a
	1	6 A
	1	9 C

Table A.1.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 E	1	6 A
	1	1 E
	1	3 F#

Table A.1.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2	1	2 F
F	4	-2 f
	2	4 G

Table A.1.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2	0	0
f		

Table A.1.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3	0	0
F#		

Table A.1.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3	0	0
f#		

Table A.1.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4	6	9 C
G	1	1 E
	2	-10 c#
	1	-9 c

Table A.1.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4	2	2 F
g	2	6 A

Table A.1.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	0	0
G#		

Table A.1.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	1	-6 a
g#		

Table A.1.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	2	2 F
A	5	-2 f
	1	-6 a
	1	9 C
	1	1 E

Table A.1.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	2	6 A
a	4	1 E
	2	-8 h
	1	-1 e
	1	2 F
	1	4 G
	1	8 H

Table A.1.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	1	-4 g
B		

Table A.1.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0
b		

Table A.1.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	1	-1 e
H		

Table A.1.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	2	4 G
h	1	-5 g#
	1	11 D

Table A.1.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	2	-6 a
C	1	-1 e
	2	1 E
	2	4 G
	1	2 F

Table A.1.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	1	-4 g
c		

Table A.1.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	0	0
C#		

Table A.1.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	1	-11 d
c#	1	1 E

Table A.1.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	2	-8 h
D	1	7 B
	3	1 E
	1	4 G

Table A.1.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	3	-4 g
d	4	6 A
	1	4 G
	1	1 E
	1	-6 a

Table A.1.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	0	0
D#		

Table A.1.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	0	0
d#		

Table A.1.25. Statistics of chord -12

A.2. Statistics for Toccata No. 45 per le levatione

In the chart below, Table A.2.1. contains the collected data on Tocatta No. 45 Op. 12 Fiori Musicali by Girolamo Frescobaldi.

Numbers symbolising major chords	1 E	2 F	3 F#	4 G	5 G#	6 A	7 B	8 H	9 C	10 C#	11 D	12 D#
The number of the certain major chords in the piece	7	4	0	5	0	12	2	2	1	0	9	0
Numbers symbolising minor chords	-1 e	-2 f	-3 f#	-4 g	-5 g#	-6 a	-7 b	-8 h	-9 c	-10 c#	-11 d	-12 d#
The number of the certain minor chords in the piece	4	0	0	0	0	6	0	4	0	0	5	0

Table A.2.1. Statistics on the chords applied in Toccata No. 45 from Fiori Musicali Op.12

What we can see is that Frescobaldi does not use all chords and exclude the following chords

f minor, F# major and f# minor, g minor, G# major, g# minor, B minor, c minor, C# major, c# minor and D# major and d# minor.

From this chart we can make another chart of statistics and that is how common Frescobaldi moves from chord to another we then get the following statistics in percent what probability we have that we would choose a certain chord. It's worth to mention that there is a part in the middle where the amount of voices is reduced to just two and in this case even though this place is repeated all voices later, I have not written out any terminology, since that would have to require at least three voices. In this composition a pedal point is present at the end, so I only write out terminology when the other parts make full chords above the pedal point.

Number and starting chord	Number of transitions	Number and ending chord
1 E	2	-6 a
	2	2 F
	2	6 A
	1	9 C

Table A.2.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 e	1	8 H
	3	6 A

Table A.2.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2	2	2 F
F	2	7 B

Table A.2.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2	0	0
f		

Table A.2.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3	0	0
F#		

Table A.2.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3	0	0
f#		

Table A.2.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4	2	6 A
G	1	1 E
	1	11 D
	1	-1 e

Table A.2.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4	0	0
g		

Table A.2.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	0	0
G#		

Table A.2.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	0	0
g#		

Table A.2.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	5	-2 f
A	1	8 H
	1	-6 A
	5	2 F

Table A.2.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	3	-6 a
a	1	-1 e
	2	2 F
	1	11 D

Table A.2.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	2	4 G
B		

Table A.2.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0
b		

Table A.2.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	1	-1 e
H	1	-8 h

Table A.2.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	1	6 A
h	1	-6 a
	1	11 D
	1	1 E

Table A.2.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	1	1 E
C		

Table A.2.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	0	0
c		

Table A.2.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	0	0
C#		

Table A.2.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	0	0
c#		

Table A.2.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	3	6 A
D	3	-8 h
	1	4 G
	1	1 E

Table A.2.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	1	4 G
d	2	-6 a
	1	6 A

Table A.2.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	0	0
D#		

Table A.2.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	0	0
d#		

Table A.2.25. Statistics of chord -12

A.3. Statistics for Toccata No. 16 Cromaticha per le levatione

In the chart below, Table A.3.1. contains the collected data on Tocatta No. 16 Op. 12 Fiori Musicali by Girolamo Frescobaldi.

Numbers symbolising major chords	1 E	2 F	3 F#	4 G	5 G#	6 A	7 B	8 H	9 C	10 C#	11 D	12 D#
The number of the certain major chords in the piece	14	9	0	13	0	22	0	0	8	0	15	0
Numbers symbolising minor chords	-1 e	-2 f	-3 f#	-4 g	-5 g#	-6 a	-7 b	-8 h	-9 c	-10 c#	-11 d	-12 d#
The number of the certain minor chords in the piece	12	0	4	9	2	27	0	2	2	1	19	0

Table A.3.1. Statistics the chords applied in Toccata No. 16 from Fiori Musicali Op.12

What we can see is that Frescobaldi does not use all chords and exclude the following chords

f minor, F# major, G# major, B major and b minor, H major, C# major, D# major, d# minor.

From this chart we can make another chart of statistics and that is how common Frescobaldi moves from chord to another we then get the following statistics in percent what probability we have that we would choose a certain chord. It's worth to mention that there are parts in the middle where the amount of voices is reduced to just two and in this case even though this place is repeated, I have not written out any terminology, since that would have to require at least three voices. In this composition a pedal point is present at the end, so I only write out terminology when the other parts make full chords above the pedal point.

Number and starting chord	Number of transitions	Number and ending chord
1 E	7	6 A
	1	-8 h
	1	-1 e
	4	-6 a

Table A.3.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 e	1	-8 h
	3	4 G
	1	2 F
	1	9 C
	1	-9 c
	2	6 A
	3	-6 a

Table A.3.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2 F	3	-6 a
	2	-8 h
	1	11 D
	2	-11 d
	1	4 G

Table A.3.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2 f	0	0

Table A.3.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3 F#	0	0

Table A.3.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3 f#	11	-8 h
	1	-4 g
	1	4 G

Table A.3.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4 G	3	6 A
	4	-4 g
	1	-1 e
	2	9 B
	2	11 D
	1	1 E

Table A.3.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4 g	1	-1 e
	2	-6 a
	2	11 D
	3	-11 d
	1	6 A

Table A.3.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	0	0
G#		

Table A.3.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	1	2 F
g#	1	4 G

Table A.3.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	2	-11 d
A	2	4 G
	10	-6 a
	1	9 C
	1	-3 f#
	4	11 D

Table A.3.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	3	11 D
a	3	-1 e
	10	1 E
	1	2 F
	2	-3 f#
	2	-8 h
	1	-4 g
	1	4 G
	1	6 A
	1	9 C

Table A.3.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0
B		

Table A.3.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0
b		

Table A.3.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	0	0
H		

Table A.3.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	1	-10 c#
h	2	-1 e
	1	-11 d
	1	1 E
	2	9 C
	1	-4 g
	1	4 G
	1	-6 a
	1	6 A
	1	-5 g#

Table A.3.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	3	-6 a
C	2	2 F
	1	11 D
	1	-9 c

Table A.3.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	1	2 F
c	1	-11 d

Table A.3.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10 C#	0	0

Table A.3.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10 c#	1	-3 f#

Table A.3.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11 D	2	4 G
	7	-11 d
	1	-8 h
	3	6 A
	1	-5 g#
	1	0 = only two voices

Table A.3.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11 d	2	-1 e
	1	9 C
	3	-8 h
	1	11 D
	3	6 A
	4	2 F
	5	0 = only two voices

Table A.3.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12 D#	0	0

Table A.3.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12 d#	0	0

Table A.3.25. Statistics of chord -12

A.4. Master chart - Girolamo Frescobaldi

In the chart below, Table B.4.1. contains the collected data from all the elevation toccatas Op. 12 Fiori Musicali by Girolamo Frescobaldi. The master chart represents the statistics that will be applied to make the blueprints.

Numbers symbolising major chords	1 E	2 F	3 F#	4 G	5 G#	6 A	7 B	8 H	9 C	10 C#	11 D	12 D#
The number of the certain major chords in the piece	37	20	0	28	0	44	3	3	17	0	31	0
Numbers symbolising minor chords	-1 e	-2 f	-3 f#	-4 g	-5 g#	-6 a	-7 b	-8 h	-9 c	-10 c#	-11 d	-12 d#
The number of the certain minor chords in the piece	19	0	4	13	3	45	0	10	3	3	24	0

Table A.4.1. Statistics on the chords applied in the master chart

Number and starting chord	Number of transitions	Number and ending chord
1 E	1	-1 em
	8	2 F
	10	6 A
	13	-6 am
	1	-8 hm
	2	9 C

Table A.4.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 em	1	1 E
	1	2 F
	1	3 F#
	3	4 G
	6	6 A
	3	-6 am
	1	8 H
	2	-8 h m
	1	9 C
	1	-9 cm

Table A.4.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2 F	3	4 G
	3	-6 am
	1	6 A
	1	7 B
	2	-8 hm
	6	-11 dm
	4	11 D

Table A.4.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2 f	0	0

Table A.4.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3 F#	0	0

Table A.4.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3 f#	1	-4 gm
	1	4 G
	2	-8 hm

Table A.4.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4 G	2	-1 em
	3	1 E
	1	2 F
	4	-4 gm
	2	6 A
	1	-9 cm
	8	9 C
	2	-10 c#m
	3	-11 dm
	3	11 D

Table A.4.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4	1	-1 e
gm	1	2 F
	2	-6 am
	3	6 A
	1	7 B
	3	-11 dm
	4	11 D

Table A.4.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	0	0
G#		

Table A.4.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	1	4 G
g#	2	-6 am
	1	11 D

Table A.4.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	2	1 E
A	1	-3 f#
	2	4 G
	12	-6 am
	1	7 G#
	1	8 H
	2	9 C
	12	-11 d
	10	11 D

Table A.4.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6 am	14	1 E
	5	-1 e
	3	3 F
	2	-3 f#
	2	4 G
	1	-4 gm
	3	-6 am
	3	6 A
	3	-8 hm
	1	8 H
	1	9 C
	5	11 D

Table A.4.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	2	-4 g
B	2	4 G

Table A.4.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7 b	0	0

Table A.4.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	2	-1 e
H	1	6 A

Table A.4.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	2	1 E
hm	2	-1 e
	3	4 G
	1	-4 gm
	3	-5 g#m
	1	-6 a
	2	6 A
	2	9 C
	1	-10 c#m
	1	-11 dm
	2	11 D

Table A.4.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	1	-1 em
C	3	1 E
	3	2 F
	2	4 G
	5	-6 am
	1	-9 cm
	1	11 D

Table A.4.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	1	2 F
c	1	-4 gm
	1	-11 d

Table A.4.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	0	0
C#		

Table A.4.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	1	1 E
c#m	1	-3 f#
	1	-11 d

Table A.4.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
-11	2	-1 em
dm	1	1 E
	2	2 F
	3	4 G
	3	-4 gm
	3	-6 am
	8	6 A
	3	-8 hm
	1	9 C
	1	11 D

Table A.4.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
11	4	1 E
D	1	2 F
	4	4 G
	1	-5 g#
	7	6 A
	1	7 B
	6	-8 hm
	6	-11 dm

Table A.4.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	0	0
E ^b		

Table A.4.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	0	0
E ^b m		

Table A.4.25. Statistics of chord -12

Appendix B – Statistics Johann Sebastian Bach

B.1. Statistics Chorale Nun komm, der Heiden Heiland

Numbers symbolising major chords	1 A	2 B	3 H	4 C	5 C#	6 D	7 E ^b	8 E	9 F	10 F#	11 G	12 G#
The number of the certain major chords in the piece	0	0	0	4	0	0	0	3	3	0	1	0
Numbers symbolising minor chords	-1 a	-2 b	-3 h	-4 c	-5 c#	-6 d	-7 e ^b	-8 e	-9 f	-10 f#	-11 g	-12 g#
The number of the certain minor chords in the piece	9	0	4	0	0	7	0	3	0	0	0	0

Table B.1.1. Statistics on the chords applied in the Chorale Nun komm, der Heiden Heiland

Number and starting chord	Number of transitions	Number and ending chord
1 A	0	0

Table B.1.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 a	1	end
	2	-3 hm
	2	-6 a
	1	-8 h
	2	9 C
	1	11 D

Table B.1.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2 B	0	0

Table B.1.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2	0	0

Table B.1.4. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3	0	0
H		

Table B.1.5. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3	0	0
h		

Table B.1.6. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4	1	-1 am
C	1	-6 dm
	1	-8 em
	1	9 F

Table B.1.7. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4	0	0
c		

Table B.1.8. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	0	0
C#		

Table B.1.9. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	0	0
c#		

Table B.1.10. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	0	0
D		

Table B.1.11. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	1	-3 hm
d	2	4 C
	1	-8 em
	3	8 E

Table B.1.12. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0
E ^b		

Table B.1.13. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0
e ^b		

Table B.1.14. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	3	-1 am
E		

Table B.1.15. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	2	-1 am
e	1	4 C

Table B.1.16. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	1	-1 am
F	1	-3 hm
	1	-6 dm

Table B.1.17. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9 f	0	0

Table B.1.18. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10 F#	0	0

Table B.1.19. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10 f#	0	0

Table B.1.20. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11 G	1	4 C

Table B.1.21. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	0	0

Table B.1.22. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12 G#	0	0

Table B.1.23. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12 g#	0	0

Table B.1.24. Statistics of chord -12

B.2. Statistics BWV 599 Nun komm, der Heiden Heiland

Numbers symbolising major chords	1 A	2 B	3 H	4 C	5 C#	6 D	7 E ^b	8 E	9 F	10 F#	11 G	12 G#
The number of the certain major chords in the piece	2	0	3	3	0	1	0	5	4	0	4	0
Numbers symbolising minor chords	-1 a	-2 b	-3 h	-4 c	-5 c#	-6 d	-7 e ^b	-8 e	-9 f	-10 f#	-11 g	-12 g#
The number of the certain minor chords in the piece	6	0	2	0	0	5	0	3	0	0	0	0

Table B.2.1. Statistics on the chords applied in the BWV 599 Nun komm, der Heiden Heiland

Number and starting chord	Number of transitions	Number and ending chord
1 A	11	-6 dm

Table B.2.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 a	1	End
	1	3 H
	1	-3 hm
	1	-6 dm
	1	8 E
	1	9 F

Table B.2.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2 B	0	0

Table B.2.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2 b	0	0

Table B.2.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3	2	-8 em
H	1	8 E

Table B.2.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3	1	-8 em
h	1	11 G

Table B.2.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4	1	8 E
C	2	9 F

Table B.2.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4	0	0
c		

Table B.2.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	0	0
C#		

Table B.2.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	0	0
c#		

Table B.2.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	1	8 E
D		

Table B.2.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	1	-1 am
d	1	3 H
	1	-3 hm
	2	11 G

Table B.2.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0
E ^b		

Table B.2.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0
e ^b		

Table B.2.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	4	-1 am
E	1	9 F

Table B.2.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	1	1 A
e	1	3 H
	1	6 D

Table B.2.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	1	1 A
F	2	-6 dm
	1	11 G

Table B.2.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	0	0
f		

Table B.2.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	0	0
F#		

Table B.2.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	0	0
f#		

Table B.2.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	3	4 C
G	1	8 E

Table B.2.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	0	0

Table B.2.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	0	0
G#		

Table B.2.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	0	0
g#		

Table B.2.25. Statistics of chord -12

B.3. Statistics Chorale Ich ruf' zu dir, Herr Jesu Christ

Numbers symbolising major chords	1 F	2 G ^b	3 G	4 A ^b	5 A	6 B	7 H	8 C	9 D ^b	10 D	11 E ^b	12 E
The number of the certain major chords in the piece	3	0	0	11	0	2	0	5	5	0	7	0
Numbers symbolising minor chords	-1 f	-2 g ^b	-3 g	-4 a ^b	-5 a	-6 b	-7 h	-8 c	-9 d ^b	-10 d	-11 e ^b	-12 e
The number of the certain minor chords in the piece	8	0	1	0	0	6	0	0	0	0	0	0

Table B.3.1. Statistics on the chords applied in the Chorale Ich ruf' zu dir, Herr Jesu Christ

Number and starting chord	Number of transitions	Number and ending chord
1	1	Ending/Paus
F	1	6 B
	1	-6 bm

Table B.3.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1	1	-3 gm
f	3	-6 bm
	2	8 C
	1	6 B

Table B.3.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2	0	0
G ^b		

Table B.3.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2	0	0
g ^b		

Table B.3.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3	0	0
G		

Table B.3.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3	1	3 C

Table B.3.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4	2	Ending/Paus
A ^b	1	-1 fm
	1	8 C
	5	D ^b
	2	11 E ^b

Table B.3.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4	0	0
a ^b		

Table B.3.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	0	0
A		

Table B.3.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	0	0
a		

Table B.3.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	2	11 E ^b
B		

Table B.3.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	2	1 F
bm	2	4 A ^b
	1	8 C
	1	11 E ^b

Table B.3.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0
H		

Table B.3.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0
hm		

Table B.3.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	1	Ending/Paus
C	4	-1 fm

Table B.3.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	0	0
cm		

Table B.3.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	2	-1 fm
D ^b	1	4 A ^b
	1	-6 Bm
	1	11 E ^b

Table B.3.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9 d ^b	0	0

Table B.3.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10 D	0	0

Table B.3.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10 dm	0	0

Table B.3.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	1	Ending/Paus
E ^b	1	1 F
	5	4 A ^b

Table B.3.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11 e ^b	0	0

Table B.3.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12 E	0	0

Table B.3.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12 e	0	0

Table B.3.25. Statistics of chord -12

B.4. Statistics BWV 639 Ich ruf' zu dir, Herr Jesu Christ

Numbers symbolising major chords	1 F	2 G ^b	3 G	4 A ^b	5 A	6 B	7 H	8 C	9 D ^b	10 D	11 E ^b	12 E
The number of the certain major chords in the piece	5	0	2	8	0	2	0	10	7	0	10	0
Numbers symbolising minor chords	-1 f	-2 g ^b	-3 g	-4 a ^b	-5 a	-6 b	-7 h	-8 c	-9 d ^b	-10 d	-11 e ^b	-12 e
The number of the certain minor chords in the piece	10	0	2	0	0	9	0	3	0	0	0	0

Table B.4.1. Statistics of the chords applied in the BWV 639 Ich ruf' zu dir, Herr Jesu Christ

Number and starting chord	Number of transitions	Number and ending chord
1 F	1	Ending/Paus
	1	3 G
	3	-6 bm

Table B.4.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 f	2	-3 gm
	1	-6 bm
	1	6 B
	1	8 C
	3	9 D ^b
	2	11 E ^b

Table B.4.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2 G ^b	0	0

Table B.4.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2 g ^b	0	0

Table B.4.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3	1	8 C
G	1	-8 c

Table B.4.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3 g	2	8 C

Table B.4.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4	1	-6 bm
A ^b	1	8 C
	1	-8 c
	3	D ^b
	2	11 E ^b

Table B.4.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4 a ^b	0	0

Table B.4.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5 A	0	0

Table B.4.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	0	0
a		

Table B.4.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	2	11 E ^b
B		

Table B.4.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	1	-1 fm
bm	1	-3 gm
	1	3 G
	3	8 C
	3	11 E ^b

Table B.4.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0
H		

Table B.4.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0
hm		

Table B.4.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	6	-1 fm
C	3	4 A ^b
	1	11 E ^b

Table B.4.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	1	1 F
cm	1	4 A ^b
	1	11 E ^b

Table B.4.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	1	6 B
D ^b	3	-6 bm
	2	8 C
	1	-8 cm

Table B.4.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	0	0
d ^b		

Table B.4.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	0	0
D		

Table B.4.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	0	0
dm		

Table B.4.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	2	-1 fm
E ^b	1	1 F
	7	7 A ^b

Table B.4.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	0	0

Table B.4.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	0	0
E		

Table B.4.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	0	0
e		

Table B.4.25. Statistics of chord -12

B.5. Statistics Chorale O Lamm Gottes, unschuldig

Numbers symbolising major chords	1 F	2 G ^b	3 G	4 A ^b	5 A	6 B	7 H	8 C	9 D ^b	10 D	11 E ^b	12 E
The number of the certain major chords in the piece	10	0	3	0	0	4	0	11	0	0	1	0
Numbers symbolising minor chords	-1 f	-2 g ^b	-3 g	-4 a ^b	-5 a	-6 b	-7 h	-8 c	-9 d ^b	-10 d	-11 e ^b	-12 e
The number of the certain minor chords in the piece	0	0	2	0	1	0	0	1	0	3	0	0

Table B.5.1. Statistics the chords applied in the Chorale O Lamm Gottes unschuldig

Number and starting chord	Number of transitions	Number and ending chord
1	2	Ending/Paus
F	1	-3 gm
	1	6 B
	4	8 C
	1	-10 dm

Table B.5.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 f	0	0

Table B.5.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2 G ^b	0	0

Table B.5.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2 g ^b	0	0

Table B.5.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3 G	3	8 C

Table B.5.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3	1	8 C
g	1	-10 dm

Table B.5.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4 A ^b	0	0

Table B.5.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4 a ^b	0	0

Table B.5.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5 A	0	0

Table B.5.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5 a	0	0

Table B.5.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	1	1 F
B	1	-5 a
	1	8 C
	1	11 E ^b

Table B.5.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	0	0
bm		

Table B.5.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0
H		

Table B.5.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0
hm		

Table B.5.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	2	Ending/paus
C	6	1 F
	2	3 G
	1	6 B

Table B.5.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	1	-3 gm
cm		

Table B.5.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	0	0
D ^b		

Table B.5.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	0	0
d ^b		

Table B.5.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	0	0
D		

Table B.5.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	1	Ending/paus
dm	1	3 G
	1	6 B

Table B.5.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	1	-8 cm
E ^b		

Table B.5.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	0	0

Table B.5.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	0	0
E		

Table B.5.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12 e	0	0

Table B.5.25. Statistics of chord -12

B.6. Statistics BWV 618 O Lamm Gottes, unschuldig

Numbers symbolising major chords	1 F	2 G ^b	3 G	4 A ^b	5 A	6 B	7 H	8 C	9 D ^b	10 D	11 E ^b	12 E
The number of the certain major chords in the piece	9	0	6	0	5	2	0	11	0	5	0	1
Numbers symbolising minor chords	-1 f	-2 g ^b	-3 g	-4 a ^b	-5 a	-6 b	-7 h	-8 c	-9 d ^b	-10 d	-11 e ^b	-12 e
The number of the certain minor chords in the piece	0	0	2	0	6	0	0	2	0	4	0	1

Table B.6.1. Statistics the chords applied in the BWV 618 O Lamm Gottes, unschuldig

Number and starting chord	Number of transitions	Number and ending chord
1 F	2	Ending/ Paus
	1	-5 am
	2	6 B
	3	8 C
	1	10 D

Table B.6.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 f	0	0

Table B.6.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2 G ^b	0	0

Table B.6.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2 g ^b	0	0

Table B.6.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3 G	1	Ending/Paus
	2	8 C
	1	10 D

Table B.6.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3 g	1	-5 am
	1	-8 cm

Table B.6.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4 A ^b	0	0

Table B.6.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4 a ^b	0	0

Table B.6.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5 A	1	10 D
	4	-10 d

Table B.6.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5 a	2	1 F
	4	8 C

Table B.6.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	1	-3 gm
B	1	8 C

Table B.6.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	0	0
bm		

Table B.6.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0
H		

Table B.6.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0
hm		

Table B.6.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	3	1 F
C	4	3 G
	2	5 A
	1	-5 am
	1	10 D

Table B.6.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	1	-3 gm
cm	1	8 C

Table B.6.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	0	0
D ^b		

Table B.6.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	0	0
d ^b		

Table B.6.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	2	3 G
D	1	5 A
	1	-8 cm
	1	-12

Table B.6.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	2	1 F
dm	1	-5 am
	1	12 E

Table B.6.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	0	0
E ^b		

Table B.6.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	0	0
e ^b		

Table B.6.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12 E	1	-5 am

Table B.6.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12 e	1	5 A

Table B.6.25. Statistics of chord -12

B.7. Master chart – Johann Sebastian Bach

In the chart below, Table B.7.1. contains the collected data on all the chorales and solo pieces by Johann Sebastian Bach. The master chart represents the statistics that will be applied to make the blueprints.

Numbers symbolising major chords	1	2	3	4	5	6	7	8	9	10	11	12
The number of the certain major chords in the piece	29	0	14	26	5	11	0	45	19	5	23	1
Numbers symbolising minor chords	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12
The number of the certain minor chords in the piece	33	0	13	0	7	27	0	12	0	7	0	1

Table B.7.1. Statistics on the chords applied in the master chart

Number and starting chord	Number of transitions	Number and ending chord
1	6	Ending/ Paus
	1	-3
	1	3
	1	-5
	6	-6
	4	6

Table B.7.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1	2	Ending/ Paus
	6	-3
	1	3
	7	-6
	2	6
	1	-8
	4	8
	6	9

Table B.7.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2	0	0

Table B.7.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2	0	0

Table B.7.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3	1	Ending/ Paus
	1	5
	1	-7
	3	-8
	7	8
	1	10

Table B.7.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3	1	-1
	1	-5
	3	-6
	2	-8
	4	8
	1	-10
	1	11

Table B.7.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4	2	Ending/Paus
	2	-1
	2	-6
	2	-8
	3	8
	11	9
	4	11

Table B.7.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4	0	0

Table B.7.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	4	-10
	1	10

Table B.7.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	3	1
	4	8

Table B.7.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	1	1
	1	-3
	1	-5
	3	8
	5	11

Table B.7.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	2	-1
	2	1
	3	-3
	2	3
	4	4
	1	-8
	7	8
	6	11

Table B.7.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0

Table B.7.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0

Table B.7.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	3	Ending/ Paus
	17	-1
	12	1
	6	3
	1	-5
	2	5
	1	6
	2	9
	1	10

Table B.7.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	2	-1
	2	1
	2	-3
	3	3
	4	4
	1	6
	1	8
	1	11

Table B.7.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	4	-1
	1	1
	1	-3
	1	4
	7	-6
	1	6
	1	-8
	2	8
	2	11

Table B.7.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	0	0

Table B.7.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	2	3
	1	5
	1	-8
	1	-12

Table B.7.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	1	Ending/ Paus
	2	1
	1	3
	1	-5
	1	6
	1	12

Table B.7.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	1	Ending/ Paus
	2	-1
	2	1
	16	4
	1	8
	1	-8

Table B.7.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	0	0

Table B.7.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	1	-5

Table B.7.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	1	5

Table B.7.25. Statistics of chord -12

Appendix C – Statistics Max Reger

C.1. Statistics Op. 67 No. 14 Herzlich thut mich verlangen

Numbers symbolising major chords	1 A	2 B	3 H	4 C	5 C#	6 D	7 E ^b	8 E	9 F	10 F#	11 G	12 G#
The number of the certain major chords in the piece	8	2	2	7	0	3	0	8	6	0	9	0
Numbers symbolising minor chords	-1 a	-2 b	-3 h	-4 c	-5 c#	-6 d	-7 e ^b	-8 e	-9 f	-10 f#	-11 g	-12 g#
The number of the certain minor chords in the piece	10	0	5	0	1	11	0	6	0	0	1	0

Table C.1.1. Statistics on the chords applied in Herzlich thut mich verlangen Op. 67 No. 14 by Max Reger

Number and starting chord	Number of transitions	Number and ending chord
1	1	End/paus
A	1	-1 am
	1	-3 hm
	4	-6 dm
	1	6 D

Table C.1.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1	1	1 A
a	1	2 B
	1	-3 hm
	1	4 C
	2	-6 dm
	1	6 D
	1	-8 dm
	1	9 F
	1	11 G

Table C.1.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2	1	1 A
B	1	-6 dm

Table C.1.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2	0	0
bm		

Table C.1.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3	1	-5 c#
H	1	8 E

Table C.1.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3 hm	1	3 H
	1	-6 dm
	1	-8 em
	2	8 E

Table C.1.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4	1	-1 am
C	1	2 B
	1	-8 em
	3	9 F
	1	11 G

Table C.1.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4	0	0
cm		

Table C.1.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	0	0
C#m		

Table C.1.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	0	0

Table C.1.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	1	3 H
D	2	11 G

Table C.1.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	1	1 A
dm	1	4 C
	2	8 E
	3	-8 em
	4	11 G

Table C.1.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0
E ^b		

Table C.1.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	0	0
e ^b		

Table C.1.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	1	end/nothing/paus
E	2	1 A
	5	-1 am

Table C.1.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	1	-1 am
em	1	1 A
	1	4 C
	1	8 E
	1	9 F
	1	11 G

Table C.1.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	2	-1 am
F	2	-3 hm
	2	-6 dm

Table C.1.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	0	0
fm		

Table C.1.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	0	0
F#		

Table C.1.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	0	0
f#m		

Table C.1.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	2	1 A
G	1	-3 hm
	4	4 C
	1	-8 em
	1	8 E

Table C.1.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	1	-6 dm
gm		

Table C.1.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	0	0
G#		

Table C.1.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	0	0
g#		

Table C.1.25. Statistics of chord -12

C.2. Statistics Op. 67 No. 27 Nun danket alle Gott

Numbers symbolising major chords	1 G	2 G#	3 A	4 B	5 H	6 C	7 C#	8 D	9 D#	10 E	11 F	12 F#
The number of the certain major chords in the piece	18	0	10	0	7	6	0	19	0	18	3	1
Numbers symbolising minor chords	-1 g	-2 g#	-3 a	-4 b	-5 h	-6 c	-7 c#	-8 d	-9 d#	-10 e	-11 f	-12 f#
The number of the certain minor chords in the piece	1	0	11	0	8	1	1	4	0	12	0	4

Table C.2.1. Statistics on the chords applied in Nun danket alle Gott Op. 67 No. 27 by Max Reger

Number and starting chord	Number of transitions	Number and ending chord
1 G	1	Nothing/end / Paus
	2	-3 am
	3	3 A
	2	-5 hm
	1	5 H
	2	6 C
	3	8 D
	3	-10 em
	1	10 E

Table C.2.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 gm	1	6 C

Table C.2.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2 G#	0	0

Table C.2.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2 g#m	0	0

Table C.2.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3 A	1	1 G
	1	-8 dm
	5	8 D
	2	-12 f#m
	1	12 F#

Table C.2.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3 am	2	1 G
	1	5 H
	1	6 C
	1	-8 dm
	1	8 D
	3	10 E
	1	11 F
	1	-12 f#

Table C.2.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4 B	0	0

Table C.2.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4 bm	0	0

Table C.2.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	1	1 G
H	1	3 A
	2	-10 em
	3	10 E

Table C.2.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	1	1 G
hm	1	8 D
	1	-10 e
	4	10 E
	1	-12 f#

Table C.2.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	2	-3 am
C	1	- 8 dm
	1	8 D
	1	- 10 em
	1	- 6 cm

Table C.2.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	1	1 G
cm		

Table C.2.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0
C#		

Table C.2.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	1	3 A
c#m		

Table C.2.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8 D	8	1 G
	3	-5 hm
	1	5 H
	4	-10 em
	2	10 E
	1	11 F

Table C.2.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8 dm	1	1 G
	1	10 E
	2	11 F

Table C.2.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9 D#	0	0

Table C.2.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9 d#m	0	0

Table C.2.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10 E	6	-3 am
	2	-5 hm
	3	5 H
	1	-7 c#m
	1	-8 dm
	5	8 D

Table C.2.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	1	1 G
em	1	-3 am
	3	3 A
	1	5 H
	2	6 C
	1	8 D
	3	10 E

Table C.2.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	1	-1 gm
	1	1 G
	1	3 A

Table C.2.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	0	0
fm		

Table C.2.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	1	-5 hm
F#		

Table C.2.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	1	3 A
f#m	2	8 D
	1	- 10 em

Table C.2.25. Statistics of chord -12

C.3. Statistics Op. 67 No. 49 Wie schön leuchtet der Morgenstern

Numbers symbolising major chords	1 F	2 F#	3 G	4 A ^b	5 A	6 B	7 H	8 C	9 C#	10 D	11 E ^b	12 E
The number of the certain major chords in the piece	37	0	11	1	10	9	0	31	0	14	3	5
Numbers symbolising minor chords	-1 f	-2 f#	-3 g	-4 a ^b	-5 a	-6 b	-7 h	-8 c	-9 c#	-10 d	-11 e ^b	-12 e
The number of the certain minor chords in the piece	1	1	14	0	8	3	2	1	0	14	0	0

Table C.3.1. Statistics on the chords applied in Wie schön leuchtet der Morgenstern Op. 67 No. 49 by Max Reger

Number and starting chord	Number of transitions	Number and ending chord
1 F	3	Nothing/paus, end
	1	-1 fm
	4	-3 g
	1	3 G
	1	-5 a
	1	5A
	1	-6 b
	8	6 B
	1	-8 c
	12	8 C
	1	-10 d
	3	10 D

Table C.3.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1 fm	1	3 G

Table C.3.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2 F#	0	0

Table C.3.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2 F#m	1	12 E

Table C.3.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3 G	1	-5
	1	5
	1	-6
	8	8

Table C.3.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3 gm	4	1 F
	1	3 G
	2	-5
	2	8
	2	-10
	2	10
	1	11

Table C.3.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4 A ^b	1	5 A

Table C.3.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4 a ^b	0	0

Table C.3.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5 A	1	-7 hm
	1	8 C
	5	-10 dm
	3	10 D

Table C.3.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	2	1 F
am	1	-3 gm
	1	6 B
	2	-10 dm
	1	10 D
	1	12 E

Table C.3.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	3	1 F
B	1	-3 gm
	1	4 A ^b
	1	8 C
	1	10 D
	2	11 E ^b

Table C.3.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	2	1 F
bm	1	3 G

Table C.3.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0
H		

Table C.3.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	1	3 G
h	1	5 A

Table C.3.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	20	1 F
C	2	3 G
	1	-5 am
	2	5 A
	2	-10
	4	10

Table C.3.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	1	10 D
cm		

Table C.3.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	0	0
D ^b		

Table C.3.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	0	0
d ^b		

Table C.3.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	7	-3 gm
D	2	3 G
	2	5 A
	1	-7 hm
	2	12 E

Table C.3.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	3	1 F
dm	2	3 G
	1	5 A
	1	6 B
	5	8 C
	1	10 D
	1	12 E

Table C.3.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	1	1 F
E ^b	1	-3 gm
	1	8 C

Table C.3.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	0	0
e ^b		

Table C.3.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	1	-2 f#m
E	1	-5 A
	3	-5 am

Table C.3.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	0	0
em		

Table C.3.25. Statistics of chord -12

C.4. Master chart – Max Reger

In the chart below, Table B.4.1. contains the collected data on all the solo pieces by Max Reger. The master chart represents the statistics that will be applied to make the blueprints.

Numbers symbolising major chords	1	2	3	4	5	6	7	8	9	10	11	12
The number of the certain major chords in the piece	63	2	23	8	17	18	0	58	6	32	15	6
Numbers symbolising minor chords	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12
The number of the certain minor chords in the piece	12	1	30	0	17	15	3	11	0	26	1	4

Table C.4.1. Statistics on the chords applied in the master chart

Number and starting chord	Number of transitions	Number and ending chord
1	5	Nothing end paus
	2	-1
	7	-3
	4	3
	3	-5
	2	5
	5	-6
	11	6
	1	-8
	15	8
	4	-10
	4	10

Table C.4.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1	1	1
	1	2
	1	-3
	1	3
	1	4
	2	-6
	2	6
	1	-8
	1	9
	1	11

Table C.4.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2	1	1
	1	-6

Table C.4.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2	1	12

Table C.4.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3	1	1
	2	-5
	2	5
	1	-6
	1	-8
	14	8
	2	-12
	1	12

Table C.4.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3	6	1
	2	3
	2	-5
	1	5
	1	-6
	1	6
	2	-8
	5	8
	2	-10
	5	10
	2	11
	1	-12

Table C.4.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4	1	-1
	1	2
	1	5
	1	-8
	3	9
	1	11

Table C.4.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4	0	0

Table C.4.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	1	1
	1	3
	1	-7
	1	8
	7	-10
	6	10

Table C.4.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5	3	1
	1	-3
	1	6
	2	8
	3	-10
	5	10
	1	-12
	1	12

Table C.4.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	3	1
	3	-3
	1	3
	1	4
	1	-6
	1	-8
	2	8
	1	-10
	1	10
	4	11

Table C.4.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	4	1
	1	3
	1	4
	3	-8
	2	8
	4	11

Table C.4.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7	0	0

Table C.4.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	2	3
	1	5

Table C.4.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	1	end or paus
	5	-1
	30	1
	2	3
	4	-5
	3	5
	8	-10
	4	10
	1	11

Table C.4.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	1	-1
	2	1
	1	4
	1	8
	1	9
	3	10
	2	11

Table C.4.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	2	-1
	2	-3
	2	-6

Table C.4.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	0	0

Table C.4.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	13	-3
	2	3
	2	-5
	5	5
	2	-7
	1	-8
	5	8
	2	12

Table C.4.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	4	1
	1	-3
	5	3
	2	5
	3	6
	6	8
	4	10
	1	12

Table C.4.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	1	-1
	4	1
	2	-3
	1	3
	4	4
	1	-8
	2	8

Table C.4.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	1	-6

Table C.4.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	1	-2
	4	-5
	1	5

Table C.4.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	1	3
	2	8
	1	-10

Table C.4.25. Statistics of chord -12

Appendix D – Statistics *Philippe Lefebvre*

D.1. Master chart - Philippe Lefebvre

In the chart below, Table D.1.1. contains the collected data on Lefebvre's improvisation. The master chart represents the statistics that will be applied to make the blueprints.

Numbers symbolising major chords	1 D	2 D [#]	3 E	4 F	5 F [#]	6 G	7 G [#]	8 A	9 B	10 H	11 C	12 C [#]
The number of the certain major chords in the piece	2	5	4	1	6	9	0	4	15	0	15	2
Numbers symbolising minor chords	-1 d	-2 d [#]	-3 e	-4 f	-5 f [#]	-6 g	-7 g [#]	-8 a	-9 b	-10 h	-11 c	-12 c [#]
The number of the certain minor chords in the piece	4	0	7	0	1	6	2	2	2	2	0	10

Table D.1.1. Statistics on the chords applied in the master chart

Number and starting chord	Number of transitions	Number and ending chord
1	1	-1 dm
D	1	3 E

Table D.1.2. Statistics of chord 1

Number and starting chord	Number of transitions	Number and ending chord
-1	1	2 E ^b
dm	1	G
	2	11 C

Table D.1.3. Statistics of chord -1

Number and starting chord	Number of transitions	Number and ending chord
2	1	-3 em
E ^b /D [#]	1	4 F
	2	8 A
	1	11 C

Table D.1.4. Statistics of chord 2

Number and starting chord	Number of transitions	Number and ending chord
-2 e ^b	0	0

Table D.1.5. Statistics of chord -2

Number and starting chord	Number of transitions	Number and ending chord
3	1	Nothing/paus/ end
em	1	1 D
	1	2 E ^b
	1	9 B

Table D.1.6. Statistics of chord 3

Number and starting chord	Number of transitions	Number and ending chord
-3 em	1	2 E ^b /D [#]
	3	-6 gm
	1	-8 am
	2	-12 c [#] m

Table D.1.7. Statistics of chord -3

Number and starting chord	Number of transitions	Number and ending chord
4 F	1	12 C [#] D ^b

Table D.1.8. Statistics of chord 4

Number and starting chord	Number of transitions	Number and ending chord
-4 fm	0	0

Table D.1.9. Statistics of chord -4

Number and starting chord	Number of transitions	Number and ending chord
5	3	6 G
F [#]	2	11 C
	1	-12 c [#] m

Table D.1.10. Statistics of chord 5

Number and starting chord	Number of transitions	Number and ending chord
-5 F#m	1	-7 g#m

Table D.1.11. Statistics of chord -5

Number and starting chord	Number of transitions	Number and ending chord
6	1	Nothing/Paus/ End
G	1	-1 dm
	3	5 F#
	4	9 B

Table D.1.12. Statistics of chord 6

Number and starting chord	Number of transitions	Number and ending chord
-6	1	3 E
gm	1	-7 g#m
	2	9 B
	1	11 C
	1	-12 c#m

Table D.1.13. Statistics of chord -6

Number and starting chord	Number of transitions	Number and ending chord
7 G#	0	0

Table D.1.14. Statistics of chord 7

Number and starting chord	Number of transitions	Number and ending chord
-7	1	9 B
G#m	1	-10 hm

Table D.1.15. Statistics of chord -7

Number and starting chord	Number of transitions	Number and ending chord
8	1	-3
A	2	5 F#
	1	11 C

Table D.1.16. Statistics of chord 8

Number and starting chord	Number of transitions	Number and ending chord
-8	1	-5 f [#] m
am	1	9 B

Table D.1.17. Statistics of chord -8

Number and starting chord	Number of transitions	Number and ending chord
9	1	-1 dm
B	1	-3 em
	1	5 F [#]
	7	11 C
	4	-12 c [#] m
	1	12 C [#] /D ^b

Table D.1.18. Statistics of chord 9

Number and starting chord	Number of transitions	Number and ending chord
-9	2	-12 c [#] m
bm		

Table D.1.19. Statistics of chord -9

Number and starting chord	Number of transitions	Number and ending chord
10	0	0
H		

Table D.1.20. Statistics of chord 10

Number and starting chord	Number of transitions	Number and ending chord
-10	1	-1 dm
hm	1	3 E

Table D.1.21. Statistics of chord -10

Number and starting chord	Number of transitions	Number and ending chord
11	2	2 E ^b
C	1	3 E
	3	-6 gm
	2	6 G
	1	-8 am
	1	8 A
	4	9 B
	1	-10 hm

Table D.1.22. Statistics of chord 11

Number and starting chord	Number of transitions	Number and ending chord
-11	0	0
cm		

Table D.1.23. Statistics of chord -11

Number and starting chord	Number of transitions	Number and ending chord
12	1	6 G
C [#] /D ^b	1	9 B

Table D.1.24. Statistics of chord 12

Number and starting chord	Number of transitions	Number and ending chord
-12	1	Nothing/ paus/ end
C [#] m	3	-3 em
	2	6 G
	1	8 A
	2	-9 a [#] m
	1	11 C

Table D.1.25. Statistics of chord -12

Appendix E – *Professor Nelson's comments*

E.1. In Swedish

Professor Nelson's kommentarer till Joel Bergströms improvisationer (2020-04-15)

Improvisation 1, Praeludium:

Härlig stilkänsla, inspirerat av Buxtehudes preludier. Bra återanvändning av tematik i början, det tar dock några sekunder innan jag förstår temats placering i pulsslagen, tydligare betoningar i inledningen skulle kunna hjälpa detta. Bra form med balans mellan fria och strikta partier, låter "Buxtehudiskt". Någon kadens i fugan sticker ut, känns lite väl modern i sammanhanget, även någon modulation (en snabb oktavparallell och ett oväntat kvartsexackord i en kadens). Men så är det, vi har ju hela musikhistorien efter Buxtehude och fram till våra dagar, i vårt medvetande. Vi känner till vändningar som Buxtehude aldrig kunde drömma om. Saknar lite större frihet i andningar mellan de olika partierna, "have more fun!" och lita på din musikalitet. Annars blir det risk att det teoretiska perspektivet tar över och resultatet blir ett något för kontrollerat och förutbestämt spel.

Improvisation 2, Passacaglia i d:

Ciaconne/improvisation

Ackordföljd, börjar lugnt och meditativt, känns mycket organiskt. Efter några vändor finns en tendens att stabiliteten bryts och det blir en viss oro i pulsen när det blir kortare notvärden. Fint med arpeggion, även om övergången inte är helt naturlig i andning. Modulationen från d-m till F-dur med ett F-sus som överledning (i den specifika läggningen) bryter av stilkänslan för ett kort ögonblick. De olika delarna varierar både i registrering och styrka, vilket gör att övergångarna kan vara lite svåra att bemästra. För en organist är detta alltid en känslig punkt, särskilt om man registrerar själv. Därefter ytterligare avsnitt, brutna ackord på svagare registrering följt av pedalsolo med ackordläggningar i händerna. Svårigheten är att, trots de olika idéerna, ändå hålla tråden. I codan en friare del med pedalsolo, här hade det varit bra med större frihet för att förstärka kontrasten mellan det stabila och fria, gäller särskilt de sista tonerna till det långa gisset i pedalen. Risken är annars att det låter för välregisserat. Generellt visar du att du har en övertygande stilkänsla!

Improvisation 3, Frescobaldi 1:

F-dur, elevationstoccata – övertygande inledning med långa ackord. Ett kvartsexackord i Cdur sticker ut i början, kommer lite plötsligt. Men mycket fungerar bra, bland annat förhållningar som leder till nya harmoniska vägar. Vissa partier fungerar så övertygande att jag verkligen tror att det är Frescobaldi. Det händer att det förekommer några "surprises" i stilen, dessa gör dock allt levande och fräscht, så varför inte? För att jag på riktigt ska beröras inombords, hade det behövts ett större liv i fraserna. Koden till detta är sannolikt att låta de harmoniska riktningarna få styra förloppet, det vill säga låta harmoniken påverka det linjära så att det finns en rörelse både framåt och tillbaka i fraserna. Grundpulsen kan med fördel vara lite lugnare, i stil med magin i en elevationstoccata.

Improvisation 4, Frescobaldi 2:

F-dur, elevationstoccata. Något kvartsexackord sticker ut. Idéer från förra toccatan, flyter på bra, mer homogent i stilen i denna version, låter mer övertygande. Första halvan klingar mer "Frescobaldi" än förra exemplet. Däremot anser jag att det inledande harmoniska förloppet E- am går lite för snabbt för att vara starten på en, som jag uppfattar, elevationstoccata. Jag uppskattar även grundkaraktären bättre än i inspelning 3. Jag anser att du är med i det harmoniska förloppet på ett annat sätt, allt känns mer levande och trovärdigt i detta exempel.

Improvisation 5, Frescobaldi 3:

Börjar med ett E-durackord, bra och långt ackord. Låter modernt i någon takt. Lite Arvo Pärt när tonen c i basstämman ligger kvar och övriga stämmor förändras och hålls över. Resultatet blir ackord som Frescobaldi nog inte kunde tänka sig men som jag upplever som intressanta, nytt och fräscht utan att störa helheten! Viss rörelse i den harmoniska pulsen som jag upplever positivt. Några idéer återkommer regelbundet, som sext- och oktavsprång i sopranstämman (i andra delen).

Improvisation 6, Bach hymn 113:

Cantus firmus i sopranstämman och figurerade stegvisa rörelser i understämman samt pedalstämman som genom sin existens och långa toner sätter det harmoniska fundamentet. Vackert och harmoniskt rätt i stilen, som framförande dock lite trevande.

Improvisation 7, Bach hymn 144:

O Haupt voll Blut und Wunden. Introduktion med imiterande stämmor i händerna och med pedalstämman i form av continuobas. Perioden innan melodin introduceras är inte helt organisk i puls. Därefter cantus firmus i sopran och långa notvärden. Frasen med melodin h-c-c-h-h-a och harmoniken E-am-D/Fiss-G-E/Giss-am är verkligen i stil med Bachs harmonik. I slutet förändras den harmoniska pulsen beroende på att cantus firmus spelas för snabbt. Som helhet mycket vacker sats!

Improvisation 8, Bach hymn 491:

Cantus firmus i pedalen med figurerad mellanstämman och ornamenterad överstämman. Lite trevande, inte helt organiskt i framförandet. Uppgiften är dock mycket avancerad. Det är svårt att hitta harmoniska lösningar med melodin i pedalen som klingar naturligt i stilen, därför blir det en del lösningar som sticker ut.

Improvisation 9, Reger hymn 121:

Förspelet D-A/ciss-hm E-A/ciss-D-A, skulle ha behövt lite mer ”finesser” för att upplevas som ”regerskt”. När cantus firmus, ”När juldagsmorgon glimmar” presenteras är det mycket Reger i denna version, inklusive registreringen med ett stort crescendo och diminuendo. Ett dim-ackord (vid meloditonerna d2 med texten ”natt”) bryter denna känsla, även om Reger använder sådana, är det något som fattas i sammanhanget, före och efter detta ackord. Fraserna därefter upplever jag verkligen går i Regers fotspår!

Improvisation 10, Reger hymn 249:

Klingar ”Reger” om detta i harmonik och stämföring. För att bli ytterligare trovärdigt behövs ett friare förhållningssätt till fraserna, mer linjer och riktning i fraser samt genomgående legatospel. Fint också om längden på meloditonerna kunde vara mer organisk, med en homogen längd på tonerna.

Improvisation 11, Reger hymn 155:

Klingar ”regerskt” både i harmonik och stämföring. För att bli ytterligare trovärdigt behövs ett friare förhållningssätt till fraserna, mer linjer och riktning i fraser samt genomgående legatospel. Låt harmoniken påverka interpretationen, tänk mer linjärt för att få ett mer levande spel. Harmoniskt har du verkligen knäckt koden! Eftersom koralen börjar med en uppmaning: ”Herren lever, våga tro det” kunde det vara lämpligt att låta musiken påverkas av denna karaktär. Kanhända genom att börja mer bestämt och i en starkare nyans.

Improvisation 12, Lefebvre Hymn 1:

Toccata med mediantlek, rytmisk och full av energi. Jag har inga särskilda kommentarer, härligt att lyssna till. Avslutningen upplever jag lite ödesmättad med de sista mollackorden innan slutackordet. Rimmor kanhända inte med psalmtemats karaktär (Te Deum).

Improvisation 13, Lefebvre Hymn 18:

Dramatisk start, mycket energi. Starten kunde ha varit mer distinkt. Intressanta överledningar, de olika delarna håller ihop på ett naturligt sätt. Även i denna version är det mycket mollackord som ger en ödesmättad attityd, med medianter. Förstår dock att detta även är fallet med den musikaliska förlagan. Den virtuosa slutklämmen sticker ut lite väl mycket från sammanhanget. Denna fungerar bra i många sammanhang, här blir den dock lite påklitrad eftersom den skiljer sig så mycket från det som har skett tidigare.

Improvisation 14, Messiaen, The Book of Psalms 19.2:

Inledningsvis stora stilkontraster. Först djupt kluster, därefter en kort temapresentation följt av en mycket snabb utveckling (till bl.a. ackordet G9). I min smak för snabb utveckling och ackord som inte är så karaktäristiska för Messiaens musik. Därefter lugnt parti, först nu känns Messiaens tonspråk igen. Fin atmosfär, stämningsfullt med de sirliga utsmyckningarna i sopranstämman på olika soloregister. Därefter stora ackord med snabba pedalrörelser och mycket energi. Plötslig övergång till ett svagare parti, detta fungerar utmärkt.

Sammanfattningsvis: Härliga improvisationer! Det är uppenbart att du kan "glosorna" men våga även inspireras av språket och lita på att du har bra uttal! Med detta menar jag att du i dessa improvisationer visar att du hittar de karaktäristiska dragen i olika stilarter. Det som kan utvecklas är att göra dessa olika tonspråk till dina egna språk för att komma ifrån känslan av imitation. Du visar med dessa inspelningar att du är på mycket god väg!

E.2. Translated to English by Joel Bergström

Professor Nelson's comments to Joel Bergström's improvisations (2020-04-15)

Improvisation 1, Praeludium:

Lovely sense of style, inspired by Buxtehude's preludes. Good reuse of the theme in the beginning, however, it takes a few seconds before I understand the theme's placement to the beat, clearer emphasis in the introduction could help this. Good balance between the free and strict parts, sounds "Buxtehude". Some cadence in the fugue stands out, feels a bit modern in the context, even some modulations (a quick octave parallel and an unexpected second inversion). But that is how it is, we have the whole music history after Buxtehude and up to our days, in our consciousness. We know twists and turns that Buxtehude could never have dreamt of. Lacks a little more freedom in breathing between the different sections, "Have more fun!" and trust your musicality. Otherwise, there is a risk that the theoretical perspective will take over and may become a somewhat controlled and predetermined game.

Improvisation 2, Passacaglia in d:

Ciaconne/improvisation

The chord sequence, beginning calmly and meditatively, feels very organic. After a few turns, there is a tendency for the stability to break and there will be some concern in the pulse when there are shorter note values. Nice arpeggios, although the transition is not completely natural in breathing. The modulation from d-m to F-major with an F-sus as the link (in the specific position) breaks off the sense of style for a moment. The different parts vary in both registration and strength, which means that the transitions can be a little difficult to master. For an organist, this is always a sensitive situation, especially if you register yourself. Then further sections, broken chords on weaker registration followed by pedal solo with chords in the hands. The difficulty is, despite the different ideas, still holding the thread. In the coda a freer part with pedals solo, here it would have been good with more freedom to enhance the contrast between the stable and free, especially the last notes and the long g-sharp in the pedal. The risk is otherwise that it otherwise sounds too well directed. In general, you show that you have a convincing sense of style!

Improvisation 3, Frescobaldi 1:

F major, elevation toccata - convincing introduction with long chords. A second inversion in C major stands out in the beginning, comes a little abruptly. But a lot works well, including relations that lead to new harmonious paths. Some sections work so convincingly that I really think it is Frescobaldi. It happens that there are some surprises in the style, however, these make everything alive and fresh, so why not? to be touched, it would have required a greater life in the phrases. The code for this is likely to allow the harmonic directions to control the process, that is, to allow the harmonics to affect the linear movement so that there is a direction both forward and back in the phrases. The tempo should be more Tranquillo, in the style of magic in an elevation toccata.

Improvisation 4, Frescobaldi 2:

F major, elevation toccata. Some second inversion stand out. Ideas from the previous toccata, is more homogeneous in the style of this version, sounds more convincing. The first half sounds more "Frescobaldi" than the last example. On the other hand, I believe that the initial harmonic progression E-am goes a little too fast to be the start of a, which I perceive, elevation toccata. I also appreciate the basic character better than in recording 3. I think you are part of the harmonic process in a different way, everything feels more alive and credible in this example.

Improvisation 5, Frescobaldi 3:

Begins with an E-major chord, good and long chord. Sounds modern in some measure. A little like Arvo Pärt when the pitch c in the bass remains and the other voices change. The result is a chord that Frescobaldi probably could not imagine, but which I find interesting, new and fresh without disturbing the whole! Some movement in the harmonic pulse that I experience positively. Some ideas come back regularly, leaps of sixths and octaves in the soprano (in the second part).

Improvisation 6, Bach hymn 113:

Cantus firmus in the soprano part and figured incremental movements in the lower part as well as the pedal part which, through its existence and long notes, set the harmonic foundation. Beautiful and harmonious right in the style, as a performance though a bit fumbling.

Improvisation 7, Bach hymn 144:

O Haupt voll Blut und Wunden. Introduction with imitation voices in the hands and with pedal part in the form of continuo bass. The period before the melody is introduced is not entirely organic in pulse. Then cantus firmus in the soprano and in long note values. The phrase with the melody b-c-c-b-b-a and the harmony E - am - D F# - G - E/G# - am is really in the style of Bach's harmony. In the end, the harmonic pulse changes due to the cantus firmus playing too fast. Overall a very beautiful movement!

Improvisation 8, Bach hymn 491:

Cantus firmus in the pedal with a figured middle voice and an ornamented solo voice. A little fumbling, not quite organic in the performance. However, the task is very advanced. It is difficult to find harmonic solutions with the melody in the pedal that sound natural in the style, therefore there are some solutions that stand out.

Improvisation 9, Reger hymn 121:

The short prelude D - A/c# - hm E - A/c# - D - A, would have needed a little more "finesse" to be perceived as "Reger". When the cantus firmus, "When Christmas Morn is Dawning" is presented, there is a lot of Reger in this version, including the registration with a large crescendo and diminuendo. A diminished chord (at the melody pitch d2 with the text "night") breaks this feeling, although Reger uses them, something is missing in the context, before and after this chord. The phrases after that I experience really follow in Reger's footsteps!

Improvisation 10, Reger hymn 249:

Sounds "Reger" in harmony and polyphony. To become even more credible, a freer approach to the phrases is needed, more lines and direction in phrases as well as a consistent legato. Also, nice if the length of the melody notes could be more organic, with one homogeneous length of the notes.

Improvisation 11, Reger hymn 155:

Sounds "Reger" both in harmony and polyphony. To become even more credible, a freer approach to the phrases is needed, more lines and direction in phrases as well as a consistent legato. Let the harmony affect the interpretation, think more linear to get a more vivid improvisation. Harmonically, you've really cracked the code! Since the chorale begins with a call: "The Lord lives, dare to believe it" it might be appropriate to let the music be affected by this character. Perhaps by starting more firmly and in a stronger dynamic.

Improvisation 12, Lefebvre Hymn 1:

Toccata playing with mediants, rhythmic and full of energy. I have no specific comments, great to listen to. The end gives a fate-filled attitude with the last minor chords before the final chord. Might be that it does not rhyme with the character of the hymn theme (Te Deum).

Improvisation 13, Lefebvre Hymn 18:

Dramatic start, lots of energy. The start could have been more distinct. Interesting links, the different parts hold together in a natural way. In this version too, there are many minor chords that give a fate-filled attitude, with mediants. However, I understand that this might depend on the musical original. The virtuoso end stands out a bit too much from the context. The end works well in many contexts, but here it becomes a bit pasted because it differs so much from what has happened before.

Improvisation 14, Messiaen, The Book of Psalms 19.2:

Initially large style contrasts. First a deep cluster, then a short theme presentation followed by a very rapid development (including the chord G9). A little too rapid for my taste and chords that are not so characteristic of Messiaen's music. After that, a soft section, only now Messiaen's tone language is recognized. Nice atmosphere, full of feeling with elegant decorations in the soprano part on various solo registers. Then big chords with fast pedal movements and a lot of energy. Sudden transition to a softer section, this works great.

To sum up: Lovely improvisations! Obviously, you know "the glosses" but dare to be inspired by the language and trust that you have a good pronunciation! By this I mean that you in these improvisations find the characteristic features of different styles. What can be developed is to make these different musical languages your own, in order to get away from the feeling of imitation. With these recordings, you show that you are well on your way!

Appendix F – *The Gustavsson & Kjersgaard Organ*

Information below retrieved from:

GUPEA. *The Gustavsson & Kjersgaard Organ*, Accessed January 15, 2020, from https://gupea.ub.gu.se/bitstream/2077/31853/1/gupea_2077_31853_1.pdf

The instrument was built by Robert Gustavssons Orgelbyggeri in Härnösand in 1993 and voiced by Mads Kjersgaard, Uppsala. The façade was designed according to early 17th-century Baroque examples. Although there was no one specific model for the façade, certain elements of the former organ in the German Church in Stockholm (now reconstructed) were used. The original façade and two divisions of that instrument, built by Paul Müller in 1608, are preserved in Övertorneå. The Principal stops – made in the style of George Herman and Philip Eisenmenger, two 17th-century builders who also worked on the above-mentioned organ of the German Church in Stockholm – were designed with uniform scaling. The cut-ups, however, have different proportions, so that a variation in sound is achieved. The open pipes are cut to length. The case is made of pine and painted. The wind chests and the action are made of oak. All of the Pedal stops are made of wood (pine or oak). The stop names were painted by hand, with Latin names in Roman letters, and German names in Gothic letters.

Specification

Huvudverk (I) • C–g3	Bröstverk (II) • C–g3
Principal 8	Grob Gedact 8
Block Floit 8	Octava 4
Octava 4	Klein Gedact 4
Quer Floit 4	Flöjt 2
Quinta 3	Regal 8
Super Octava 2	Tremulant
Scharf II	Pedal • C–f1
Trompet 8	Sub Bas 16
	Octav Bas 8
	Trompet Bas 8

Couplers: II/I, I/P, II/P, II 4/P

Pitch: a1 = 440 Hz

Temperament: Kirnberger-III

Schwimmer bellows and concussion bellows

Wind pressure: 70 mm

Appendix G – *The North German Baroque Organ*



Information below retrieved from:

GOART. *The North German Baroque Organ*, Accessed January 15, 2020, from http://goart-vas-1.it.gu.se/webgoart/goart/go_pub.php?p=9&u=1&f=334&l=sv§sel=sform

Örgryte New Church The North German Baroque Organ The monumental city organs built in our cultural sphere during the Baroque period represented the pinnacle of that time's architecture, music, mechanics, mathematics, art, and technology. The organs of the North German cities developed during the most prominent period of organ art, the time of organists such as Heinrich Scheidemann, Matthias Weckman and Dieterich Buxtehude. The aim of the North German Organ Research Project was to reconstruct, on a scientific basis, a 17th-century North German organ in the style of Arp Schnitger (1648-1719). Within the project, methods of ancient organ building handicraft were reconstructed. This was made possible through the combination of extensive research on pipe material, acoustics, and air flow dynamics at Chalmers University of Technology, and through experimentation with and development of craft techniques in GOART's Research Workshop at the University of Gothenburg. The North German Baroque Organ has four manuals, pedal and 54 stops, and its specification was modeled on that of Schnitger's organ in the Hamburg Jakobi Church. The façade is a copy of the 1699 Schnitger organ façade in the Lübeck Cathedral (this organ was destroyed during World War II).

Specification

Pedal • CD-d1	Rück Positiv (I) • CDE-c3	Werck (II) • CDEFGA-c3	Ober Positiv (III) • CDEFGA-c3	Brust Positiv (IV) • CDEFGA-c3
Principal 16	Principal 8	Principal 16	Principal 8	Principal 8
SubBass 16	Quintadena 8	Quintaden 16	Hollfloit 8	Octav 4
Octav 8	Gedact 8	Octav 8	Rohrfloit 8	Hollfloit 4
Octav 4	Octav 4	Spitzfloit 8	Octav 4	Waltfloit 2
Rauschpfeiffe 3 fach	Blockfloit 4	Octav 4	Spitzfloit 4	Sexquialter 2fach
Mixtur 6.7.8fach	Octav 2	Super Octav 2	Nassat 3	Scharff 4.5.6fach
Posaunen (from F) 32	Quer Floit 2	Rauschpfeiff 2 fach	Octav 2	Dulcian 8
Posaunen 16	Sieffloit 11/2	Mixtur 6.7.8 fach	Gemshorn 2	Trechter Regal 8
Dulcian 16	Sexquialt 2 fach	Trommet 16	Scharff 6fach	
Trommet 8	Scharff 6.7.8 fach		Cimbel 3fach	
Trommet 4	Dulcian 16		Trommet 8	
Cornet 2	Bahrpfeiff 8		Vox Humana 8	
			Zincke (from f°) 8	

Couplers: OP/W, BP/W

Cimbelstern

Vogelgesang

Trommel

Sperrventile: W, RP, OP, BP, Pedal

Hauptsperrventiel

Tremulant

Tremulant RP

Tremulant Pedal

12 bellows of 4' x 8'

Pitch and temperament: a1 = 465 Hz (at 19° C);

quarter-comma meantone

Subsemi-keys in all manuals:

eb°/d#°, g#°/ab°, eb1/d#1, g#1/ab1, eb2/d#2

In RP, add: bb°/a#°, bb1/a#1, g#2/ab2

Pedal: eb°/d#°, g#°/ab°

Interchangeable wind systems

Appendix H – *The Willis Organ*



Information below retrieved from:

GOART. *The Willis Organ*, Accessed January 15, 2020, from http://goart-vas-1.it.gu.se/webgoart/goart/go_pub.php?p=9&u=1&f=334&l=sv§sel=sform

Örgryte New Church Willis organ, originally built c. 1871 for St. Stephen's Church in Hampstead, London by Henry Willis, who was the leading organ-builder in England from 1850. When the church in Hampstead was closed in 1971, the organ was disassembled and sold to the Netherlands. In 1992, the Academy of Music in Gothenburg learned of the instrument, after which it was purchased by Tostareds Organ Factory and in 1998 by the Örgryte Assembly Organ Foundation. The organ is the largest Victorian organ of British manufacture in Sweden.

Specification

Pedal C - fl	Choir (I) C - g3	Great (II) C - g3	Swell (III) C - g3
Grand Open Diap. 16'	Dulciana 8'	Double Diapason 16'	Contra Gamba 16'
Violone Metal 16'	Lieblich Gedact 8'	Open Diapason 8'	Open Diapason 8'
Bourdon 16'	Gemshorn 4'	Claribel Flute 8'	Lieblich Gedact 8'
Violoncello 8'	Flute harmonique 4'	Viola 8'	Gamba 8'
Ophicleide 16	Piccolo 2'	Octave 4'	Voix Celeste 8'
	Corno di Bassetto 8'	Quint 2 2/3'	Octave 4'
		Super Octave 2'	Flageolet 2'
		Mixture 3 ch	Cornocean 8'
		Bombarde 8'	Hautboy 8'
			Wox humana 8'
			Clarion 4'
			Tremulant

Gr/P, Ch/P, Sw/P, Sw/Gr, Ch/Gr, Sw/Ch, Sw/Gr 4', Sw/Gr 16', 7 fixed combinations: Comb 1: Gr & Ped.I Claribel Flute 8', Viola 8' & Bourdon 16'. Comb 2: Gr & Ped.II: Open Diapason 8', Claribel Flute 8', Viola 8', Octave 4' & Violone 16' Bourdon 16'. Komb 3: Gr & Ped III: Double Diapason 16' to Super Octave 2' without Viola, Claribel Flute & Grand Open Diapason to Violoncello with exception for Bourdon. Comb 4: Gr & Ped IV: all stops with exception of Viola, Claribel Flute & Bourdon. Comb 5: Swell I: Lieblich Gedact 8', Gamba 8'. Comb 6: Swell II: Open Diapason 8', Lieblich Gedact 8', Gamba 8', Octave 4', Hautboy 8'. Comb 7: Swell III: all stops register with exceptions of Voix Celeste 8'. Wox Humana 8' och Tremulant.

Appendix I – *The French Symphonic Organ*



Information below retrieved from:

Gothic Catalog. *The French Symphonic Organ*, Accessed January 15, 2020, from https://www.gothic-catalog.com/Gothenburg_Sweden_Verschueren_French_Symphonic_organ_s/781.htm

The French romantic organ at HMS, Högkolan för Scen och music, Gothenburg was built 1998 by Verschuren Orgelbuow. Its design is based on the style by Cavaille-Coll and copied to reflect the French romantic aesthetic. It has 43 registers, a fully developed symphonic organ for a small concert hall.

Specification

PÉDALE, C–g ¹	GRAND-ORGUE (Manual I), C–a ³	POSITIF (Manual II), C–a ³ – enclosed	RÉCIT (Manual III), C–a ³ – enclosed
<i>laie de fonds</i>	<i>laie des fonds</i>	<i>laie des fonds</i>	<i>laie des fonds</i>
32 Basse acoustique	16 Principal	8 Cor de nuit	16 Bourdon
16 Soubasse	8 Montre	8 Salicional	8 Flûte harmonique
16 Contrebasse	8 Salicional	8 Flûte traversière	8 Viole de Gambe
8 Flûte	8 Bourdon	4 Prestant	8 Voix céleste
4 Octave	8 Flûte harmonique	4 Flûte douce	4 Flûte octavante
	4 Prestant	16 Cor anglais	8 Voix humaine
			8 Basson et Hautbois
<i>laie d'anches</i>	<i>laie de combinaison</i>	<i>laie de combinaison</i>	<i>laie de combinaison</i>
16 Bombarde	2 ² / ₃ Quinte	2 ² / ₃ Nazard	2 ² / ₃ Nazard
8 Trompette	2 Doublette	2 Quarte de Nazard	2 Octavin
4 Clairon	4 Cornet IV	1 ³ / ₅ Tierce	1 Piccolo
	1 Plein jeu IV–V	1 ¹ / ₃ Plein jeu III–IV	16 Basson
	8 Trompette	8 Cromorne	8 Trompette harmonique
			4 Clairon harmonique
			Trémolo

Pédales de combinaison

Orage

Tirasse G.O.

Tirasse Pos.

Tirasse Réc.

Copula G.O. (Barker Machine)

Octaves graves G.O.

Appel Comb. (= Setzer)

Anches Péd.

Anches G.O.

Anches Pos.

Expression Pos.

Expression Réc.

Anches Réc.

Appel Comb. (= Setzer)

Copula Pos. au G.O.

Copula Réc. au G.O.

Trémolo Réc.

Copula Réc. au Pos.

Appendix J – Terminology

Blueprint	A chart containing Contours and harmony gathered from the master chart. It is from the blueprints I can make improvisations.
Cantus Firmus	The melody.
Construction	A part of the method in which improvisations are made from the blueprints and we have a result that will be reflected on, commented on by my improvisation teacher professor Nelson.
Chromatic Function Analysis	Is a model with added concepts that originates from traditional function analysis. It is both a Direction-based system and a Position-based system. In this thesis it operates as a Position-based system.
Contours	Refers to the sequence of motions between notes of a melody. In this thesis I use contours I.e. a melody and bassline together with the harmony from the master chart to create blueprints.
Data collection	Is the process to collect harmony in a piece of music and later make a chart of the chords probability to go to another chord.
Deconstruction	A part of the method to deconstruct music into chords and functions and analyse it statistically. It is not to be associated with the post-structuralist analysis by Derrida
Direction-based system	A system, in which all chords are given a specific function that is determined by previous or next coming chord. It cannot work to collect data.
Dominant	A function that usually represents the fifth scale degree. In this thesis it is spelled with an uppercase D to not confuse theoreticians who have studied other terminology. Being Uppercased it is understood as Major.
Dual representation	A term from The Chromatic Function Analysis Model to deal with the reinterpretation of an altered chord. In this thesis it is used to be able to categorize such chords to collect data.
Explicit Knowledge	Knowledge that can be readily articulated, codified, stored and accessed.
Extensions	Triads with notes extended, or added, beyond the seventh. Ninth, eleventh, and thirteenth chords are extended chords.
Figuration	A figure of notes.

Fiori Musicali Op.12	Is a collection of liturgical music by the composer Girolamo Frescobaldi.
Function Analysis	The theory on functions created by Hugo Riemann and is commonly taught in German speaking countries and Scandinavia. It is a direction-based system.
Harmony	In this thesis Harmony is commonly referred to chords built on triads.
Master chart	A chart containing the compiled data from all the music pieces to show a chords probability to go to another chord. It is from the master chart the blueprints can be created through being provided with statistics.
Modes of limited transposition	Are scales or modes that were published in <i>La technique de mon langage musical, The Technique of my Musical Language</i> by Olivier Messiaen.
Musical language	A musical language to me is the entire atmosphere that is being created in order to move me. To me harmony is one of the most central aspects in the language. The other two are melody and rhythm.
N.C	Stands for No Chord.
Op. 67	Is a collection of liturgical music by the composer Max Reger.
Patterns	Several chords that joined together forms a structure that is repeatedly placed around in a composition.
Phrygian	A church mode with the characteristic low 2nd.
Position-based system	A system, in which all chords are given a specific function that is non determined by previous or next coming chord. It can work collecting the data where function analysis cannot.
Prima Prattica	Refers to early Baroque music which looks more to the style of Palestrina.
Tone Language	The choice of pitches, that collectively or played by themselves constitutes a composer or improviser's suggested harmonic choices that is statistically/or auditatively perceived as original to the musician/listener. An example would be an arpeggiated c major chord. The tones played in this case suggests the harmony of a C major chord and are pitches the improviser play. Putting together the many pitches accumulates the tone language a composer or improviser uses and gives such an originality to the music that it enables the listener to point out Messiaen from Buxtehude and this originality of sound is what constitutes the musical language.

Reconstruction	A part of the method in which the deconstructed material is applied to recreate harmony and generate blueprints.
Seconda prattica	Refers to early Baroque music which encouraged more freedom from the rigorous limitations of dissonances and counterpoint characteristic of the prima prattica.
Style brisé	A general term for irregular arpeggiated texture
Subdominant	A function that usually represents the fourth scale degree. In this thesis it is spelled with an uppercase S to not confuse theoreticians who have studied other terminology. Being Uppercased it is understood as Major.
Tacit Knowledge	Hidden knowledge as opposed to formal, codified or explicit knowledge.
TCFAM	The Chromatic Function Analysis Model
The Liturgical Year or Das Orgelbüchlein	Is a collection of liturgical music by the composer Johann Sebastian Bach.