MASTER THESIS IN AUDIOVISUAL MEDIA

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Submitted by

Florian Laurens Heidecker
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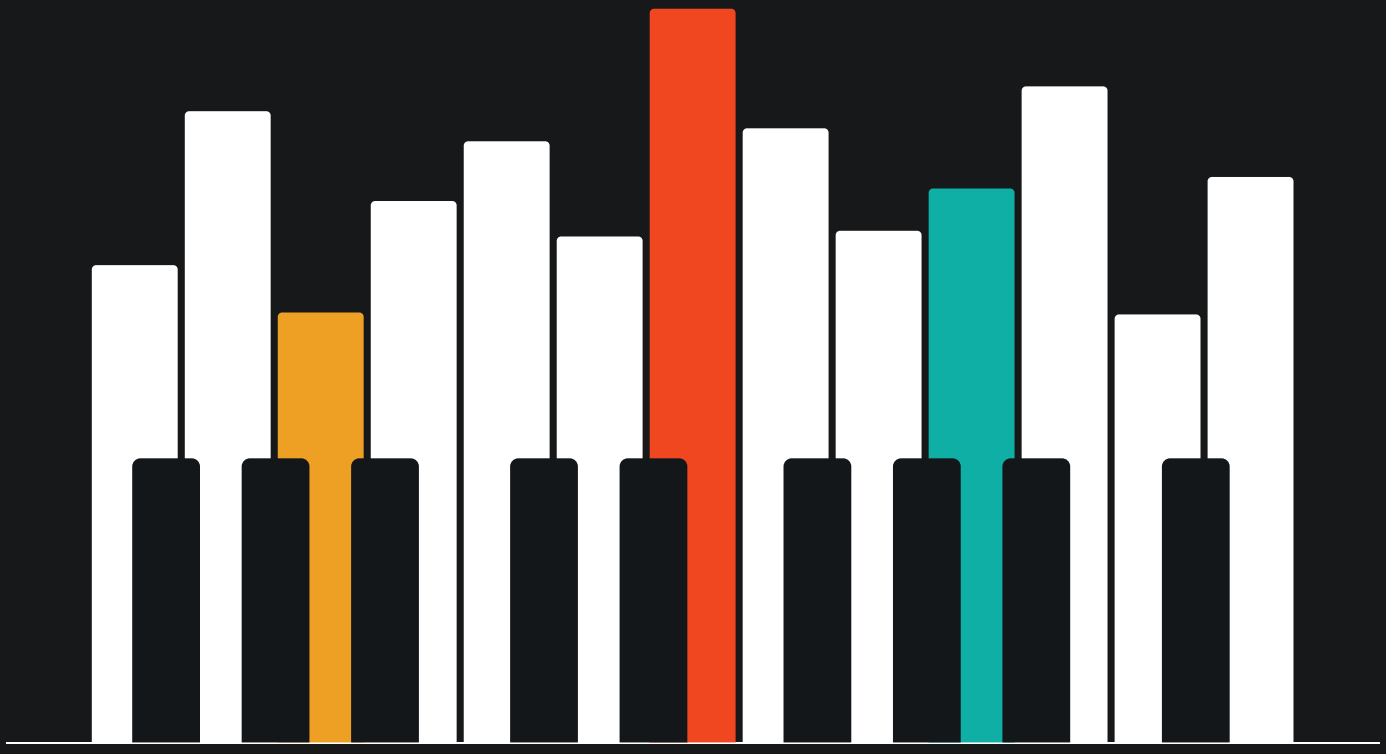
HOCHSCHULE DER MEDIEN

THE DIGITAL COMPOSER'S WORKFLOW

Exploring the Sonic Background of Musical Composition and Experimental Scoring Approaches for Film, TV and Video Games



Supervisor: Prof. Oliver Curdt (Stuttgart Media University)
Co-Supervisor: Dr. Daniel Hug (Zurich University of the Arts)

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ABSTRACT

English Version:

The Digital Composer's Workflow explores the creative process of musical composition within the domain of audiovisual media, unfolding within the dynamic field of tension between the established terminology of classical music and the boundless sonic possibilities of modern music technology. Navigating within a constantly shifting musical and sonic landscape, this book negotiates the structural conventions of musical form alongside the experimental textures and timbres of contemporary sound design.

It provides a structured overview of the digital composer's workflow—from foundational concepts in music theory and audiovisual storytelling to advanced production methods involving the workflow inside the digital audio workstation (DAW), virtual orchestration, modular synthesis, and experimental field recording.

This book has the goal to bridge the gap between the musical and sonic background of scoring for audiovisual media, inviting aspiring screen composers, sound designers and already established musicians to further dive into the fascinating world of sound design, while providing inspiring sonic ideas and resources to guide them on their journey towards a unique sonic palette.

German Version:

'The Digital Composer's Workflow' beleuchtet den kreativen Prozess der Musikkomposition im Bereich der audiovisuellen Medien. Die Thesis bewegt sich dabei im Spannungsfeld zwischen der etablierten Terminologie der klassischen Musik und den grenzenlosen klanglichen Möglichkeiten der modernen Musiktechnologie. Im Kontext einer sich kontinuierlich wandelnden musikalischen und klanglichen Umgebung werden in diesem Buch die strukturellen Konventionen der musikalischen Form neben den experimentellen Texturen und Klangfarben des zeitgenössischen Sounddesigns erörtert.

Dabei bietet es einen strukturierten Überblick über den Arbeitsablauf des digitalen Komponisten – von grundlegenden Konzepten der Musiktheorie und des audiovisuellen Storytellings bis hin zu fortgeschrittenen Produktionsmethoden, die den Arbeitsablauf innerhalb der digitalen Audio-Workstation (DAW), virtueller Orchestrierung, modularer Klangynthese und experimenteller Field-Recordings umfassen.

Das vorliegende Buch verfolgt das Ziel, eine Brücke zwischen dem musikalischen und klanglichen Hintergrund der Vertonung audiovisueller Medien zu schlagen. Es richtet sich an angehende Filmkomponisten, Sounddesigner und bereits etablierte Musiker und lädt sie dazu ein, tiefer in die faszinierende Welt des Sounddesigns einzutauchen und bietet ihnen dabei inspirierende klangliche Ideen und Ressourcen, die sie auf ihrem Weg zu einer einzigartigen Klangpalette begleiten.

Acknowledgements

First and foremost, I would like to express my sincere gratitude to my supervisors, Dr. Daniel Hug and Prof. Oliver Curdt, for their continuous support, valuable insights, and guidance throughout the research and writing process of this thesis. Their expertise and encouragement were crucial in shaping this work.

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A special thanks goes to my sister Sophia Heidecker, who read this book from cover to cover and had many useful things to say, commenting in an always specific and constructive way. Her encouragement and musical and educational expertise has been enormously helpful during the process of writing.

To my beautiful wife, my family and friends, thank you for the music, the silence, the patience, and the unwavering belief in the path I've chosen and in the journey that is still before. You kept me grounded when deadlines loomed and reminded me why I started in the first place.

Finally, I would like to acknowledge the artists, composers, and sound designers whose work have inspired me to write about the creative workflow behind composition for screen and who have influenced me to go my own path within the field of audiovisual media.

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01 Introduction ■ What Is It All About?

Introduction to the Digital Composer's Workflow

Musical composition in the context of scoring for audiovisual media: A creative process situated within the digital domain of postproduction, unfolding within the dynamic field of tension between the established terminology of classical music and the boundless sonic possibilities of modern music technology. The digital composer navigates within a constantly shifting musical and sonic landscape, negotiating the structural conventions of musical form alongside the experimental textures and timbres of contemporary sound design.

Working within the digital environment, composers are continuously challenged by the demands of audiovisual production, which often call for distinctive and adaptable sonic approaches across a wide range of storytelling contexts. To meet these expectations, screen composers are not only required to master technical workflows, but also to develop an understanding of how stories can be shaped from multiple perspectives—and how the integration of unique sonic elements within an evolving soundscape can support, challenge or transform the meaning of a scene.

But how can we meaningfully define the compositional process in this context? Should it be understood through the formal principles of tonal music, or approached as a form of sound design rooted in timbre, texture, and the audiences sonic experience? Is screen composition best viewed as a personal artistic expression, or as a systematic organization of sonic elements designed to serve narrative and emotional goals—shaping and being shaped by the screen?

This book explores the fundamental aspects of the digital composer's workflow, examining the the core elements of the creative process, the foundations of musical storytelling, the role of the digital audio workstation (DAW), and the evolving interplay between music and sound in the context of film, television and video games. Through these topics, it offers both creative and technical resources to inspire digital composers to develop their own unique sonic palette, while also providing a deeper understanding of the relationships between the sonic and musical aspects behind the process of modern screen scoring.

Motivation & How to Use this Book

As a sound designer, composer and audiovisual engineer himself, Florian Laurens Heidecker has developed a passion about combining both musical and sonic aspects of the creative process behind the digital composer's workflow. In the writing of this book, his goal is to bridge the gap between the musical and sonic background of scoring for audiovisual media, bringing together aspiring screen composers, sound designers and already established musicians, while providing inspiring sonic ideas and resources to guide them on their journey towards a unique sonic palette.

Fig. 01: Florian on a Field Recording Trip

Growing up in a musical family, from early on Florian received a broad musical education in vocal performance, violin, drums, and percussion, appearing in operatic productions and traveling throughout Europe with award winning choirs and orchestras.

In his studies about audiovisual media at the Stuttgart Media University (Stuttgart, Germany), Florian acquired a wide range of knowledge in various aspects of audiovisual technology, including the dimensions of audio engineering, film, television, interactive and event media. Besides his studies, he has gained several years of professional experience as a freelance audio engineer in the field of production and postproduction for feature film, television, commercials and video games. Also he had the possibility to further dive into the professional environment of cinematic postproduction at Bewegte Bilder (Tübingen, Germany) and Studio Hamburg (Hamburg, Germany), getting familiar with the tools and digital workflows behind the auditive and visual domain of several films and series, including productions for ARTE, ARD and Netflix.

Having the goal of consolidating his passion and experiences in music and technology, Florian choose to write his thesis about the digital workflow and the sonic background of musical composition, resembling a part of his graduation with the degree Master of Engineering. Through this workflow, also Florian sets off on a sonic journey, exploring new ways of storytelling through sound and experimental scoring approaches.

How Does it All Come Together?

Outlining the the structure of the following chapters, this introduction provides an overview of the compositional workflow explored throughout the book. This chapter serves as a guide for the reader, offering a roadmap of the topics to follow and showing how each part contributes to a comprehensive understanding of the compositional process behind scoring for audiovisual media.

This book is generally structured in five individual parts, determining the overall background of the thesis in an all-encompassing order. After the first part of this book, resembling in the introduction you are just reading, the second part is all about the fundamentals of the digital composer's workflow. While providing a foundational understanding of the creative process behind musical composition, music theory and production and the work with an audiovisual reference, this part is aimed to give the reader the background knowledge for the following chapters. In the third part, the workflow inside the digital audio workstation (DAW) is being further determined, including the music production process behind virtual orchestration within the scoring template and methods of digital sound generation and signal processing. In contrast to the third part that is more about the technical aspects of musical composition within the digital domain, the fourth part contains the creative background of the sound design workflow, leading towards the creation of a unique sonic palette. This also implies various combinations of sonic and musical elements, creative resources for the invention of sample-based instruments and alternative scoring approaches with noise and experimental field recordings. The final part of the book brings all the previous chapters together, looking back on the digital composer's workflow, while also providing further steps and resources for the readers own journey towards a unique sonic palette.

The first chapter within the workflow's fundamental aspects gives an insight into the creative process behind musical composition, starting from a blank page, the concepts of originality and inspiration, unity and variety, the expectations of the audience and the practice of letting go and starting anew. The understanding of the creative process, therefore, is based on the concepts of Grammy winning music producer Rick Rubin. Taking place as a practical example of the creative workflow, additionally the process of Oscar winning composer Hildur Guðnadóttir on her score for the HBO series Chernobyl is being examined.

The following chapter is all about the interplay of music theory and music production, providing important background knowledge about how the musical form can be defined, while further determining the timbral similarities of orchestration, sound design and methods of synthesis. It also connects the firmer concept of unity and variety with musical terminology of harmony, melody and rhythm, also leading to the sonic characteristics of a musical piece and its modulation of texture and density.

The last chapter within the context of mapping the workflow, implies the fundamental background and the process of scoring for screen. In this sense, it is all about the process of spotting the scenes and musical role models, the expressive and narrative role of music in the audiovisual context and about the different musical landscapes of film, television and video games. The fundamental aspects of scoring for screen in this book are usually based on practical examples or the concepts of composers and educators Fred Karlin and Rayburn Wright, while the background of scoring for interactive media is mostly provided by the game composers Michael Sweet and Winifred Phillips.

Coming into the domain of the music production workflow, the first chapter describes the application of scoring templates and virtual orchestration, coming from DAW sessions for different scoring approaches onto the programming of sample-based instruments. This also gives the reader an introduction on how usual software instruments are build, enabling him to invent his own later in the book.

The following chapter examines the methods of digital sound generation and signal processing, having the focus on the modular environment of synthesis and the digital audio workstation itself. Further determined are various software examples of modular synthesizer platforms, the background of oscillation, audio modification and signal modulation, the concept behind granular synthesis, and common approaches of digital signal processing in the domains of time-based and dynamic effects.

The sound design workflow starts off with an introductory chapter about the blurring lines between tonal and sonic elements within the context of musical composition. In the beginning of the chapter the musical understandings of avant-garde composer John Cage and Canadian composer Raymond Murray Schafer are discussed, leading the way to the exploration of timbre, atmosphere, texture and noise within our surroundings to further use them within the context of music. Another aspect of this chapter is the definition of sonic stereotypes and common sound design elements in screen scoring, determining the elements of drones, pulses, risers, fallers, booms and accents and how they can be designed.

The second chapter of the sound design workflow determines the invention of sample-based instruments, providing creative resources like extended instrumental playing techniques, custom building and modifying instruments, and creative use of resampling and signal processing. Also discussed are the creative possibilities of recording accidents that often provide hidden potential for further use and modification within a sampling environment. The practical examples within this chapter are from composer and musician Ryan Lott and sound designer and composer Robert Dudzic.

The final chapter of the fourth part of this book determines the field of musical composition with noise and field recordings, including various experimental microphone techniques and methods of tuning noise and shaping ambient field recordings in a musical manner. This implies the recording of vibrations that occur inside solid materials, the seismographic movement of the earth, the acoustic environment of underwater surroundings and the capturing of electromagnetic fields. It is also about the spectral shaping of signals and an example use of spectral vocoding, used by composer Tom Holkenborg on the movie '300: Rise of an Empire'.

Wrapping up, the fifth and last part of this book is all about the closing thoughts and the look back on the sonic journey of musical composition. The reader also gets invited to further explore and experiment with the provided resources and to apply the acquired knowledge to his own soundscapes and compositions.

02 Fundamentals ■ Mapping the Workflow

The Creative Process Behind Musical Composition

"If you don't have a tune, you have nothing. You have nowhere to go."[1]
Hans Zimmer (2025)

"Our work begins with a seed, which sprouts a trunk of the core idea. As it grows, each decision we make becomes a branch splitting off in a new direction, growing finer and finer in detail as we move further out."[2]
Rick Rubin (2023)

Start with a Blank Page

At the start of every composition journey is an investigation for a musical concept. Often based on one or several core ideas, a structure of musical form and dimensions or sonic qualities is being defined. There can be a simple primary idea, a focused definition of the central intention, which can be seen as the heart of the piece and the foundation on which the score is constructed.[3] As soon as the composer's intentions are clear, different aspects of music composition and music production will become definite and take on character. But in many cases it is just that: the invention of a focused and memorable musical idea or the exploration for a suitable and unique sonic palette are often considered to be the most time-consuming parts of the composition process. Every new project and every new cue need a fresh start with new ideas, and a new foundation must be developed. In this regard, every piece of music starts off from a blank page and needs to form a motivation for the following creative and constructive process to build on. But do we really start from zero?

When composing music for a specific purpose, it is all about context. According to Hans Zimmer, the difference between scoring to picture and writing a song lies in the direction the

[1] Rick Beato, "The Hans Zimmer Interview," March 14, 2025, accessed July 7, 2025, https://www.youtube.com/watch?v=TbeevzNmU1g.
[2] Rick Rubin, The Creative Act: A Way of Being, 2023, 305.
[3] Fred Karlin and Rayburn Wright, On The Track: A Guide to Contemporary Film Scoring, 2004, 63.

images, the dialogue, the story, or the conversation with the director offer you.[4] You always have something to begin with, at least the title of the film.[5]
As the visuals may lead in a direction, the composer may also follow a certain musical concept, offering a set of rules of common techniques and creative restrictions. In other cases the ideation process may start off from a standpoint of sonic exploration and experimental approaches, figuring out possibilities of sound design and formation of a unique sonic palette. Rather, it may be the reinterpretation of an already established set of rules or the search for unique sonic ideas, a musical piece is always organized within a form and is defined by its logic and coherence.[6] Starting from a predefined set of rules or exploring experimental approaches can both be viable options of how to begin a project, while figuring out the creative process is always a matter of perspective.

Defining a set of rules is a process of setting up restrictions or limitations within the creative journey of musical composition. Every piece of music is like a well-constructed puzzle of single musical building blocks and sections. No block stands on its own, and every section has a purpose. It's like a construction of musical ideas, a matter of how and when they play together. In this matter, every piece of music is built on a framework and evolves inside its limitations or breaks out of them intentionally.[7]
Defining rules for the creative workflow can be an opportunity to narrow down possibilities and to set up a sonic palette for each project.[8] On the other hand, musical composition can be considered as craftsmanship, consisting of learned musical principles and knowledge about the listeners perception of each aspect.[9] Not only retaining a learned specific set of rules, it is more about the piece's expressive goals and knowledge about how they can be achieved more easily.[10]

In the audiovisual field, the idea of coming back to an already established framework can be seen in a variety of different contexts. In screenwriting, for example, there is a well-known concept of introducing a toolkit, used to construct almost any situation within a story while

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[4] Mix with the Masters, "Writing to Picture With Hans Zimmer," July 17, 2020, accessed July 7, 2025, https://www.youtube.com/watch?v=sj2PdzPzyYY.
[5] Mix with the Masters, "Writing to Picture With Hans Zimmer."
[6] Arnold Schönberg, Fundamentals of Musical Composition, 1999, 1.
[7] Jameson Nathan Jones, "5 Simple Ideas That Changed My Music Forever," February 5, 2025, accessed July 7, 2025, https://www.youtube.com/watch?v=Zd_sbC5bnCA.
[8] Rubin, The Creative Act: A Way of Being, 207.
[9] Alan Belkin, Musical Composition: Craft and Art (Yale University Press, 2018), xv.
[10] Ibid., xv.

remaining true in a dramatic, entertaining, and psychological sense.[11] "The Hero's Journey" describes a simple idea that every story is built from the same few structural elements, which sprout from myths, fairy tales, movies, and dreams.[12]

In music, traditional compositions often take place within the structure of musical forms. As composer Arnold Schönberg describes in his book about the 'Fundamentals of Musical Composition', the form can be defined by the number of parts a piece consists of and their differentiation in content, character, mood or tonality, size, and overall structure.[13] While a musical form is foremost about the overall structure of the composition, regardless of its style, establishing elements of specific musical genres can also function as the conceptual foundation of a piece.[14]

Many modern scores for film, television, and video games are influenced by a variety of musical genres, be it pop, rock, jazz, or electronic dance music. Also, there are limitless possibilities of variation in combining two or more stylistic musical elements or styles.[15]

Another creative possibility of setting up limitations within the process lies in bringing up variability by forcing the composer out of his comfort zone. Rick Rubin, for example, states that by breaking out of the artists normal rhythm, he may find new ways of expressing himself, of telling a story, and see where the chosen framework will lead him.[16] In this sense, temporary rules might help us to break a pattern and to grow beyond ourselves.[17]

In other cases, set limitations might force us to remain with the simplest ideas and to become more creative within set boundaries. This is also the case with the process of elimination, where certain ideas and musical elements are defined that should not be part of the composition.[18] The definition of a set of rules sometimes also leads the way to more experimental approaches: if there were no boundaries, there wouldn't be the possibility to push up against them or to break the rules.[19]

Exploring experimental approaches & sound design possibilities is a process of tuning into the sonic world of a project and collecting creative ideas and audio material for further composition. Experimentation in this regard can have different qualities and a wide range of possible

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[11] Christopher Vogler, The Writer's Journey - 25th Anniversary Edition: Mythic Structure for Writers, 2020, 4.

[12] Ibid., 4.

[13] Schönberg, Fundamentals of Musical Composition, 20.

[14] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 88.

[15] Ibid., 93.

[16] Rubin, The Creative Act: A Way of Being, 210.

[17] Ibid., 210.

[18] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 95.

[19] Jones, "5 Simple Ideas That Changed My Music Forever."

outcomes, tending to have a strong relation to the overall (visual or narrative) setting. According to Rubin, there are no predictions, no predefined paths to follow: you always begin with a question mark, and you set out on a journey of exploration until you stumble upon a conclusion.[20] As it might be true that every creative process has a stage of experimentation, it is also possible to let experimental approaches entirely define an artist's work. The experimental approach becomes the process, and preconceived expectations most likely will not be fulfilled, and the outcome might surprise or challenge you.[21] Either way, this might offer the possibility to surprise or challenge the audience as well with more unique sonic and musical approaches. Experimentation can take place in both the musical and sonic dimension.

In a musical sense, this is mostly about the concept of improvisation and exploration of ideas while being in the flow of a free musical performance. Rubin also states that when approaching music in such a playful way, there are no boundaries, no stakes, and you can't do anything right or wrong.[22] He further describes that, in this case, the music is playing itself, and the goal must be to stay in it and to accept the risk of bad musical ideas or interpretation.[23] Sometimes the fingers may fall on the same keys again and again, and other times a fully formed track appears out of spontaneous ideas. Either way, in most cases composers don't use improvisation as the final piece. Rather, they use the session as a playful ideation process. Overall, spontaneity by any means is not given, and there is always a lifetime of experience in every work.[24]

When exploring the sonic possibilities within the composition process, it is all about a unique tone or character of sound for each new project. This is also how Hans Zimmer describes his creative workflow: with every new project he needs to figure out an idea to start from, something he's never done before and something that will not bore him on his musical journey.[25] He begins with an ambitious concept he describes as undoable or impossible to do.[26] Then he spends as much time as possible experimenting with synthesizers, making up sounds, and writing suites before committing to writing the actual cues to picture.[27] For Hildur Guðnadóttir, bringing a story into a musical dimension is always about listening, about going into an environment, and about being completely present in the experience of every sound.[28]

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[20] Rubin, The Creative Act: A Way of Being, 151.

[21] Ibid., 151.

[22] Rubin, The Creative Act: A Way of Being, 354.

[23] Ibid., 301.

[24] Ibid., 300.

[25] Mix with the Masters, "Writing to Picture With Hans Zimmer."

[26] Ibid.

[27] Ibid.

[28] Score: The Podcast, "'Chernobyl' Composer Created Entire Haunting Score From Real

Either working with synthetic sound sources or field recordings, it is always about collecting ideas or building a palette of audio recordings that are prepared for further use in the composition.

Compared with the firmer approach of reinterpreting an already defined set of rules, going on a journey of experimentation and exploration is considered a more creative and artistic approach. When you do what you've planned to do in the first place, you are a craftsman, but when you go on a journey full of questions and discovery, you become an artist.[29]

Commonalities of Originality, Inspiration and Plagiarism

Before diving deeper into the techniques and tools of composition and music production, taking a closer look at the sources of the creative process, which also can be determined in the context of design, might be appropriate. As described in various different theories of design and the underlying process, the archetype of design lies in having both an input and an output.[30] Not solely relying on recreation of the source material, there might be a phase of processing in between, transforming the input into a creative piece.[31]

Following these concepts, inspiration can be considered as the first foundation of design, maybe taking place in any creative process. And inspiration can be found all around us. For Rick Rubin, source material does not form within us.[32] For him it is more about perceiving the world around him and paying attention.[33] In music, possible resources for inspiration can lie in various musical forms or genres, as described in the previous chapter. Coming from a history of music that came before us, there are always musical pieces that inspire us. Through them a composer defines his personal taste while paving the way to his own creative identity. Having a collaboration with everything that came before us and what comes after, it is all about our experiences, our tools, our audience; about who we are today.[34] The source is drawn

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Power Plant Sounds," May 22, 2019, accessed July 8, 2025, https://www.youtube.com/watch?v=bTw1-nw5S4A.

[29] Rubin, The Creative Act: A Way of Being, 153.

[30] Hugh Dubberly, How do you design?: A Compendium of Models, PDF, Beta, 2005, 12, https://www.dubberly.com/articles/how-do-you-design.html.

[31] Ibid., 12.

[32] Rubin, The Creative Act: A Way of Being, 14.

[33] Ibid., 2.

[34] Ibid., 89.

through our own filter consisting of the sum of all conceived thoughts and feelings.[35]

In being inspired by other musical pieces and how they are used within audiovisual media, we also learn more about the function of music. In further projects, the composer's intuition and subconscious may lead him through the creative process of composition. The goal must be to respond to the project emotionally as an audience member while avoiding to be influenced by your intellect and then translating the intuitive senses of emotion into music.[36] This describes the way of how to come from the dimension of inspiration to the actual creative process. While being inspired by our surroundings, there always comes a time to take action and to actually begin to craft the musical piece. It can be seen as the balance between the states of consumption and creation, bringing you forward without being held back by preconceived ideas or writer's block.[37] In conclusion, the creative piece has its origins in inspiration, while the act of composition can be seen as the craft of combining source materials that are constantly all around us.

Considering these thoughts, there also is the question about originality and about certain situations when inspiration might cross the line of plagiarism. In terms of copyright, "the work has to be original (not copied from something else) and of sufficient creativity."[38] But in a creative sense, the term originality is not always clear, although among artists there is a continuous search for it. In general, it can be stated that no creative concept or composition can be seen as completely new in all of its parts. While this is the case in screenwriting, as mentioned in the previous chapter, the definition can also be stated within the art of music. For Danny Elfman, "it's impossible to be 100 percent original with anything."[39] For him, taking and twisting old approaches by integrating new and personal ideas can be one way to make it your own.[40]
This can also be referred to as the psychological statement that human brains can take ideas that correspond with us and make them better through cognitive tools of innovation.[41] In this

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[35] Rubin, The Creative Act: A Way of Being, 25.
[36] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 189.
[37] Venus Theory, "5 (Stupid) Tricks to Be a Better Musician," May 28, 2024, accessed July 9, 2025, https://www.youtube.com/watch?v=L-ZHaCUPzj8.
[38] Donald S. Passman, All You Need to Know About the Music Business, print version, 11th edition (Simon & Schuster, 2023), 216.
[39] Danny Elfman, "Danny Elfman Teaches Music for Film," ed. Jeff Bond, MasterClass, August 10, 2021, 67, accessed January 9, 2024, https://www.masterclass.com/classes/danny-elfman-teaches-music-for-film.
[40] Ibid.," 67.
[41] Anthony Brandt and David Eagleman, "How Your Brain Takes Good Ideas and Makes Them

sense, Anthony Brandt and David Eagleman propose a framework for the evolution of creative ideas, divided into the cognitive operations of bending, breaking, and blending.[42] In this context, bending means to take an original idea, modifying and twisting it out of shape.[43] Breaking, on the other hand, is more about taking away a whole part of the original idea, while blending describes the combination of two or more distinctive sources that are being merged into a new idea.[44] In arranging and processing the source material through the subjective filter, new creative ideas and musical pieces might emerge that are defined by their combination and reinterpretation.

Due to the tonal limitations and overall conventions within the musical landscape, coming up with something completely original can be almost impossible, and maybe the term originality can be better described as the unique way of arrangement and performance within the piece. Also, in Donald Passman's understanding of copyright, "[…] if the infringed material has to naturally flow from the genre or idea of the material, it's not protectable."[45] For example, when the composition follows the standard blues scheme within a chord progression or the time signature of ¾ for establishing a waltz, in copyright law it can be seen under the viewpoint of prior art, excluding it from the possibility of suing for infringement.[46] But the cases are not always clear, and the limitation of being in the Western musical scale of twelve notes only makes it more difficult. Technology lawyer and musician Damien Riehl describes that due to the fact of the finite number of possibilities within writing a melody, chances of accidental infringement are quite high (foremost within the context of pop music).[47] While criticizing the current terms of copyright, he collaborated with programmer Noah Rubin and built an algorithm to create all possible melodies within the scale of Western music, proving that all melodies have a mathematical foundation and shouldn't be seen as originally invented.[48] Maybe the same could be stated for the musical elements of harmony and rhythm.

Better: Bending, Breaking, and Blending Are Enduring Tools for Innovation.," Psychology Today, October 10, 2017, https://www.psychologytoday.com/us/blog/the-guest-room/201710/how-your-brain-takes-good-ideas-and-makes-them-better.

[42] Ibid.

[43] Ibid.

[44] Ibid.

[45] Passman, All You Need to Know About the Music Business, 335.

[46] Ibid., 335.

[47] Damien Riehl, "Copyrighting All the Melodies to Avoid Accidental Infringement | Damien Riehl | TEDxMinneapolis," January 30, 2020, accessed July 9, 2025, https://www.youtube.com/watch?v=sJtm0MoOgiU.

[48] Ibid.

For Danny Elfman, it is more about the intent of plagiarism and not about the exact notes.[49] It's also about context when purposely using similar musical elements to invoke the emotional sense of, for example, another film.[50] He further states: "If you're trying to invoke the sound of another composer over an image that is in the vein of what they're conveying in the first place, don't do it. You've lost the battle."[51] On the other hand, Elfman acknowledges that while finding yourself in a copyright minefield, the basic elements that inextricably define the creative process behind musical composition still are homage and inspiration.[52]

A Structure of Unity and Variety

In the previous section we determined that every piece is built on basic musical elements that have their origin in our experiences and inspiration. Determining how these elements come together and how the overall piece takes form, we will take a closer look at the underlying structure of unity and variety within music. It is all about the direction of the piece, its pacing and its form and about repetition and contrast within it.

According to composer Danny Elfman, a good score contains a fine balance between repetition and unity.[53] Repetition can take place in the melodic, harmonic, or rhythmic dimension and within the combination and variation with other musical elements.[54] Together they result in the concept of form, defining the structure beyond the music and the relation to the audiovisual form of the film [or game].[55] But in defining musical variation only within the formal principles of tonal music, contemporary compositions with an emphasis on sound design might seem out of the line. As it can be witnessed in a variety of songs within popular music and modern examples from the world of film, television and video games, there has been an evolution of the role melodies take within music.[56]

In recent years there has been a movement from solely musical elements towards the dimension of timbre and sonic characteristics of sound, resulting in almost infinite

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[49] Elfman, "Danny Elfman Teaches Music for Film," 66.

[50] Ibid., 66.

[51] Ibid., 65.

[52] Ibid., 65.

[53] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 194.

[54] Ibid., 194.

[55] Ibid., 194.

[56] Venus Theory, "The Future of Music Is Noise," April 14, 2025, accessed July 10, 2025, https://www.youtube.com/watch?v=i41mDWwydxo.

possibilities of combination and variation.[57] Even in early 20th century music there was a concept, defined by Arnold Schönberg, that there might be no difference between the timbre and the pitch of a note, resulting in an assumption that a phrase out of differences in timbre might have the same fundamental and logic as the concept of a melodic phrase.[58] Either coming from a melodic or sonic standpoint, a musical piece must consist of both the persistence in its artistic language and the promotion of variety to neither fall apart into unconnected fragments or to become too monotonous.[59] This can be pursued within the melodic dimension by composing within a musical form, by establishing a motive and its variations, for example with the use of inversion, or by applying the theory of counterpoint.

While this can be seen as a horizontal approach to composition and arrangement, achieving variation in timbre by introducing differences within the sonic character of the music or its production techniques has now become more and more common.[60] In this sense, the opportunity emerges to solely use one specific idea or motive throughout the whole musical piece and to either add or reduce additional musical elements in a vertical manner. Composer Cameron Gorham (YouTube: VenusTheory) describes this approach as a 'tape-loop style' of music, forming the foundation of many songs in popular music, while also being constantly evolving within other genres and musical styles.[61]
The concept of using only one basic motive and its developing variations in achieving a sense of growth within music is not a new invention and, for example, was already described by Arnold Schönberg in his understanding of the Fundamentals of Musical Composition.[62] But maybe it can be stated that with the evolution of digital music production, there has been a shift towards a more vertical approach to arrangement and composition, using one musical idea that constantly repeats during the piece, while introducing variation through adding or subtracting additional elements.

To accomplish a sense of unity within a score, it is all about the audience's cumulative reaction over the duration of the audiovisual content.[63] In this sense, the audience can associate a single musical theme, for example, with a character, remember the underlying emotions of earlier

[57] Venus Theory, "The Future of Music Is Noise."
[58] Arnold Schönberg, Harmonielehre, eBook, revised 3rd edition, 1922, 507.
[59] Belkin, Musical Composition: Craft and Art, 105.
[60] Jameson Nathan Jones, "Making a SONG From a LOOP Without Boring Everyone," January 3, 2024, accessed July 10, 2025, https://www.youtube.com/watch?v=Vpms3uaSAZI.
[61] Venus Theory, "The Future of Music Is Noise."
[62] Schönberg, Fundamentals of Musical Composition, 8.
[63] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 195.

scenes, and empathize with them.[64] This can either be through exact repetition or reinterpretation within a different setting.[65] Every theme can take place in several different contexts, and the variation of the musical or sonic character can have an incredibly powerful impact on storytelling and the narrative meaning of a scene.

In achieving contrast, we have discussed several options of horizontal and vertical arrangements. Another powerful option of contrast within the score can be the advancement of silence as a narrative tool.[66] Also, as a composer, it is essential to leave space for the other departments of sound within the audiovisual production, and there can be situations where simply no music is needed to contribute to the story. One famous example of this approach is the beginning scene of Sergio Leone's Spaghetti Western C'era una volta il West (Once Upon a Time in the West, ITA / USA 1968).[67] Taking place at a farm in the middle of nowhere, the opening of the film does not convey any music, but focuses on various distinctive ambiences and sound effects that naturally occur in the windy surroundings of the farm. According to Oscar-winning Sound Designer Randy Thom, also the visuals were shot with the sonic ideas in mind, making it possible that the sound effects themselves could take a musical role while being isolated by silence.[68]

In summary, every score has to have a delicate balance between the two states of unity and variety, defining both pacing and form of a piece, having the goal to maintain interest from the audience. In the following chapter we will determine that in many situations it is not only about the personal taste and style of the composer. Rather, audience expectations and references can have a major influence on the overall composition and use of thematic material within different forms of audiovisual content.

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[64] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 195.

[65] Ibid., 195.

[66] Frank Hentschel and Peter Moormann, Filmmusik: Ein alternatives Kompendium, eBook (Springer-Verlag, 2018), 263.

[67] Ibid., 264.

[68] Private Kitchen, "Randy Thom - Sound as Music in Once Upon a Time in the West," January 15, 2022, accessed July 30, 2025, https://www.youtube.com/watch?v=p_sCjWLbo2E.

Audience Expectations and Perspective

As with the musical language and its forms and concepts, there are also certain ways of how stories are told within a narrative genre and how the audiovisual content connects with the audience. Different genres can be defined by their conventions and characteristics and through the way of how they are shaping the audience's interpretation. It is about similar narrative and stylistic approaches and the overall aspects of storytelling. And since making music for audiovisual media can be considered as a creative process or craft in service of the story, having the characteristics and expectations of specific genres in mind can be necessary within or before composition. For example, a film within a specific genre must deliver certain elements, often based on a tradition or precedents that were established decades ago or were developed over time or even through a contemporary trend.[69] And in a situation when these elements are not part of a film within this genre, it can either have huge success based on it's unique artistic approach or being dismissed and criticized by the audience.[70]

Regardless of the genre, every film or game creates its own unique expectations, foremost in terms of the score's function and style, predefining the way of how and when the audience should have an emotional reaction.[71] And since it is mostly about this emotional response to specific moments within the story, there can be much space for individuality and expressive freedom for the composer and his musical style or unique sonic palette.[72] But in some cases, the underlying genre or source material may not follow a clear enough line to state artistic assumptions, or a specific audience could not be defined due to the unique characteristics of the production. As nearly any film or game can be uniquely characterized to a certain extent, the composer must develop a sense of what is needed in telling the story and of how the musical elements fit within the emotional and narrative requirements of the audiovisual scenery.

Regarding those situations, Rick Rubin states the following questions: "What is the test an artist uses in those crucial moments during the process? How do you know when the work - and the working - is good? How can you tell when you're moving in the right direction? What does forward motion look like?"[73] For him it is more about a feeling: "An inner voice. A silent whisper that makes you laugh. An energy that enters the room and possesses the body."[74]

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[69] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 129.

[70] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 129.

[71] Ibid., 129.

[72] Ibid., 129.

[73] Rubin, The Creative Act: A Way of Being, 230.

[74] Ibid., 230.

Having an intuition and understanding of when something goes in the right direction is especially important when working with an audiovisual reference. A non-musical experience an audio engineer could make would be the situation inside a dubbing studio when everybody in the room can tell if the voice actor is in sync to the picture and if it fits the scene, even when somebody has no professional experience in this field. The same can be true for the musical composition within an audiovisual context when the audience perceives the music of a film sequence as more or less effective.[75] In this sense, the narrative and expressive functionality of music within an audiovisual context is dependent on its clarity in tone and timing and on the audience's interpretation of perception.[76]
Within a musical piece, a smooth and even-textured experience is not always desired.[77] Furthermore, it can be important to embrace certain moments within the piece and to give your special attention to those parts that are important to remember.[78] It is all about having an impact on the audience, about the moments that will be remembered afterward, and especially about "the beginning, major climaxes and contrasts, and the ending."[79]

Some situations may demand the composer to give up certain decisions and to leave it to the audience. This can become important within the process, especially when the composer (and director) and the audience have different perspectives on the story. Since the composer already knows how the ending and distinctive moments within the story will look like, under most circumstances it is important to keep the audience blindfolded and to not give away the plot too easily.[80] Embracing the audience can become especially important when dealing with complex emotions within storytelling. In those cases, it can be more about the personal and individual emotional reaction of each audience member rather than being the same for everyone. By finding simple, poetic, and subtle ways of conveying complex emotions within a story, the audience can be turned into co-creators of certain scenes, making them more personal to them.[81] The goal is to engage the audience to react on a deeper emotional level, leaving space for their imagination and cognitive recreation of the scene, nearly as if they were reading a book.[82] One approach of leaving it to the audience can be found in the score of the

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[75] Günther Rötter, Handbuch Funktionale Musik, Springer eBooks, 2017, 453, https://doi.org/10.1007/978-3-658-10219-7.
[76] Ibid., 453.
[77] Belkin, Musical Composition: Craft and Art, 178.
[78] Ibid., 178.
[79] Belkin, Musical Composition: Craft and Art, 178.
[80] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 130.
[81] Lofi Cinema, "When Audience Becomes Author," September 26, 2024, accessed July 10, 2025, https://www.youtube.com/watch?v=-BdGAolBniE.
[82] Ibid.

HBO series Chernobyl (USA / UK 2019), composed by Oscar-winning composer Hildur Guðnadóttir:

> "That's really how I first went about approaching the music — from the spatial side, from the nuclear side, and from the catastrophic side of what happened. I felt like going a bit more heavy and oppressive was the right approach, rather than thumping, which would have been more like the sound of a thriller. What happened in Chernobyl was such a dramatic event in itself. It was so remarkable and so scary that I felt like it didn't need any extra dramatization from the music. It didn't require any enhancement of these feelings."[83]

Letting Go and Starting Anew

Sometimes our creative ideas do not yield the expected outcome, and it is time to let them go and to start anew. Or perhaps we recently completed one project and want to make our way towards the next one. Either way, letting go of creative ideas and coming up with something new and unique can be difficult to accomplish.

For Rick Rubin, art is a constantly repeating "cycle of death and rebirth", manifested in the completion of one project in service of the next.[84] For him, "each ending invites a fresh beginning" and "sharing art is the price of making it."[85] While this can be clearly defined for the release of our works - may it be within an audiovisual context or not - letting go of an idea, musical piece, or even the whole project can be more difficult when rejection was involved during the process. As [artist] Robert Henry sees it, rejection can be commonplace within the artistic world: "Don't worry about the rejection. Everybody that's good has gone through it. Don't let it matter if your works are not 'accepted' at once."[86] In an audiovisual context, it is all about the director's vision, and if a cue - for him - doesn't work to picture, it will be dropped or replaced.[87] In most cases it is not about the music itself but foremost about its function within the audiovisual production. Either the work can be used anyway, or it will be dismissed.

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[83] Hildur Guðnadóttir, "Hildur Guðnadóttir Interview," interview by Paul Goldowitz, ed. Ruby Gartenberg, Pop Disciple, August 9, 2019, accessed June 28, 2025, https://www.popdisciple.com/interviews/hildur-gudnadottir.

[84] Rubin, The Creative Act: A Way of Being, 349.

[85] Ibid., 349–50.

[86] Robert Henri, The Art Spirit, 2022, 5.

[87] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 364.

It is not about a better version of the music when you have to create a new cue for a scene. Rick Rubin states that there is no way to define a better version of anything - only the differences can be seen.[88] When comparing different versions of a work, it can also be stated that not only has the work evolved, but also the artist will be in a different position.[89] And when having difficulties in finding a new approach to tell the story, maybe it is just about changing your perspective, about taking a step back, tuning yourself out, and cleaning your slate. Also, when you find yourself too close to the work itself, perspective is lost and you become disoriented.[90] A chance for creativity to arise can lie in a form of distraction. While waiting for an idea to come, the artist distracts himself with other tasks, preferably simple and unrelated to the project itself. In any way, taking a step back can help the artist to create space for new ideas and solutions, lighting the way to our subconscious or to gain various perspectives on a specific problem.[91]

[88] Rubin, The Creative Act: A Way of Being, 203.

[89] Ibid., 203.

[90] Ibid., 335.

[91] Ibid., 86.

The Sonic Interplay of Music Theory and Production

"I am more and more convinced that music, by its very nature, is something that cannot be poured into a tight and traditional form. It is made up of colors and rhythms."[1]
Claude Debussy (1907)

"The sound of a score is what stays with you more than the actual melody."[2]
Anne Dudley (2004)

The Theory Behind Harmony, Melody and Rhythm

In going on a journey towards a better understanding of the creative process behind musical composition, the concept of form within music has already been mentioned and brought into context. The form defines the model of every piece, consisting of few distinguishable musical elements. Within the composition process, these elements will be chosen and brought into an arrangement, just as if building a construction out of individual building blocks. For the composer it can be essential to know the properties of each building block to get a better understanding of how they can be arranged in various dimensions. In music, this results in a beneficial understanding of theory - foremost in terms of harmony, melody and rhythm - and the relations between those dimensions within a piece. Although a musicological analysis of the structure and form of certain musical works often allows us to assign them to a specific time or epoch within the history of music, most contemporary compositions can not be defined by a strict analytical form or traditional framework. Nevertheless, acknowledging the fundamentals of music can be seen more as a toolkit for organizing the piece and forming the musical elements in relation to their function on the audience.[3] Music is often described as a language of its own with a wide range of expressive possibilities. Also, in many cases there is a correlation within the terminology of music and lyrical languages, describing mostly similar aspects within the "conversation". It is all about the organization of the (musical) sentence,

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[1] Claude Debussy, Letter to Jacques Durand (1907), quoted in Nat Shapiro, Encyclopedia of Quotations About Music, eBook, 1977.

[2] Anne Dudley, 2004, quoted in Fred Karlin and Rayburn Wright, On The Track: A Guide to Contemporary Film Scoring, 2004, 297.

[3] Arnold Schönberg, Fundamentals of Musical Composition, 1999, 1.

about comprehensibility through the application of punctuation, about the tonal direction, and about the connection between different subjects.[4] Based on their importance and function, the interplay of various musical elements will be arranged according to logic and coherence.[5] Due to the limitations of the human mind in terms of attention and memorization, we must divide musical ideas into manageable and small sections.[6]

As within lyric poetry, this concept is called phrasing and defines the length and complexity of a musical idea. The phrase contains one or several motives, developing and evolving in an arc of expression while being divided and structured through punctuation.[7] In many cases, the structure of a phrase is not solely defined by its length due to the differences in its musical character or its context within the piece.[8] Arnold Schönberg, on the other hand, describes the phrase as the smallest structural element of music that should have the appropriate length to be able to sing it within a single breath.[9]

The motive within music is a small unit or musical pattern, being defined by its unique characteristics and its memorability.[10] Within a motive, it is all about contrast, avoiding predictability, and introducing a gentle sense of suspense to stimulate interest from the audience.[11] Applying the concept of internal contrast within a motive can result in a variety of approaches within all dimensions of music: harmony, melody and rhythm. This can take place, for example, within a pattern of variations in pitch or rhythm, or through timbre, dynamics, articulation, or the motive's register.[12] Inside a musical piece, the motive appears over and over again and in this sense defines itself through repetition.[13] Then it can be further developed and modified, forming motivic variations to overcome a sense of monotony.[14]

As described in the firmer chapters about the creative process behind musical composition, there is a concept of unity and variety within every piece, having the goal to maintain the audience's attention and interest. Regarding the phrase and its motives, this concept can be also redefined for every musical element and its variations within a piece. In the following, we

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[4] Schönberg, Fundamentals of Musical Composition, 1.

[5] Ibid., 1.

[6] Alan Belkin, Musical Composition: Craft and Art (Yale University Press, 2018), 16.

[7] Ibid., 17.

[8] Ibid., 16.

[9] Schönberg, Fundamentals of Musical Composition, 1.

[10] Belkin, Musical Composition: Craft and Art, 1.

[11] Ibid., 1.

[12] Ibid., 2.

[13] Schönberg, Fundamentals of Musical Composition, 8.

[14] Ibid., 8.

will take a closer look on the dimensions and theoretic aspects of harmony, melody and rhythm. Since every aspect in the theory of music in itself can become rather complex, often based on several developments within the history of music, this book can not give an universal definition of the theory behind the terms mentioned. Nevertheless, you should get a brief overview of the composer's musical possibilities within a piece. And by remaining in an audiovisual context, understanding the fundamentals of music can empower the composer to determine various musical approaches within a narrative framework, drawing upon a wide range of resources.

Musical Harmony: The concept of harmony can be determined in the vertical aspect of composition and the combination of simultaneously sounding notes within a scale. In the context of contemporary composition for audiovisual media, there is always a strong foundation of harmonic resources the composer can draw from - from the eighteenth-century understanding of diatonic and chromatic harmony to the twentieth- century concepts of twelve-tone music and polytonality.[15] While different aspects and combinations of harmony result in a variety of perceptional and sonic characterizations, many harmonic approaches find themselves within the narrative context of audiovisual media, in many cases even several ones within a single project.[16]

There can always be differences within the complexity of the harmonic language and its application in the context of screen scoring, but in a fundamental sense it is mostly about the tonality of the piece, the sonic relations between intervals, and foremost, about a structure of tension and release. In any case, the structure of harmony and complexity of a progression should always correspond to the character of a scene.[17] In this context composers and educators Fred Karlin and Rayburn Wright suggest playing the harmonic progression without the melodic theme at first to test how it plays with the visuals when separated.[18]

In the understanding of twentieth-century harmony from Vincent Persichetti, "any tone can succeed any other tone, any tone can sound simultaneously with any other tone or tones, and any group of tones can be followed by any other group of tones, just as any degree of tension or nuance can occur in any medium under any kind of stress or duration."[19] In this sense, it can be stated that the harmonic language can become rather complex; a generalization of the use of specific progressions within certain contexts might not always be feasible. On the other hand, different musical applications of certain harmonic approaches can both create more ear-

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[15] Fred Karlin and Rayburn Wright, On The Track: A Guide to Contemporary Film Scoring, 2004, 223.

[16] Ibid., 223.

[17] Ibid., 257.

[18] Ibid., 257.

[19] Vincent Persichetti, Twentieth-Century Harmony: Creative Aspects and Practice, 1961, 13.

pleasing results or invoke a sense of instability and tension.

In the theory of Western music, every harmonic progression is based on twelve semitones within an octave and the possible intervals within the given limitations. It is all about the sonic qualities of the interval in terms of its consonance or dissonance, determined by the characteristics of the acoustic waves, their physical properties, and the mathematical ratio of the overtones.[20] In the context of audiovisual scoring, there can be a constant shift between tonality and atonality, even within a single cue, according to the narrative relationship between tension and release. When the storytelling suggests increasing the overall sense of anxiety, in most cases also the tension within the harmonic language will be increased, often resulting in a more dissonant character of the music.[21] In order to release the tension, there is (nearly) always a coming back to the harmonic roots of a piece, its key center of tonality. Tonality within music can be achieved within the strong tonal context of a cadential realization or within different kinds and degrees of the tonal character and the implication of tension and relaxation around the tonal base of a piece.[22]

This also implies the concept of harmonic pedal points and ostinatos, which are both incredibly common and extensively used within the music of contemporary films, TV-shows, and video games.[23] While creating a static feeling within a constantly changing harmonic or rhythmic environment, the pedal point resembles the key center through the repetition or sustaining of a single tonality.[24] The same can be stated for the concept of the ostinato, which in most cases also results in the function of the harmonic pedal point, mostly by reinforcing a single tonal character within a cue, often resulting in the establishment of a tonal center or specific key.[25]

In this sense, the harmonic language of a piece can have a huge influence on the overall character of a motive or theme, and in some cases the theme might be even solely defined by its harmonic progression and repetition. And in a passage of static tonality, the harmonic expression might be even more dependent on the rhythmic application of the thematic material.[26]

The Melody and the Motive: One way of expressing the tune of a piece can be through melody, which can be determined by a sequence of individual notes within a clear directive line. Although the melody, in most cases, also resembles a layer within the musical form upon a

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[20] Persichetti, Twentieth-Century Harmony: Creative Aspects and Practice, 14.

[21] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 267.

[22] Persichetti, Twentieth-Century Harmony: Creative Aspects and Practice, 248.

[23] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 243.

[24] Ibid., 243.

[25] Ibid., 243.

[26] Ibid., 285–87.

structure of harmony and rhythm, the melodic line itself often implies a harmonic and rhythmic direction and certain timbral properties. The concept of melody is often defined by its singability and its strong reliance on mostly tonal and melodious elements within the natural scale of the key harmony.[27] A sequence of tones is being perceived as a melodic contour, as a succession of linear harmonic relationships, resulting in the shape and figure of a melody.[28] Even when being rearranged and transposed, the melodic contour and form can still remain recognizable.[29]

In the context of scoring for audiovisual media, the terms of melody and motive are often perceived as interchangeable. But since the concept of melody solely describes a melodious movement, not determined by its length or context within a piece, a differentiation between those two terms might be reasonable. According to Karlin and Wright, in modern films or video games that often do not invoke a strong sense of characterization, there is often just no time for long-lined melodies.[30] In those situations the short character of the motive becomes particularly useful while still offering a wide range of possibilities to manipulate the thematic material to fit various shots and lengths.[31]

As mentioned above, the motive can not only be characterized through its melodic dimension. Rather, it can also be defined by a certain harmonic progression or rhythmic pattern. And it can also resemble in the simple combination of a two-note pattern within a specific interval, played in a certain timing. For the most of us this sounds familiar and resembles a popular motive-example of the shark attack scene from the film Jaws (USA, 1975), composed by John Williams.

In most cases, a melody will be accompanied by a harmonic progression. In others, the melody can also stand on its own, offering a break from the context of a more complex orchestration while often resulting in a sense of intimacy.[32] There can even be several melodic motives all at once, combined in an approach of counterpoint, moving within parallel motion, or playing more freely against each other.[33]

Regarding the melodic motive, there is a tradition within film music that is still relevant today: the leitmotif approach.[34] Due to its strong reliance on the narrational aspects of music, the

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[27] Schönberg, Fundamentals of Musical Composition, 98.

[28] Thomas Görne, Sounddesign: Klang Wahrnehmung Emotion (Carl Hanser Verlag GmbH Co KG, 2017), 76.

[29] Ibid., 76.

[30] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 197.

[31] Ibid., 197.

[32] Ibid., 210.

[33] Ibid., 213.

[34] Danny Elfman, "Danny Elfman Teaches Music for Film," ed. Jeff Bond, MasterClass, August 10, 2021, 22, accessed January 9, 2024, https://www.masterclass.com/classes/danny-elfman-

approach often implies one recognizable melody to obtain an overview perspective of the story or various single motives to help with the identification and relatability with the characters.[35]

Pulse and Rhythm: In defining the concept of rhythm in music, it is all about the pace and arrangement of time within a piece. There is always a specific structural timing framework behind any sequence of individual sounds, also defined by the audience's expectations of the next expected sonic event.[36] While it is not about the absolute time-based distances between individual sounds, the figure of rhythm can be determined in the relative temporal intervals within a phrase.[37] As in the melodic dimension, the figure can still be recognized after variation within the given structure.[38]

In the context of audiovisual media, it can be stated that every film or video game has its own rhythm, its own pulse, and its own structure upon the narrative pace of storytelling. From an analytical standpoint on the reception and interaction between the audiovisual rhythm and the audience's physical experiences, even a correlation between the human rhythm of movement and the cinematic act of perception can be stated.[39] For the composer, either supporting or countering the pulse or pace of the visuals can be defined as the primary function of the score.[40] To fit the narrative requirements, the score can play with even and uneven rhythmic figures within the perceived structure of the rhythmic meter while always being dependent on the cultural codes of musical perception.[41]

Comparable to the introduction of tension within the harmonic structure and the underlying concept of tonality and atonality, also the rhythmic dimension offers the possibility of determining rhythmic disorders and discrepancies, resulting in a tension inside the rhythmic sequence or phrase.[42] This can also be the case with changing meters throughout a piece and polyrhythmic approaches. In those cases, either several rhythmic meters can be used simultaneously (sometimes characterized by the interaction and interplay of both timings), or the composer introduces aleatoric passages within a cue, providing freedom of performance in the time domain.[43]

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teaches-music-for-film.

[35] Ibid., 22.

[36] Görne, Sounddesign: Klang Wahrnehmung Emotion, 79.

[37] Ibid., 79.

[38] Ibid., 79.

[39] Jan-Hendrik Bakels, Audiovisuelle Rhythmen: Filmmusik, Bewegungskomposition und die dynamische Affizierung des Zuschauers (Walter de Gruyter GmbH & Co KG, 2016), 220–21.

[40] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 279.

[41] Görne, Sounddesign: Klang Wahrnehmung Emotion, 80.

[42] Ibid., 82.

[43] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 290.

While some rhythmic parts can only be played by percussive instruments or sounds with a percussive character, many figures of rhythm can also be played by the orchestra. An example would be an action cue with short-noted string performances and impulsive brass bursts. But also every ostinato has a rhythmic character, using rhythm to invoke forward motion.[44]

Timbral Similarities of Orchestration, Sound Design and Synthesis

In the last chapter we have explored the theory behind the musical elements and building blocks and how they come together within the musical form of composition. Although the concepts of harmony, melody and rhythm represent the foundation of many scores, no musical piece can exist without the consideration of its overall sonic qualities.

Within the theory of music, the determination of instrumentation and tonal qualities takes place in the field of orchestration. In his book The Study of Orchestration, German-American composer Samuel Adler emphasizes that everyone who is writing music for the orchestra should regard the study of instrumentation and orchestration as a basic part of his musical education.[45] He also states that orchestration "is […] highly individual, depending greatly on the taste and even the prejudice of the composer or orchestrator."[46]

In symphonic orchestration it is all about the particular sound and range of each instrument, about the combination and interaction of several instruments with each other, and the physical properties and techniques behind the production of sound.[47] This also includes combinations of the instruments' individual characters in timbre, texture, and density, offering a wide range of possible orchestral colors. Additionally, the orchestration also defines the balancing and the voicing of the orchestra. In music there is often a clear distinction between symphonic orchestration, the musical arrangement of other genres, and the craft and art of sound design. Although the concept of orchestration in classical music follows a long tradition of already established forms and structures regarding the use and arrangement of traditional instruments within a piece, the term orchestration can also be determined across genres, applying the same fundamental concepts in the context of diverse approaches.[48]

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[44] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 285–87.

[45] Samuel Adler, The Study of Orchestration: Fourth Edition (W. W. Norton & Company, 2016), 5.

[46] Ibid., 8.

[47] Ibid., 6.

[48] Michael Filimowicz PhD, "Orchestration & Arrangement - Sound & Design," Medium, November 16, 2024, https://soundand.design/orchestration-f93ab89e83a5.

Another common field in audiovisual scoring is the combination and blending of both electroacoustic and acoustic elements, as well as different musical genres, giving the composer the ability to create and establish expansive soundscapes that otherwise would not have been possible.[49] Also experimental approaches can find themselves in the process of orchestration through interesting and unexpected combinations of instruments or the exploration of unique and unusual sounds that enhance the overall sound of a piece while corresponding with the narrative.[50] Either way, for the composer it is always about his vision of the tonal color and the distinctive and unique sonic character of a piece, may it be through the orchestra or by approaching a fusion character with other sonic elements. In this sense, through orchestration, the composer has the ability to establish a unique sonic palette for a project while prioritizing the timbral and sonic character of the composition. In bringing out various tonal colors, it is also about evoking different moods or settings to arouse an emotional reaction from the audience.[51] Although the terms orchestration and sound design, within the common books and resources about composition and classical orchestration, are not mentioned to be similar or related, certain commonalities come to mind:

In orchestration, different instruments can be distinguished by their unique tonal color and timbral properties, resulting in decisions on the choosing of instruments based on the desired character of sound. Certain instruments can either blend or contrast with each other, enhance the emotional reaction of the audience, or create appealing sonic textures.[52] In defining the concept of timbre in music, it is all about the spectrum of sound, the spread of the base note and its overtones, and their acoustic energies within the frequency domain, while also being dependent on the duration of a sound.[53] It also describes the sonic character and the audible distinction of various instruments that are playing the same note. In this regard, it is also about the distinction between periodic oscillation. Also, when a signal is containing not only integer multiples of the base frequency it often results in a more complex and non-harmonic overtone structure.[54]
In symphonic orchestration, desired timbral characters can be achieved through instrumentation and decisions about voicing and doubling of certain musical elements. This can also be compared to the sound design aspect of layering within other musical genres and the arrangement of sound effects and ambiences in the context of postproduction for

[49] Filimowicz, "Orchestration & Arrangement - Sound & Design."
[50] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 312.
[51] Filimowicz, "Orchestration & Arrangement - Sound & Design."
[52] Ibid.
[53] Jürgen Meyer, Handbuch Der Audiotechnik, ed. Stefan Weinzierl, Springer eBooks, 2008, 127, https://doi.org/10.1007/978-3-540-34301-1.
[54] Ibid., 127.

audiovisual media. Also the use of further signal processing like reverb, delay, chorus, and distortion inside the digital audio workstation can have a huge influence on the timbral quality of an instrument or sound.[55] It can even be stated that in the context of electronic music, there is the concept of spatial orchestration, determined by the use of spatial effects like panning or reverb, either in stereo, surround, or immersive audio.[56]

In electronic music, the initial premise was the idea to use synthesis to reproduce and mimic any possible sound that was already present, evolving into the ability to create any sound that could be imagined.[57] These synthesized sounds often result in unprecedented possibilities of sound design, going beyond the timbral characters of traditional acoustic instruments.[58] While using different sound layers to evoke the desired character of timbre, it is also about texture and density within the arrangement. In orchestration, the term texture describes the number of voices that play simultaneously and how they complement each other throughout the piece.[59] A thin texture, for example, defines itself through its small number of layers and a clear distinction between different voices.[60] While often establishing a sense of intimacy or transparency, every musical figure within the piece can be clearly determined.[61] When a piece consists of more sonic layers, it can be described as having a thicker texture. Multiple harmonic progressions and melodic elements are layered, often throughout a large orchestral ensemble, all participating in the overall sonic arrangement.[62] To achieve dynamic contrast throughout a piece, there is often a modulation of texture and density involved, also dependent on the narrative arc of the musical form.[63] Whether using orchestration or sound design in a strong orchestral or fusion approach, in scoring for audiovisual media it is always about the texture of the visuals too.[64] In the end, it is all about the "ability to find the right colors for every dramatic situation."[65]

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[55] Filimowicz, "Orchestration & Arrangement - Sound & Design."

[56] Ibid.

[57] Kim Bjørn and Chris Meyer, Patch & Tweak. Exploring Modular Synthesis, 2018, 12.

[58] Filimowicz, "Orchestration & Arrangement - Sound & Design."

[59] Ibid.

[60] Ibid.

[61] Ibid.

[62] Ibid.

[63] Ibid.

[64] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 297.

[65] Ibid., 297.

Scoring for Screen

"The job is not to listen to the director, telling you what the music is he wants. Because if he knows what music he wants, then he could do it himself. My job is to […] listen to him, tell me the story, and then do the thing that he can't even imagine. […] And I need sort of collaboration and at the same time complete freedom to do this."[1]
Hans Zimmer (2025)

"A composer can look at a score and think non-linearly, but even a simple looping piece of music is nonlinear in nature. We've done that for ages, with repeats & codas built into notation. Adaptive scores take a moment of change derived from player input changing the game state, and make the music react. It's like musical spatial awareness. If you're writing a piece of music, what comes before & after? What comes during?"[2]
Lena Raine (2024)

The Expressive and Narrative Role of Music in Audiovisual Media

Over the last chapters we have determined the individual musical elements and how they come together within the form and structure of a piece. Also, the concepts of unity and variety and the influence of audience expectations were discussed from the background of the creative process behind musical composition.

In the context of audiovisual media, any of those aspects can be traced back to the expressive and narrative needs of the story while also keeping other dimensions of visual and auditive storytelling in mind. In this sense, it is all about the function of the score within the context of the overall production and the individual scenes and about how to play the drama in accordance with the other audiovisual elements. Although the function of music within the cinematic dimension (or within the gameplay) usually is strongly dependent on various concepts of perceptual psychology (which also can become particularly engaging and applicable for any screen composer), the goal of this section is more about the introduction to

[1] Rick Beato, "The Hans Zimmer Interview," March 14, 2025, accessed July 7, 2025, https://www.youtube.com/watch?v=TbeevzNmU1g.
[2] Lena Raine, 2024, quoted in Tom Riley, "Music That Moves: How Adaptive Soundtracks Shape the Gaming Experience", November 18, 2024, accessed July 7, 2025, https://www.linkedin.com/pulse/music-moves-how-adaptive-soundtracks-shape-gaming-experience-riley-rokqe/.

different approaches, techniques and use cases of music within different scenes and contexts. While keeping a wide range of musical applications within the dramatic framework of audiovisual productions in mind, in general the functionality of music can be divided into three areas: the syntactic function (mostly about the understanding of the structural sequences and the differentiation of settings), the expressive function (determining the affective arousal and intensification of emotional perception), and the narrative function (including characterization, creation of tension, foreshadowing and flashback).[3]

Regarding those general concepts of possible musical functions throughout the drama, there are also three ways of playing within a scene or sequence: Playing through without engaging specific moments or points of interest can be one way of establishing the scene while prioritizing the overall emotional response and mood.[4] Another option might be the acknowledgement of changes or shifts both in the dramatic and emotional dimension through the devision and phrasing of a sequence.[5] In another context, it might be applicable to strictly follow the action of a scene and to use musical accents to engage certain dramatic events.[6] In this sense, the role of music within the context of different audiovisual productions can go all the way from setting the overall mood, enriching the narrative, developing the characters, guiding audience expectations, and enhancing the viewing experience and immersion to the interpretation and commenting of a scene.

While keeping the focus on the musical function, in many cases the composer will also be challenged by other parts of the sonic landscape, by elements of sound design and dialogue. The challenge is to preserve the emotional and narrative character of the music while not conflicting with the dialogue, avoiding elements of distraction, scoring out of the range of the human voice, avoiding musical extremes, and keeping it simple.[7] As already mentioned above, music within audiovisual media does not only work through its expressive or narrative function but also through its influence on the audience's memory due to the recognition value of certain musical elements.[8] Also the perceived duration and timing of a film or game sequence can be significantly influenced by the sonic character and rhythm of sound design

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[3] Günther Rötter, Handbuch Funktionale Musik, Springer eBooks, 2017, 434, https://doi.org/10.1007/978-3-658-10219-7.

[4] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 154.

[5] Ibid., 154.

[6] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 154.

[7] Ibid., 168–71.

[8] Henning Albrecht, Leitmotivik in Der Filmmusik, 2021, 103, https://doi.org/10.5771/9783828877146.

and music.[9] In this sense, music can be used to overcome long periods of time, offering continuous harmonic or sonic layers in contrast to narrative leaps in time.[10] In the context of game design, the music can also help to establish transitions between different states within the gameplay or acoustically comment on the player's action.[11] Overall, the role of music in audiovisual media can be mostly about influencing the perception of the audience and thereby reinforcing the clarity of the development of music, also resulting in the common techniques of setting the mood, establishing a motive, or underscoring the drama:[12]

The Mood Technique: In the approach of setting the mood of a scene with music, it is often about playing an overview, establishing an atmosphere in the sonic landscape or guiding the audience's emotional response to the narrative while evoking a specific feeling. Using this technique, either to play the environment or the situation of a scene can become particularly effective due to the association with the surroundings of the characters.[13] Sometimes the mood technique also finds itself in a more understated use case, avoiding the mirroring of specific moments and actions within the visuals while also not becoming too melodramatic.[14] While the approach of the mood technique can be mostly defined by its character of playing through a scene, it can also be preferable to organize a sequence into sections or phrases to further reflect and acknowledge certain shifts or changes of emotional intensity.[15]

Underscoring: In contrast to the mood technique, the concept of underscoring determines a descriptive approach, directly mirroring or paraphrasing the actions and emotions of a scene. While often being used within the context of physically or emotionally captivating visuals, it may also be employed in a more subtle way, showing the details of a character's internal emotional state. The approach can also be pushed to its limits by imitating the actions on screen in a very literal way. Resulting in a specialized form of underscoring, the approach is often referred to as "Mickey-Mousing" due to its history in cartoons and animated films. The idea of hitting the action can also be more appropriate in the context of thrilling and suspenseful genres, playing within a more intense and impulsive performance, than within more intimate moments of storytelling.[16]

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[9] Thomas Görne, Sounddesign: Klang Wahrnehmung Emotion (Carl Hanser Verlag GmbH Co KG, 2017), 189.

[10] Rötter, Handbuch Funktionale Musik, 438.

[11] Ibid., 411–12.

[12] Ibid., 429.

[13] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 135–37.

[14] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 144.

[15] Ibid., 156.

[16] Ibid., 158.

The Leitmotif Approach: In the context of audiovisual storytelling the leitmotif describes a musical phrase or figure that is unique and recognizable in character while being repeated over the duration of a film or game.[17] Within the narrative framework, it is always being associated with a certain person, an object, or with a specific situation or location, reminding the audience of a certain event or establishing a sense of changing the situation or developing a character.[18] As determined above, the motive can resemble either melodic, harmonic, or rhythmic elements and can be structured within the musical form. Although the leitmotif, most often, can help the score in the characterization and emotional relation, it is often more about getting beneath the surface of the characters emotions and to musically express what the situation essentially means while always keeping the backstory in mind.[19]

The Spotting Session and the Temp Track

Within the field of audiovisual media, collaboration between all departments of a project can be considered as one of the most essential parts in achieving a well-conceived outcome. In the production of a movie or video game, it is all about the team effort of everyone who was involved in the project, including experts from a variety of backgrounds.[20] When entering the phase of postproduction, cooperation typically takes place in the separate departments of visuals and sound. In the context of music, most composers come to the project not until the start or midrange of postproduction, but there is not always a clear distinction between the individual phases of a project, and composers sometimes may be involved right from the beginning. This was also the case for Hildur Guðnadóttir in the process of scoring the film Joker (USA, 2019), who had the opportunity of starting the creation of music right within the early stages of the project, just after she had finished reading the script.[21] She describes, that in this way the music became a vital part of the process, setting the tone of the film even before shooting.[22] This approach also gave the production team the opportunity to play certain cues on the set, also resulting in the interaction between the actors' movements and the character

[17] Albrecht, Leitmotivik in Der Filmmusik, 7.

[18] Ibid., 7.

[19] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 137.

[20] Fred Karlin and Rayburn Wright, On The Track: A Guide to Contemporary Film Scoring, 2004, 3.

[21] Hildur Guðnadóttir, "Hildur Guðnadóttir Interview," interview by Paul Goldowitz, ed. Ruby Gartenberg, Pop Disciple, August 9, 2019, accessed June 28, 2025, https://www.popdisciple.com/interviews/hildur-gudnadottir.

[22] Ibid.

of the music.[23] Either coming early or late into a project, at the beginning there is always a meeting with the filmmakers (or, in the context of video games, with the production team of the game).[24] In this stage, it is all about the director's dramatic vision and expectation of the score's function in relation to the already established narrative or visual framework, and the organization and communication aspects between all departments of the production.[25] As determined above, reading the script at first can be one way of starting into the collaboration of an audiovisual project. But in many cases the composer first comes into contact with the production shortly before or during the first screening or starts directly into the composition process from the first or final cut that was sent to him by the editor. In the context of the collaboration between the composer and the filmmakers or game production, the terminology often refers to the concepts of spotting session and temp track:

The Spotting Session: When working in the field of audiovisual media with a linear character, as it is the case for film and television, the spotting session is often one of the first meetings between the composer and the director, in many cases also with the film editor, the producer, and other members of the filmmaking team. This often takes place at the end or during the editing process, usually in the premises of the editing suite or in a small screening environment, going through the project scene by scene, starting and stopping at any time.[26] Regarding the collaboration within the interactive landscape of video games, there is often also a high degree of communication involved, with the difference that spotting directly to the visuals, in most cases, may not yet be possible due to the longer and agile organization of a project. Either way, the goal of any collaboration between the composer and the director or producer should be to find an answer to the common questions of the context in which the music will be played in, the duration, beginnings and endings of musical cues and most importantly, the kind of music that should be established throughout the arc of auditive storytelling.[27] In this sense, it is also always about the function of every musical cue within the narrative framework, the expectations of the audience, the interaction with the visuals, and the transition between several cues or narrative parts.[28] During the spotting session, either the composer, music editor, or producer takes notes, offering a breakdown of all musical cues

[23] Guðnadóttir, "Hildur Guðnadóttir Interview."

[24] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 3.

[25] Ibid., 4–6.

[26] Danny Elfman, "Danny Elfman Teaches Music for Film," ed. Jeff Bond, MasterClass, August 10, 2021, 10, accessed January 9, 2024, https://www.masterclass.com/classes/danny-elfman-teaches-music-for-film.

[27] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 34.

[28] Ibid., 34–36.

while organizing them within a coding system.[29] This also leads the way to the project's cue sheet, either organized within a standard sheet document or over a commercial provider of online cue sheet services (e.g., CueDB).[30]

The Temp Track: Before the composer comes to the table, many films and games use musical role models that already are mostly synced to picture, resulting in a completely constructed track of preexisting music to support the editing of specific scenes or the overall production. This concept is called the use of a temp track (or temp score) regarding the temporary character and its later replacement by the project's original score.[31] For the composer, the use of temp tracks can either provide a point of reference, acting as the base of communication with the director, or otherwise cause distress and anxiety within the further process of composition.[32] Danny Elfman, for example, states that "temp music is the bane of every composer. Sometimes, I'm looking at a rough preview, where there's a full temp score from beginning to end. And I hope never to see it again."[33] When temp music was present during the process of editing and within the context of several screenings, both for the director and the composer, there is the danger of not getting the music out of your head, making it difficult to come up with new ideas or resulting in a preconceived affection for your emotional reaction.[34] In those cases, sometimes even the temp track will remain within the production through the licensing of the original master recording.[35] In other cases the temp track can be particularly useful for the expression of the director's abstract impressions of the future score.[36] Alan Silvestri, for example, really likes to listen to the individual elements of a temp track when it results in the base of further communication between him and the director.[37] Due to the tight deadlines of a project or the lesser capacities of the director or producer, there are also times when the composer does not have the opportunity for a hands-on spotting session. In those cases, the temp score can fulfill the purpose of communication with the filmmakers (or game designers), defining the deliberate character of the future score.

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[29] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 37.

[30] Anne-Kathrin Dern, "Spotting Sessions and Cue Sheets," May 23, 2020, accessed July 11, 2025, https://www.youtube.com/watch?v=52zNy0iwKxw.

[31] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 26.

[32] Ibid., 26.

[33] Elfman, "Danny Elfman Teaches Music for Film," 13.

[34] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 31.

[35] Ibid., 30.

[36] Ibid., 29.

[37] Alan Silvestri, 2004, quoted in Fred Karlin and Rayburn Wright, On The Track: A Guide to Contemporary Film Scoring, 2004, 31.

Comparing the Musical Landscape of Film, TV and Video Games

While most scores and soundtracks for audiovisual media are often described as cinematic music, there are only a few composers who solely write music for feature films that will be screened in large-format movie theaters. Furthermore, composers are often required to have background experience in several fields, including the musical composition in both linear and non-linear environments. In this context, the comparison of the musical language of film, TV, and video games is mostly about different structures, adaptive approaches, specific musical elements, and differences in production schedules:

Similarities and Differences of Music in Film and TV Shows: Before diving into context, it should be stated that the terms TV and television shows also refer to modern streaming services like Netflix, Amazon Prime, Disney Plus, and so forth due to the history of the series format in traditional television programs. Comparing the audiovisual formats of film and television series, the first thing coming to mind may be that they are both being dependent on a linear narrative structure. In both situations, it is all about the arc of storytelling in correspondence to the time-based and specific edit of motion picture. But also their differences must be accounted for: while film can be referred to as the audience experience of a singular and continuous narrative structure with a usual runtime between 90 minutes and three hours, television series are generally divided into several episodes with the average duration of 20-60 minutes.[38] In most cases, there is also a differentiation of the musical development of individual themes, allowing the composer to establish a more unified experience within the context of a film score or keeping the thematic material across episodes as modular and adaptive as possible while constantly reusing or extending it for a variety of environments and emotional contexts.[39] In television, this concept is also about the engagement of the audience over a longer period of time and the building of a relationship with the audience, playing with familiarity and recognizability of certain themes across multiple episodes.[40] A huge role in the establishment of a serie's unifying character takes, in most cases, also the creation of a memorable main title theme. While in the past they often consisted of distinctive melodic figures, today it is often more about the sound of a show, emphasizing rhythmic grooves and sonic characterization.[41] Another difference in scoring for cinema and television often lies in the scheduling and timing of a production, resulting in sometimes incredibly tight deadlines.

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[38] Sourabh Pateriya, "Film Vs. Television: A Composer's Guide to the Differences," Soundverse AI (blog), January 30, 2025, accessed July 9, 2025, https://www.soundverse.ai/blog/article/film-vs-television-a-composers-guide-to-the-differences.

[39] Ibid.

[40] Ibid.

[41] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 428–29.

In their book "On The Track" composers Fred Karlin and Rayburn Wright refer to a common schedule of five to seven days per episode, often including revisions and the stem mixdown.[42] Due to those deadlines, everything must be done in the box, using software to replicate the entire orchestra or scoring solely with synthesizers.[43]

The Adaptive Shape of Video Game Soundtracks: While both film and TV shows share the same linear characteristics of the audiovisual shape and structure, video games always evoke interactivity and adaptation within the gameplay. Since, in the context of interactive media, in-game events occur at any time, also through the interaction of a player, the score must find a way of adapting to the narrative storyline while always encountering the actual game state.[44] This often results in an adaptive approach to scoring for interactive media, but there also are situations where linear music can be appropriate. The most obvious example of linear cues in the context of video games would be the use of one-shot tracks in the gameplay, in cinematics or cut scenes, or in scripted events.[45] Triggered once without being looped, the one-shot track can have a similar character of linearity as in film or television.[46] Another linear element of game music is the stinger, which can be defined by its short duration and its use in situations of victory or defeat, establishing a transition, giving a hint, or collecting a prize.[47] Also, the concept of looping within interactive media can be described as linear in its character, defined by its planned and never-altering structure.[48] On the other side, there are certain compositional techniques for interactive and adaptive music, and some games might even demand an adaptive approach in the auditive storytelling. When changing an in-game event, the music might switch between different musical cues through horizontal re-sequencing.[49] Depending on the middleware or game engine, the transition can take place through crossfading or the consideration of the phrase or downbeat in a musical manner.[50] The concept of vertical remixing and the addition or subtraction of instrumental layers throughout the gameplay is another technique to encounter the adaptive character of the music.[51] In the

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[42] Karlin and Wright, On The Track: A Guide to Contemporary Film Scoring, 425.

[43] Ibid., 426.

[44] Michael Sweet, "Scoring for Games: Composing Music for Interactive Media," Berklee Online Take Note, May 5, 2025, accessed July 9, 2025, https://online.berklee.edu/takenote/scoring-for-games-top-techniques-for-composing-music-for-interactive-media/.

[45] Winifred Phillips, A Composer's Guide to Game Music, eBook, 2014, 196–97.

[46] Ibid., 196.

[47] Ibid., 191.

[48] Ibid., 170.

[49] Sweet, "Scoring for Games: Composing Music for Interactive Media."

[50] Ibid.

[51] Ibid.

context of the chapters above, these techniques can also be described as "adaptive orchestration in video games".[52] Another possibility of further adaptation can lie in the alteration of tempo, harmony, and melody according to the player's decisions or the state of the game.[53] The composer can also find additional sources of variability in the interactive implementation of digital signal processing or randomization.[54] Also, the concept of generative music can find itself in an environment of video games. In this case, musical elements are created in real time and in correspondence to the in-game actions. But since the integration of the generative approach can be difficult, most successful examples can be found in the category of "music games", participating the player in his interaction with the musical score.[55] In general, the approach of adaptive music in the context of interactive media can be all about immersion and about the emotional and physical response of the audience.

[52] Michael Filimowicz PhD, "Orchestration & Arrangement - Sound & Design," Medium, November 16, 2024, https://soundand.design/orchestration-f93ab89e83a5.

[53] Sweet, "Scoring for Games: Composing Music for Interactive Media."

[54] Ibid.

[55] Phillips, A Composer's Guide to Game Music, 230.

03 Music Production Workflow
Inside The Digital Audio Workstation

Scoring Templates and Virtual Orchestration with MIDI

"On occasion, I have an idea and I don't have the sound for it. Then I've gotta find the sound - or I've gotta make the sound."[1]
Danny Elfman (2021)

"For me, to make a blend between the organic world and the programming world, is to actually use things that are programmed in a very organic way, so they start blending over into the real played instruments, and taking things that are played by the orchestra, but then treading them with sound design plugins."[2]
Tom Holkenborg (2019)

In the beginning chapters of this book, we have already explored the creative process, the background of music theory and orchestration, and how elements of music come together in the concept of form. We have also discussed the sonic aspects of timbre within music, leading the way to combining both the sonic character of traditional acoustic instruments with the unprecendent possibilities of synthesis and experimental sampling approaches. In the previous chapter, we have also determined the workflow of scoring for screen, the function of music in the audiovisual context, and the differences within the fields of film, TV and video game productions.

In the following chapters we will examine the workflow inside the Digital Audio Workstation, considering session management and common scoring templates, backward planning of stem deliveries, and programming and orchestrating with MIDI while exploring the expressive capabilities of sample based instruments. Before then jumping off to the sound design workflow and creation of a unique sonic palette, we will also delineate the basics of digital modular synthesis and signal processing in the time and frequency domain.

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[1] Danny Elfman, "Danny Elfman Teaches Music for Film," ed. Jeff Bond, MasterClass, August 10, 2021, 39, accessed January 9, 2024, https://www.masterclass.com/classes/danny-elfman-teaches-music-for-film.

[2] Orchestral Tools, "Tom Holkenborg: Sound Design in Film Music," March 12, 2019, accessed July 11, 2025, https://www.youtube.com/watch?v=U172Nhiayxg.

DAW Sessions and Templates for Different Scoring Approaches

Scoring for audiovisual media, in many cases, comes along short time constraints and tight deadlines. In those cases an efficient workflow can become essential while still remaining flexible throughout the creative process.

In determining the beginning stage of a musical composition and the underlying process of creativity, the possibilities of creative boundaries, restrictions or limitations were examined. Also we have explored more experimental approaches and possibilities of sound design that could become the creative process or structure themselves.

These concepts of the creative process can also be brought into the digital domain of music production. Inside the digital audio workstation the composer has countless options to start from, and the wide range of different track presets, virtual instruments and audio effects can become challenging at first. Max Blomgren, professor at Berklee College of Music, compares the start from an empty session, with no tracks for audio, effects or virtual instruments inside, to a blank canvas that often demands much time to be filled towards the needs of a project.[3]

But the composer could also start from a session that was created in advance. Blomgren describes this as setting up an individual workspace for various scoring situations, consisting of all needed musical elements in an organized and well prepared manner.[4] While Blomgren mostly refers to the workflow behind orchestral mockups, the scoring template can also include project specific instruments and audio tracks as repeatable starting points for experimental approaches and sound design.[5]

Another reason for the introduction of a specific scoring template for different scores or cues can be the management of markers, timing settings and visual references within the global tracks of a session. Also, planning a stem workflow even before starting on a project can become essential for the collaboration between the composer and the dubbing stage. Serving a concept of backward planning, required deliverables can be defined ahead of time, resulting in a specific layout of tracks and effects and a pre-routed structure of the template.

Global Tracks and the Stem Workflow: In most scoring situations in a context of audiovisual media, it is all about the visual reference and the collaboration with other departments within

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[3] Virtual Orchestration, "BASIC TEMPLATE CREATION - SAVE VALUABLE TIME ⌛ - Feat. Max Blomgren," February 6, 2023, accessed July 10, 2025, https://www.youtube.com/watch?v=emNM51pC2eA.

[4] Ibid.

[5] Ibid.

the process of postproduction. This also leads to the management of a sessions global tracks and a workflow of prepared and pre-routed stems within the scoring template.

While music is typically structured in the rhythmic domain of bars and beats, depending on tempo and time signature, the visuals are mostly reliant on time-based measures and durations. A well known standard in the field of film and television resembles the synchronization based on a timecode clock (SMPTE), in the format of HH:MM:SS:FF (hours, minutes, seconds, frames), always being related to the visual framerate. Inside the digital audio workstation both musical and time-based measures can be present simultaneously within the global tracks of a session, offering a musical grid and timecode reference.
As determined in previous chapters, the aspects of timing and function of musical cues are being discussed within a projects spotting session or in one of the first meetings between the composer and the director. In this context, also specific visual references and hitpoints can be defined or the edit may already follow a deliberate tempo. These aspects can also be taken into account before starting into the composition process when setting up a projects template, resulting in the pre-definition of tempo and time signature and marker tracks for both musical and visual events.

The global tracks of a session also can become beneficial when chasing the edit of a film or TV show. Since most audiovisual productions nowadays are solely released in the digital domain (for example in the format of a digital cinema package, short DCP), a film could be edited even until the day of public screening. In case the music of a scene was already written (and sometimes also recorded), changes of picture can often challenge the composer. But, as Danny Elfman declares, it is the composers responsibility to follow the edit with his score, because the visuals are often not constructed with the music in mind.[6] He further describes, that it does not always work out as it did before the change of tempo and timing, but the composer, in most cases, has to live with the compromise.[7] Either if changes may work out or not, modern digital audio workstations offer the composer many possibilities to synchronize the music with the visual reference. For example, with musical and time based markers you can align certain beats within the musical grid with a visual hit point, resulting in a modulation of the tempo track. Or the tempo track may follow a free played musical performance to introduce a more dynamic timing of a cue. A certain pre-defined tempo track can also be used to create a click track for the recording of musical live performances. This was also the case for [composer] Ludwig Göransson in scoring the Oscar-winning soundtrack for Oppenheimer: For the track 'Can You Hear the Music?' he programmed a click track for the recording of the constantly evolving and mathematically structured string figure, providing the orchestra an indicator of when and how

[6] Elfman, "Danny Elfman Teaches Music for Film," 53.
[7] Ibid., 54.

the irregular tempo changes take place within the cue.[8]

Another common part of the composers template can be the definition and routing of pre-defined stem busses. In this demand, the composer either declares his own workflow or collaborates with the mixing engineers, delineating how many individual stems and instrument groups will be needed for the final mix or dubbing session. Stems can be seen as sub-mixes of the score, combining (routing) related audio and instrument tracks into individual groups. When working with stems the full mix can be recreated when combining and playing them all together at unity gain. At this point it is important to state that every stem must also have its individual effect channels and sents to gain a consequent separation of all sub-mixes (when using plugins in the mentioned approach and not on every individual channel).
Stems can offer the mixing engineers much flexibility within the process of postproduction, enabling them to balance distinctive musical elements with sound effects, ambient sounds and dialogue. Having in mind the workflow of printing stems in advance, the composer can save time while collaborating with his colleagues in audio postproduction.

The Digital Orchestra and Studio Instruments: Some composers have various DAW templates for different scoring approaches while others mostly rely on a single master template. Either way, in most cases there are certain track presets, structures and groups of software instruments that usually will not be changed or reformed. In a studio environment this also includes the predefined set-up of certain recordings situations, studio instruments and the setting of the DAWs inputs and outputs.

For many composers and scoring approaches the digital orchestra resembles the core of the scoring template, consisting of the classical formation of strings, woodwinds, brass and percussion. Sometimes, they are divided into individual templates or track presets, or they are part of one orchestral scoring session. There can also be various options for different ensemble sizes or there can be multiple sample libraries combined within a session, providing different sonic characters or to layer them in a unique way.
In the following chapter, we will further determine the possibilities of MIDI programming and virtual orchestration while considering various articulations and characteristics.

Project Specific Instruments and Audio Tracks for Sound Design: While the previous part of the template defines a workflow of consistency over various scoring approaches and sessions, the background of this section is more about offering a starting point for creative and project

[8] Variety, "Ludwig Göransson - 'Can You Hear the Music?' From 'Oppenheimer' | Behind the Song," February 19, 2024, accessed July 13, 2025, https://www.youtube.com/watch?v=fWvX4M1dXss.

specific approaches and sound design. It is all about the exploration of a unique sonic palette for the individual project and about its distinctive sound that will not take place in the context of another project.

Project specific instruments can either be solo instruments that characterize a specific narrational situation, rare or traditional instruments with an individual sonic character, or unusual combinations, performances, and articulations. It can also be blank presets of software synthesizers, or empty sampling or audio tracks, leading the way to the creation of your own sounds and software instruments and the layering and arranging of sound effects within the musical structure. This will also be further discussed in the following chapters about the sound design workflow as part of the composition process.

The use of special instruments and sonic characters is always dependent on the project's overall setting and the structure of storytelling. Sometimes, the project might also require from the composer a vast amount of research in various musical backgrounds, traditions or cultures.[9] While these often contrasting influences might lead into unique and original compositional ideas, they often demand the composer to expand his sound palette, to close the gaps of his template, and sometimes to purchase specific software instruments and sample libraries.[10]

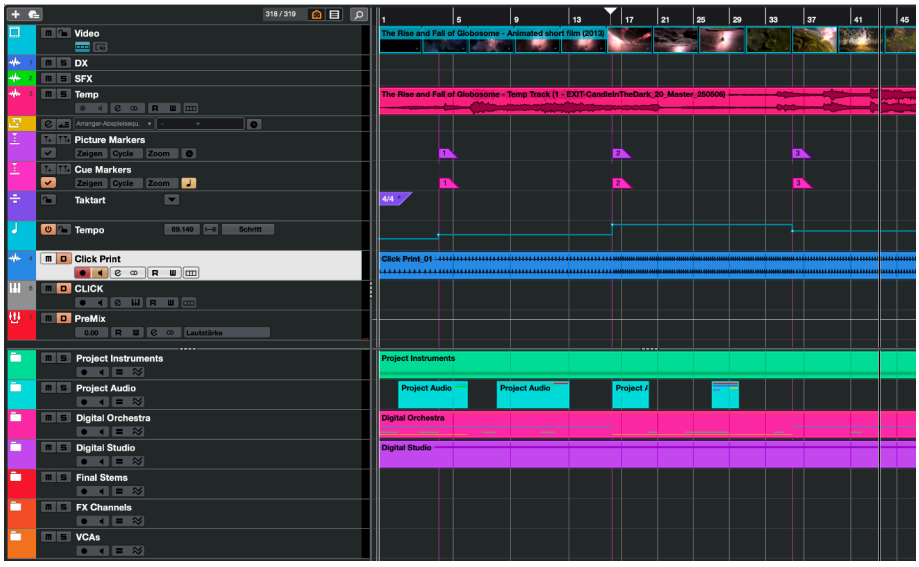

Fig. 02: Scoring Session in Steinberg Nuendo

[9] Winifred Phillips, A Composer's Guide to Game Music, eBook, 2014, 141–43.
[10] Ibid., 143.

Programming MIDI and Orchestrating with Sample Based Instruments

As we have already discussed in the previous chapters about orchestration and timbre, both acoustic and electroacoustic instruments can be defined by their distinctive sound, their tonal range, and their characteristics of sound production. When studying orchestration the composer also often learns about the expressive capabilities of individual groups of instruments, different articulations and performances, and the interpretation of musical phrases and punctuation. While electronic mock-ups and orchestral simulations often require high-quality sample-based instruments and sound libraries, they are also dependent on the composers knowledge about orchestration and musical performances.[11]

Within the software dimension the aspects of dynamic and musical expression are controlled by numeric parameters (0 - 127) within the MIDI protocol. While this can be defined for most virtual instruments within the digital domain, the particular dynamic range of an instrument can be dependent on the depth of sampling, defined by the quantity and quality of the individual layers of volume and expression. Every sample consists of the sonic characteristics of the recording environment, the individual groups of instruments, and the distinctive performance of the players. In sampling, every articulation and dynamic layer can be recorded separately, allowing the composer to smoothly transition between different expressions and dynamic characteristics through MIDI continuous controllers, MIDI velocity, key-switches, or the interface of the sampler.

In many cases the orchestration with virtual instruments and sample-based performances is geared towards a convincing simulation of either small or large ensembles of acoustic instruments, replicating chamber strings or a full symphonic orchestra. But even when aiming towards a realistic replication of real instrumental ensembles, the sonic perspective of the audience might differ when comparing the MIDI arrangement to a live performance, due to the positioning of the microphone and the acoustic properties of the room.[12] Within the environment of digital music production, the composer can also break the rules of traditional orchestration. In those situations, musical figures can be created that would not be playable by acoustic instruments, either being too difficult to perform or simply not possible within the tonal range of the instrument.[13] This also can result in the advantage of interesting

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[11] Alan Belkin, Musical Composition: Craft and Art (Yale University Press, 2018), 225.

[12] Virtual Orchestration, "Beyond Realism: BOOST UP Your Arrangement With a Compelling SONIC PERSPECTIVE!," February 13, 2023, accessed July 14, 2025, https://www.youtube.com/watch?v=6BEh-w2ZA34.

[13] Andrea Pejrolo and Richard DeRosa, Acoustic and MIDI Orchestration for the Contemporary Composer: A Practical Guide to Writing and Sequencing for the Studio

combinations of tonal colors while remaining flexible and exploratory.[14]

Expressive Control of Sustains and Long Articulations: As we have determined above, the MIDI programming of a good instrumental or orchestral mock-up, besides good quality sample libraries, requires the composer's knowledge about various aspects of orchestration and instrumental performances. And while most instruments can be played in a variety of expressive and dynamic ways, resulting in distinctive possibilities of phrasing and control over articulation, composers must train their ears according to focus on the delicate nuances of timbral characteristics and shape of tone.[15] For strings this implies the player's decision about speed and pressure of bowing, movement of pitch between notes (portamento), depth and speed of vibrato, and various extended playing techniques.[16] In the context of woodwinds, it is all about breath control and tongue articulation, resulting in the natural shape of a phrase, real-time adjustment of intonation, and dynamic control over the instruments attack and punctuation.[17] The character of sustained notes never resembles in a completely static way and always contains subtle or intentional variations and graduations in tone and dynamic expression.[18] In programming MIDI this expressive arc must also find itself in the virtual performance of the instrument.

To achieve a well balanced and realistic simulation of an instrumental ensemble or orchestra, various groups of instruments must be treated differently within the digital domain of MIDI while always keeping the expressive characteristics of a real musical performance in mind. This also defines how to program the different continuous control parameters of CC1 (modulation), CC2 (breath/vibrato), CC7 (volume), and CC11 (expression). While those describe the most common parameters within the field of virtual instruments, there is a list of 127 MIDI continuous controls which are predefined to other specific parameters or undefined and attachable to any digital knob or fader (MIDI learn). In most sample libraries with a sustained character or within the long articulations of virtual instruments, the modulation parameter (CC1) is mapped to a crossfade between the various dynamic layers of the instrument. This often gives the composer the most artistic control over the digital performance. But in many cases the modulation will be supplemented with the control over the expression parameter (CC11), offering an additional automation of volume within a single dynamic layer. The controls over breath or vibrato (CC2) are not mapped in every software instrument, often being

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Orchestra, eBook, 2nd Edition (Taylor & Francis, 2017), 413.

[14] Ibid., 413.

[15] Belkin, Musical Composition: Craft and Art, 226.

[16] Belkin, Musical Composition: Craft and Art, 227.

[17] Ibid., 227.

[18] Ibid., 226.

linked to the dynamic layers of a library (modulation control). The parameter of volume (CC7), on the other hand, mostly defines the master volume of a sample library and is most often used to control the balance between various virtual instruments.

Fig. 03: MIDI Programming of Long String Articulations

Dynamic Programming of Short Notes and Percussive Elements: When programming sample-based libraries in an orchestral context, within most samplers and virtual instruments, the composer has the option to choose from a variety of long and short articulations. For strings, playing short notes can range from spiccato, ricochet, staccato, marcato, pizzicato, to the articulation of col legno. As already mentioned above, the articulation of woodwinds is mostly dependent on the players tonguing, ranging from staccato over double and triple tonguing to flutter tongue.[19] Also for brass instruments the character and attack of a note is dependent on tonguing and additionally the pressure of the players lips.[20]

While all those articulations on various different instruments can result in a wide range of sonic characteristics, in the domain of MIDI programming both short articulated notes and percussive instruments will be most often controlled by a single parameter: velocity. Like the control of modulation of sustained notes and long articulations, the velocity parameter (0 - 127) crossfades between the dynamic layers of a sample library. In this sense, the composer can digitally perform an instrument, defining the dynamic range and intensity of playing. To create a more natural and realistic sound, there are often subtle variations of the same sample played back in a cycle, avoiding to be perceived as too repetitive. This approach of sampling is called round robin and is preventing the so called 'machine gun effect'.

[19] Samuel Adler, The Study of Orchestration: Fourth Edition (W. W. Norton & Company, 2016), 180–83.

[20] Adler, The Study of Orchestration: Fourth Edition, 328.

Performance Samples and Expressive Sustains: In contrast to the conventional approach of sampling, within some libraries the recorded samples may already contain an instrumentalists expressive performance or a recorded shape or contour of tone. In those cases the composer will not have the ability to afterwards control the parameters within the sampler, and expression or playing style might already be predefined. While in most scoring situations the composer might need full control over a virtual instruments dynamic and expressive parameters, the prerecorded performance or expression of samples can become advantageous in achieving a more natural and authentic sound of solo instruments or extended playing techniques. Therefore, there are often also several takes with different playing styles and dynamic variations that are being recorded and labeled for specific later use.

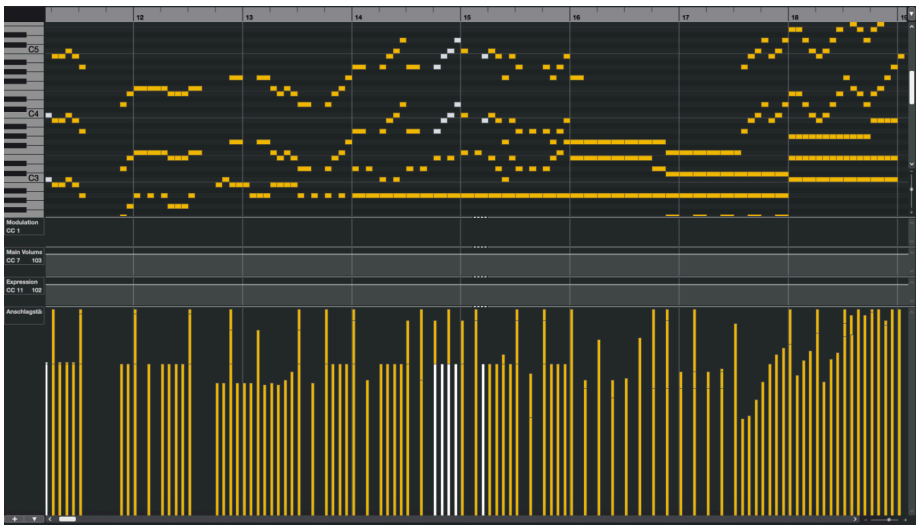

Fig. 04: MIDI Programming of Short String Articulations

In contemporary scoring for audiovisual media, this approach of sampling is used in a variety of different virtual instruments and finds itself in many scores for film, TV and video games. They range from string textures, brass swells, and solo instruments to more experimental use cases and polyrhythmic performances. One example of this sampling approach in the context of string textures is the commercial library 'Evolutions' from Ólafur Arnalds and Spitfire Audio.[21] Also the free library 'Cello Moods' from Spitfire Labs offers the composer an expressive instrumental performance in various harmonic keys and emotional feelings.[22] Also other companies offer similar libraries or go beyond traditional instrumental playing techniques in a more experimental approach. This will also be discussed in the following chapters of this book.

[21] "Ólafur Arnalds Evolutions — Spitfire Audio," n.d., https://www.spitfireaudio.com/olafur-arnalds-evolutions.

[22] "Cello Moods," accessed July 15, 2025, https://labs.spitfireaudio.com/packs/cello-moods.

Methods of Digital Sound Generation and Signal Processing

"Usually, the best things in my scores, I feel, are the accidents, the things that were not intended. So, synthesizers are kind of the new punk rock for me. It's like an instrument I don't really understand. But because I don't understand it, it's fun to explore, and most of the time I don't know exactly what I'm going for."[1]
Cliff Martinez (2019)

"The best tip I can give you to take your production skills to the next level (and save you a lot of money) is to master the tools you have. The more tools you have, the harder it will become to decide what to use and when. It will slow down your creative process and it's very easy to get lost."[2]
Robert Dudzic (2020)

The Background of Digital Modular and Granular Synthesis

In the previous chapters of this book we have already discussed the timbral similarities and distinctions between acoustic and electroacoustic instruments and how synthesized sounds can also be determined in the context of orchestration. We have also delineated that the sonic character of acoustic instruments can mostly be defined by their physical properties and methods of sound production. While this can clearly be defined for acoustic instruments, in the synthesis domain it is more about the individual and modular combinations of various audio sources and different approaches to modulate or modify the signal in distinctive ways.

In the world of synthesis, the term modularity defines that the user can freely manipulate the signal flow and combine and connect (patch) or custom build different modules or individual units. Unlike some traditional (analogue) synthesizers that often feature a predefined signal flow, built on a fixed architecture of circuit boards, the digital domain can provide more

[1] vpro cinema, "Cliff Martinez (Drive) on the Secret of a Good Soundtrack," February 6, 2019, accessed July 16, 2025, https://www.youtube.com/watch?v=1o60tI81ySs.
[2] Mick Benjamins, "Robert Dudzic: How to Be the Best at Sound Design | Native Instruments Blog," Native Instruments Blog, October 23, 2020, accessed July 16, 2025, https://blog.native-instruments.com/robert-dudzic-how-to-be-the-best-at-sound-design/.

flexibility. In this sense, most software synthesizers are already intended to be as modular as possible within their user interfaces, providing numerous options of possible audio sources, modulators and modifiers. The most common examples of 'standard' software synthesizers are: Xfer Serum, Arturia Pigments, UVI Falcon and Kilohearts Phase Plant.

There are also full modular systems both in the analogue and digital world of synthesis with modules from a variety of different manufactures. In the analogue world this would be the formats of 3U: Eurorack, 4U: Serge, 4U: Buchla, and MU/5U: Moog.[3] These formats also find themselves in the digital domain through the emulation of common modules and building blocks, foremost within the modular-platforms from Softube and VCV Rack.[4] In addition there are also digital modular systems like Reaktor from Native Instruments, offering a convenient way to learn modular synthesis with easy to use and customizable building blocks.[5]

When listening to contemporary examples of award winning scores for films and TV shows, such as Stranger Things (Netflix, USA, 2016 - 2026) and The Social Network (USA, 2010), you will probably notice that they are often based on the distinctive sound of classic hardware synthesizers from the 80s or 90s. In a series like Stranger Things this might have to do with the overall setting of the story, playing in the fictional town of Hawkins, Indiana in the early 1980s. But also in other contexts, vintage synthesizers from manufactures like Moog, Arturia, Roland, Buchla, Yamaha, Oberheim, and others have gained great popularity in recent years. While focusing mostly on the digital domain of music production, several options of software emulations of classic synthesizers come to mind, for example the Arturia V Collection, Moog Vintage Synths, and further options from Softube, Cherry Audio and others. In the context of this book it is not possible to evaluate how accurate these software emulations will reproduce the sound of the original parts. But in the end, it all comes down to the distinctive characteristics of the oscillator waveforms, modulation and wave shaping, and the resonant frequencies of the modifiers.

[3] Kim Bjørn and Chris Meyer, Patch & Tweak. Exploring Modular Synthesis, 2018, 30–33.
[4] Ibid., 38–39.
[5] Ibid., 43.

Fig. 05: Native Instruments Reaktor Blocks

The Sonic Character of the Oscillator Waveform: The standard oscillator, based on early testing equipment for basic electronic circuitry, can resemble a few common waveforms: sine, triangle, sawtooth and square.[6] Due to their different harmonic overtone structure, every waveform has its own distinctive sonic character and timbral properties.[7] While the sine wave is the only waveform with no added overtones, containing only a single (fundamental) frequency, the other waveforms either introduce even or odd harmonics, shaping the sound for different sonic approaches.[8] In the analogue world, various waveforms were often realized by applying a wave shaping modifier to bend one waveform into another.[9] Digital oscillators, on the other hand, resemble different waveforms by approximately reproducing their shape while being dependent on the aspects of bit depth and sample rate.[10] There can also be more advanced waveforms then those determined above, resulting in a more complex harmonic structure.[11] In the context of emulations of acoustic instruments or classic analogue synthesizers, the waveform will often be based on an algorithm or computer model, mimicking the characteristics of physical objects, instruments or specific electronic circuits.[12] Also worth mentioning is that even some software instruments like string or woodwind libraries are based on this approach.

[6] Bjørn and Meyer, Patch & Tweak. Exploring Modular Synthesis. 16.
[7] Ibid., 16.
[8] Ibid., 16.
[9] Ibid., 100.
[10] Ibid., 122.
[11] Ibid., 17.
[12] Ibid., 17.

Audio Modifiers and Modulation Sources of Modular Synthesizers: Regarding the general building blocks of synthesis, a system can not be called modular until the introduction of either modulation or modification within the synthesizers signal flow. Applying an audio modifier on the generated tone of the oscillator (or other tonal sources like audio samples or granular textures), the signals harmonics and structure of overtones will either be cut or expanded, using filters and wave shapers.[13] Filters are usually designed to weaken or remove high frequencies (low-pass and high-shelf), or to weaken or remove low frequencies (high-pass and low-shelf).[14] Another option is to isolate one or several frequency bands, using a band-pass filter, or to reduce the harmonic content of a frequency band with a notch filter.[15] When using filters in the context of synthesis, it is also about the strength of attenuation (filter slope) and the aspects of self-oscillation (filter resonance).[16]

As we have determined above the sonic character of a waveform can also be altered through wave shaping, which also finds itself within separate modules of audio modification. While the introduction of wave shapers can result in almost infinitive alternations of a signals harmonic content, there are also common examples like flattening the waveform (distortion and saturation), inverting the waveforms bottom half, or folding the waveform back on itself (resulting in the reinforcement of odd harmonics).[17]
Another important factor of modular synthesis is the time-based modulation of a signal, defining the duration of a note and the variation of sonic character. In this sense, following modulation sources come to mind: envelope generators, low frequency oscillators and random sources.[18] The sonic character of an instrument can often be defined by the development of volume and pitch within the duration of one played note. In the synthesis domain, the development of volume can be influenced by applying a generated envelope on a signal. The envelope can shape the sound, determining how fast or slow the individual notes are triggered (attack), how long they can be held (decay and sustain), and how fast they will fade out (release).[19] Low frequency oscillators or random sources, on the other hand, can modulate various aspects of the synthesizer, including volume fluctuation (tremolo), pitch modulation (vibrato), variation of the waveforms shape or pulse width, audio-rate modulation (ring and frequency modulation), and automation of filter parameters (wah-wah effect).[20]

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[13] Bjørn and Meyer, Patch & Tweak. Exploring Modular Synthesis, 18.
[14] Ibid., 18.
[15] Ibid., 18.
[16] Ibid., 18.
[17] Ibid., 19.
[18] Ibid., 20–21.
[19] Ibid., 20.
[20] Ibid., 20–21.

Granular Synthesis: While still remaining in the synthesis domain, we will take a look behind the process of granulation, leading the way to the subject of digital signal processing. In general, the term granulation describes the decomposing of an audio sample into small fragments (grains).[21] The individual fragments can then be manipulated separately, allowing the user to tread them in a creative way and to rearrange them in various alternative orders. In his book about the concept of microsound, Curtis Roads, professor at the University of California, describes the grain as a micro-acoustic event that is usually in the range of the auditory threshold of human perception, having an average duration of about 1 to 100 milliseconds.[22] He further describes that every grain resembles a waveform while the amplitude is being shaped by an envelope function, resulting in the windowing between the several individual grains.[23] In the context of modular systems, granular synthesis can either be introduced as an audio source that is ment to be further manipulated, sometimes also in combination with oscillators with the standard waveforms or wavetables, or as a standalone effect-module for further modification of the signal. But due to the sampling background of granular synthesis, the module is always dependent on its input signal. In the world of digital signal processing there are also further examples of granulation, mostly within the field of time-stretching and pitch-shifting algorithms like Celemony Melodyne or Ableton Live's audio warping.[24] But since the focus of this book is more on the creative possibilities of the tools mentioned, those use cases will not be covered. Nevertheless, the creative potential of granular synthesis in the context of the sound design workflow of musical composition will be discussed in the following chapters of this book.

Common Approaches of Digital Signal Processing

As we have determined the possibilities of signal modulation and modification within the field of modular synthesis, the digital audio workstation and additional effect plugins can also offer various options of signal processing. Also the digital audio workstation in itself can become quite modular, offering the composer a wide range of possibilities to route or manipulate

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[21] Native Instruments, "Granular Synthesis: A Beginner's Guide | Native Instruments Blog," Native Instruments Blog, April 23, 2024, accessed July 18, 2025, https://blog.native-instruments.com/granular-synthesis/.

[22] Curtis Roads, Microsound, eBook, 2002, 86.

[23] Ibid., 86–90.

[24] "The Basics of Granular Synthesis," accessed July 18, 2025, https://www.izotope.com/en/learn/the-basics-of-granular-synthesis?srsltid=AfmBOorHNdtWs5X47b7l6Bew_6vvCUfrje4jVgCD9TOiTkLlHUDpxmGN.

signals across the platform, using group channels, effect channels, sends and inserts. These routing capabilities also allow for further applications like for example side-chaining or spectral vocoding or simply allow to bring synthesized or manipulated sounds into the audio domain through resampling.

Processing audio can go all the way from time-based effects, modulation effects, dynamic effects to the manipulation of the frequency spectrum.[25] In the previous chapter we have already determined the use of audio modifiers that influence the frequency domain: filters and wave shapers. We have also discussed the use of envelope generators, low frequency oscillators and random sources to modulate a signals volume, pitch, wave shape, audio rate or the parameters of a filter effect. Also the aspects of granulation within digital signal processing were already mentioned, offering the composer advanced possibilities of audio modification. This leads us to the introduction of time-based and dynamic effects, including reverb, delay, and dynamic compression and expansion.

Time-based Effects: In general, all audio signals can be determined both in the time and frequency domain, resulting in the distinction of audio effects that either influence or manipulate the dimension of space or the spectral range and distribution of a signal. When discussing time-based effects, it is all about the simulation of the immersive sonic experience within a three-dimensional environment and the enhancement of atmosphere in the mix of music production and elements of sound design.[26] In this sense, effects in the time domain of a signal flow often result in added reflections or echos that will be introduced to a dry audio signal that was recorded in a non-reflective environment.[27] This mostly describes the concept behind the audio effects of reverb and delay.

In the context of an acoustic definition, reverberation describes the reflective characteristics of a room and their sonic persistence after the sound source went silent. While this also has an influence on the distinctive perception of space and the physical environment, this concept is also used in the processing of audio to implement the sense of depth and spatial ambience.
In music production the reverb effect can be used in various ways, ranging from the simulation of a real sonic environment to the inception of an abstract sound design effect which was based on an algorithm. While algorithmic reverb effects can result in unique or unrealistic spaces and almost infinitive spatial ambiences, the concept of convolution is always dependent

[25] "AUDIO EFFECTS: GUIDE TO SCULPTING SOUND," Avid Technology, October 13, 2023, accessed July 19, 2025, https://www.avid.com/resource-center/audio-effects-guide.
[26] Ibid.
[27] Nick Messitte, "Ultimate Guide to Audio Effects," iZotope by Native Instruments, January 5, 2023, accessed July 19, 2025, https://www.izotope.com/en/learn/guide-to-audio-effects?srsltid=AfmBOoobQ8QonuWbM4GNEaolTK7xhlxZF2CMun3gQGWY9egtE-1yEkMI.

on the recorded impulse response of an acoustic environment. When recording an impulse response, a room or space is usually triggered through a sine-sweep or dirac impulse, containing a wide spectrum of frequencies within the audible range of human perception (20Hz - 20kHz), capturing its acoustic response and reflective characteristics across various frequency bands.[28] The captured impulse response can then be used to process a dry audio signal through the acoustic characteristics of the recorded space, using convolution.[29] In digital signal processing this can be realized due to the possibility to bring a signal from the time into the frequency domain, using a FFT (fast Fourier transformation), then multiplying the spectrums of both signals, and bringing the product spectrum back into the time-based surroundings of the digital audio workstation, using an inverse FFT.[30]

In a mixing environment, reverb can be used to bring together various musical instruments or elements of sound design into one sonic space to create the illusion that everything was recorded and performed within the same space.
Alternatively, reverb can also be used in more experimental scenarios, embracing special reflective characteristics that can define the sonic character of an element of sound design. This can also be achieved through the experimental use of alternative impulse responses, often resulting in unique and unpredictable sonic textures.[31] In further combinations with other effects of digital signal processing, the reverb can also be played back in reverse, frozen in time or modulated in volume or pitch.[32] In those use cases, the composer might even be creatively inspired through the use of reverb. Sometimes also the convolution with the special characteristics of an interesting spatial environment, alternative sources of impulse responses, or the combination with creative layers of reverb effects may become the main sonic idea behind the composition with elements of sound design.

We have now further discussed the possibilities of reverb, based on algorithms and convolution. In the field of time-based processing of audio there is also the effect of delay, replicating the original signal in a succession of echos.[33] While natural delay can also be found

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[28] Varun Nair, "Recording Impulse Responses," December 29, 2012, accessed July 20, 2025, https://designingsound.org/2012/12/29/recording-impulse-responses/.
[29] Alexander Lerch, Handbuch Der Audiotechnik, ed. Stefan Weinzierl, Springer eBooks, 2008, 846, https://doi.org/10.1007/978-3-540-34301-1.
[30] Ibid., 846.
[31] Venus Theory, "Convolution: The Secret Weapon of Sound Design 🤫," April 18, 2022, accessed July 20, 2025, https://www.youtube.com/watch?v=uvMKOkkCwBU.
[32] Like It Or Not, "3 Reverbs You Didn't Know You Needed," June 5, 2025, accessed July 20, 2025, https://www.youtube.com/watch?v=GVKqgp06W6g.
[33] "AUDIO EFFECTS: GUIDE TO SCULPTING SOUND."

in some impulse responses of real sonic environments due to the distinctive reflections of a space, delay effects usually repeat the signal multiple times to create the sense of an echo. In the context of music production, the use of delay can enhance movement or excitement of a sonic event or repeat musical elements in a rhythmic manner.[34] In more complex applications, the effect might also result in a soundscape of ambient patterns or polyrhythmic figures.[35]

Dynamic Effects: The characteristics of a sonic event or musical element can also often be defined by the shape of volume and its dynamic range over the duration of a track, describing the difference in volume and balance between the quietest and the loudest part.[36] In this sense, dynamic compression is used to reduce the dynamic range, affecting the volume of both the louder and quieter parts.[37] In contrast, dynamic expansion can be used to extend the dynamic range of a signal, amplifying its level when passing a threshold that is defined by the user.[38] Creative possibilities of dynamic processing can be the use of extreme compression of a signal, often resulting in an impactful and unexpected sonic character, or the modulation of either compression or expansion through side-chaining.

[34] "AUDIO EFFECTS: GUIDE TO SCULPTING SOUND."
[35] Ibid.
[36] Ibid.
[37] Messitte, "Ultimate Guide to Audio Effects."
[38] Ibid.

04 Sound Design Workflow
Creating a Unique Sonic Palette

Blurring the Line Between Music and Sound Design

"What you're hearing is very old-fashioned, in a way [...]. It's layers and layers and layers of piano — but without the attack. It's like piano wire. You're hearing just the sustain of the piano."[1]
Jóhann Jóhannsson (2016)

"The sonic world is the most defining variable that the composer has, [...] and the tradition that comes from a pitch-oriented score has been replaced by a sound-oriented world. Sound is not just a carrier of pitch anymore; it has its own character and personality."[2]
Patrick Kirst (2016)

At this stage of the book, we have already delineated the fundamentals of musical composition and the workflow of music production inside the digital audio workstation, always keeping in mind the sonic background of music. We have also discussed the general function of music within the audiovisual fields of film, TV and video games and common scoring techniques for different approaches of storytelling.

As we have determined the previous chapters from a musical and sonic perspective, blurring the line between music and sound, music itself has gone through an evolution from traditional instrumental arrangements and musical terminology towards the application of sonic textures, atmospheres and experimental approaches into the context of music. This can be seen as a reassessment of perception about the general definition of music, a shift from the firmer understanding of the musical form, solely relying on concepts of harmony, melody and rhythm, into the domain of sound design and the combination of unique sonic elements within interesting and evolving musical soundscapes.

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[1] Jóhann Jóhannsson, 2016, quoted in Kristopher Tapley, "'Arrival,' 'Jackie' Composers Push Boundaries of Music and Sound Design," Variety, October 19, 2016, https://variety.com/2016/artisans/production/music-sound-arrival-jackie-1201892755/.
[2] Patrick Kirst, 2016, quoted in Kristopher Tapley,"'Arrival,' 'Jackie' Composers Push Boundaries of Music and Sound Design," Variety, October 19, 2016, https://variety.com/2016/artisans/production/music-sound-arrival-jackie-1201892755/.

Although there are also early examples of the use of sound emitting elements in musical compositions that usually were perceived as non-musical in character before the epoch of the twentieth century, composers and artists like Luigi Russolo, John Cage and Steve Reich have questioned and redefined the boundaries between the musical and sonic world. In his book "Silence" (including a collection of his lectures and writings) John Cage has questioned the musical term in itself which was, at this time, reserved and predefined for the traditional instrumentation with musical elements from the eighteenth and nineteenth century.[3] He further defines a broader term of music which includes the concept of sound in its definition, describing music in a more meaningful expression: "organization of sound".[4]

This organization of sonic elements doesn't only occur in the context of music, but also in the sonic environment all around us. It is all about the soundscape of our surroundings, about the urban rhythms, the tonal qualities of nature, about mechanical noises and how they all play against each other. And like the evolution of the understanding of music, also our environments and the soundscapes around us have changed over the last centuries and decades. In his book "The Soundscape: Our Sonic Environment and the Tuning of the World" Canadian Composer Raymond Murray Schafer describes the perceptive relation between ourselves and the sounds around us, leading to the sonic evolution from soundscapes of nature, of civilization from town to city, towards the post-industrial soundscape and the electroacoustic revolution.[5] He also discusses that music could be the best permanent record of soundscapes that were present in the past, defining the cultural evolution of European musical epochs in the dynamic environment of the past five hundred years.[6] In this sense, Schafer states that the sonic surroundings have always had an influence on musicians, affecting their work either consciously or unconsciously.[7]

Today, composers have many tools to explore the aspects of timbre, atmosphere, texture and noise both in their surroundings and within the musical context, implementing soundscapes and unique sonic elements into their work. As already mentioned before, the modern possibilities of synthesis, digital signal processing and experimental sampling approaches can lead towards almost infinitive possibilities of sonic character and atmosphere within elements of music, while combinations of harmony and melodic figures are somewhat limited in

[3] John Cage, Silence: Lectures and Writings, PDF, Wesleyan University Press eBooks, 1976, 3, https://monoskop.org/images/6/6b/Cage_John_Silence_Lectures_and_Writings_1973.pdf.
[4] Ibid., 3.
[5] R. Murray Schafer, The Soundscape: Our Sonic Environment and the Tuning of the World, PDF (Destiny Books Rochester, Vermont, 1994), 103.
[6] Ibid., 103.
[7] Ibid., 103.

variation. These implications of music production tools and experimental approaches of sound design within the process of composition can offer the composer a broader sonic palette, and in many cases the aspects of sound design can become even more important than other concepts of music (that were determined above). Unconventional textures and noises that were previously considered as flaws become part of the music, sometimes the key elements of a composition, defining the unique sonic character of a piece. Building a bridge to the first chapters of this book, this is also about audience expectations and the emotional perception of certain musical elements within the narrative structure and audiovisual context in film, TV and video game productions.

In some situations only aspects of sound design can provide or establish an emotional mood, atmosphere or textural element in correlation to picture while musical elements alone couldn't have built the narrative environment in a similar way. Contemporary scores, therefore, often feature elements of sound design that integrate into the music and sometimes also the ambiences and sound effects will be treated in a musical way, combining both sides into a single and comprehensive soundscape.
Some genres within audiovisual media already have been reliant on atmospheric soundscapes and haunting textures instead of melodic elements to build up a sense of tension and suspense while playing with the unfamiliar characteristics of sound. While this, for example, was always the case within the supernatural genre of horror, the same approach can be applicable to other narrative environments such as science fiction, drama or thriller. In most of these cases, it is all about an experimental approach of composition and the establishment of unconventional ways of musical performances, unique combinations and open-minded collaborations within the creative process.

In talking about his Oscar-winning score of the science fiction movie "Dune" (USA, 2021), Hans Zimmer has questioned the musical approaches that were previously used within this genre, that was mostly influenced by European orchestral music from the romantic period:[8] "We're supposed to be on a different planet, different culture. We're supposed to be in the future."[9] To evoke this feeling, he has collaborated with many musicians in London and Vienna, exploring alternative playing techniques, distinctive methods of signal processing while also inventing and custom building new instruments for specific purposes.[10]

Another example for an experimental approach of scoring with an emphasis on the sonic

[8] Vanity Fair, "How 'Dune' Composer Hans Zimmer Created the Oscar-Winning Score | Vanity Fair," March 17, 2022, accessed July 22, 2025, https://www.youtube.com/watch?v=93A1ryc-WW0.
[9] Ibid.
[10] Ibid.

character of the music was the score for the Netflix series 1899 (Germany, 2022) from australian islandic composer and sound designer Ben Frost. To remain in the context of the show, playing in the environment of a large steam ship, the music also had the goal to embrace the unique characteristics of the surroundings.[11] Therefore, Ben Frost's creative process has implied the re-recording of his music inside various spaces of ships and fishing boats that were being repaired in the harbor of Reykjavík.[12] His process was more about an approach of field recording, capturing his music that was played back in the reverberant space of the ship together with the ambiences that were naturally occurring during the repairing works.[13]

Examples of Sonic Stereotypes in Screen Scoring

While the field of sound design in music is often about an experimental approach and the reinvention of creative boundaries within the process of musical composition, in the context of scoring for audiovisual media there are also certain sonic elements that are used on a common basis. In many cases, they have a background in the history of Western music, in the cultural traditions of folk music, or resemble musical elements that are based on more recent genres of music, like from the broader field of the electronic dance genre.
Another background of those 'cinematic' sound effects lies in the promotion of movie, TV or video game trailers that are often edited in a suspense- and pace-full way, featuring visual key moments, a distinctive rhythm of the edit or transitional effects between various scenes and narrative climaxes.

As we have determined above, there are some musical elements that could not be described by the musical terminology alone, solely evolving in their sonic character while remaining on a single pitch or having no perception of distinctive tonality at all. This brings us to the definition of sonic stereotypes in the context of audiovisual media, that often find themselves in specific situations of storytelling. In the following we will first delineate the concepts of drones and pulses, risers and fallers, and booms and accents. Then, we will go further into detail, highlighting a few examples of how these effects and sonic textures can be achieved.

The Musical Concept Behind Drones and Pulses: A drone in the context of music can be defined by its characteristics of a long, constant note that is held on the same pitch over a long duration within a cue. It often serves as the harmonic foundation or tonal center against which other musical elements like melodic, harmonic or rhythmic figures unfold.

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[11] "'1899' Composer Ben Frost on Recording the Soundtrack Inside of a Ship," Netflix Tudum, November 30, 2022, accessed July 22, 2025, https://www.netflix.com/tudum/articles/1899-composer-ben-frost-soundtrack-musicians-dark.
[12] Ibid.
[13] Ibid.

When defining a drone from a musical perspective, it is all about context, about combination with other musical elements and harmonic relationships. In this sense, drones are often described through the musical concept of pedal point, which has its background in early organ music. On the organ the biggest and lowest pipes can be operated through the foot pedals. Holding down one pedal, for example on the harmonic function of the tonic (root note) or the dominant (5th of a scale), results in a constant note that allows the upper voices (played on the keyboards above) to modulate freely in the harmonic relation to the pedal point.[14] Also other instruments, for example different melodic Indian instruments like the sitar, or Scottish bagpipes are based on the concept of drone-based music, emphasizing the use of a sustained note against which other voices are modulated.
In many cases, the pedal point can be found in the lower frequency spectrum, but its also possible to establish an inverted or an internal pedal, either being present in the higher frequency range or in the middle range of a cue.[15] Also two or several pedals can occur at the same time, often resembling the extremes of the tonal range while other musical elements are playing in between.[16]

While drone elements within music are always static in pitch, they often must evolve in another domain to remain interesting in character: texture and sonic development. In those cases, the drone can become the leading part of the composition while other musical elements, like melodic and harmonic figures, might stay behind the sonic characteristics and evolving textural elements. In other cases, the drone can also build the textural basis in the midrange of a cue, freeing up the lower frequency range and allowing the composer to establish an interesting and more complex base line or counterpunctual figure.[17]

In the audiovisual context, drones often resemble in a good compromise between the continuity over the duration of a scene and harmonic variation above its unifying character.[18] They are also able to build an anchor even for complex harmonies, extended chords and unconventional chord progressions that are played above the harmonic pedal point, introducing harmonic flavor and a sense of tension and release.[19]

Drone elements are sustained by nature. But when the note of a drone is articulated and

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[14] Virtual Orchestration, "STEP on the PEDAL - Long Notes to Enrich Your Harmonies!," July 30, 2023, accessed July 23, 2025, https://www.youtube.com/watch?v=xduDtHrsJxo.
[15] Ibid.
[16] Ibid.
[17] Jameson Nathan Jones, "How to SYNTH DRONE Without Boring Everyone," May 22, 2024, accessed July 23, 2025, https://www.youtube.com/watch?v=9Re-L7z0068.
[18] Virtual Orchestration, "STEP on the PEDAL - Long Notes to Enrich Your Harmonies!"
[19] Virtual Orchestration, "STEP on the PEDAL - Long Notes to Enrich Your Harmonies!"

constantly repeated in a rhythmic manner it results in the musical element of a pulse, still remaining in a similar harmonic function (harmonic relationship between the pedal point and other musical elements). Due to their rhythmic character, pulses are often used in the audiovisual context of action scenes and suspensive narratives. To establish a development in the sonic character of a pulse, the composer often automates an audio modifier or modulation source to follow the narrative arc of a scene, establishing a constantly evolving soundscape.

Risers and Fallers: Introducing a transition within a cues arrangement or to build up tension towards a climax, risers and fallers are often considered as transitional sound effects. In music they play with a sense of tension and release, comparable to similar aspects of musical harmony. In the audiovisual context, they are used to mark transitions between sections, to connect and unify them or to create a stronger contrast between them.
Risers usually find themselves in the form of a musical crescendo within a cue or between two sections, defined by their character of gradually increasing pitch, motion or intensity until a climatic hit point is reached. Fallers, on the other hand, are the opposite of risers and are often used when tension dissipates, sometimes also defining the end of a musical cue. Elements of sound design with a rising or falling character are also often used in combination with impacts or hits, anticipating and marking punctuation of climatic moments even further.[20]

Booms and Accents: Imagining the sound of a blockbuster trailer you often think of cinematic booms and accents, building up tension, creating an emotional impact on the viewer and establishing a distinctive tone and rhythm. Sound effects such as booms or accents are often used to emphasize individual hit points of a cue, with booms typically playing in the lower and accents in higher frequencies, enhancing the overall sound of a cue or unifying its sonic texture. In contrast to other sonic elements from the domain of musical instruments, individual sound effects are usually implemented on separate audio tracks within the digital audio workstation. The design of sound effects often involves layering different audio clips, each with distinctive sonic characteristics. Whooshes are often combined with hits, impacts, reversed sounds, and longer reverberation spaces.

One famous example of an accent in the context of audiovisual media, defines the iconic 'Braam' sound within the score of action and science fiction movie 'Inception' (USA/United Kingdom, 2010), composed by Hans Zimmer. While the sound effect is constantly repeated during the film, marking important moments of storytelling, the sound also became popular beyond the context of the film, inventing an own category of cinematic sound effects.

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[20] Native Instruments, "Sound in Film: How to Create 6 Unique Sound Effects | Native Instruments Blog," Native Instruments Blog, October 23, 2024, https://blog.native-instruments.com/sound-in-film/#drone.

The Sound Design Process Behind Sonic Stereotypes

When designing sound effects that will be used in a musical context, the composer often finds himself in the field of modular or semi-modular synthesis, creating various sonic textures and musical elements like drones, pulses, risers and fallers. In the previous chapters about the workflow of digital music production we have foremost discussed synthesis in a more modular and flexible approach, allowing not only to use standard subtractive techniques but also concepts of wavetable synthesis and frequency modulation.
The character of a drone, for example, is often defined by its sonic modulation or development over time in contrast to its stagnation in pitch. This can also be said about wavetable synthesis, creating an interesting sonic character through modulation of the wavetable position, sweeping through the sweet spots of the complex waveform, which sometimes contains weird and unpleasant harmonic structures.[21] Also the introduction of FM synthesis, modulating one oscillator with another (both in higher frequency ranges), can result in unique and sometimes really complex waveforms, offering an experimental starting point for sonic textures or musical applications.[22] When discussing the possibilities of synthesis in the creation of sound design elements and sonic stereotypes with the sustained character of a drone, also the concept of granulation can offer the composer almost infinitive sonic combinations and variations, depending on the type of sample that was used.[23]

Besides the possibilities of synthesis, also the various methods of digital signal processing can result in a wide range of creative starting points and audio sources for musical sound design. One example could be the introduction of extreme time stretching on an instrumental sample, sound effect or field recording, playing them back in extreme slow motion and sustaining the sound towards an organic soundscape with a natural occurring evolution of volume and pitch. Another opportunity can be the reversing of a sound with a distinctive attack, often resulting in a whoosh like sound effect or sonic texture with a rising character. You could also create an ambient texture or drone through the resampling of a signal through a reverb effect, featuring an extremely long reverberation time (for example 2000ms).[24] When using just the resulting reverb as a starting point for sampling, this approach results in a playable drone texture while also being dependent on the previous audio signal. The subject of sampling and creative

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[21] Jameson Nathan Jones, "How to SYNTH PAD Without Boring Everyone," April 3, 2024, accessed July 24, 2025, https://www.youtube.com/watch?v=ySjZQ697Mt0.
[22] Ibid.
[23] Ibid.
[24] Loopcloud, "How to Create Epic Drones From Any Sample - the Resample Sessions With Venus Theory," May 7, 2021, accessed July 22, 2025, https://www.youtube.com/watch?v=Tpu146TBoas.

resources for sample based instruments will also be delineated in the following chapters of this book. Also we will discuss how field recordings and noise can be used in the context of musical sound design, tuning organic sounds and ambiences into unique sonic elements.

Until now, we have mostly determined the sound design of sustained musical elements like drones, textures or pads. To come from a sustained character of sound towards the sonic stereotypes of risers, fallers or pulses, the signal must be modulated in its envelope, pitch, or volume. The rhythmic sequence of a pulse, for example, can be created by applying an arpeggiator on a synthesizer patch or by introducing a tremmolator on an audio signal. Further modulation can be achieved by automating a low-pass filter over the duration of a cue, evolving the sound in relation to the audiovisual reference.
One example of the design of a riser effect can be achieved through an ascending function, modulating the tuning parameter of a software synthesizer. To go even further, the automation can also affect the frequency of an LFO, which modulates a filter, also rising in speed and intensity. Another example for the sonic character of ascending or descending pitch would be the application of a filter sweep (notch filter) on a noise signal (white or pink noise). Also using a simple pitch-shifting algorithm can result in the sonic effect of a riser or faller.

Like in the sound design world of audio post production, certain effects can only be reached through the layering of different approaches and sonic characteristics. In this sense, the soundscape of a cue, in most cases, does not only consist of a single sonic element. Furthermore, it is build up on the combination of various sound design elements, several layers of drones, risers, fallers, booms or accents.

Fig. 06: Creation of a Riser Effect in Arturia Pigments

Creative Resources for Sample-Based Instruments

"It's like you're having a party. The party's good, it's not great. Who can we invite into the room to make this a great party? That's kind of what it feels like to inflect your process with a new instrument that you've never heard before because it's never been made."[1]
Ryan Lott (2023)

"The most interesting of instruments I've worked with would be one I built from Random Things I Found at Garage Sales or the flea market."[2]
Robert Dudzic (2022)

In the chapters above, when determining the process inside the digital audio workstation, we already have discussed a projects demand for specific and unique instrumental or sonic approaches in the individual context of storytelling. One way of achieving a unique sonic palette can be through the introduction of sampling into the workflow of composition, unlocking the composer's creative potential. By inventing your own sample-based instruments you can create unique playable software versions of any possible sonic event that you have recorded beforehand.

The concept of sampling can be defined by the recording, editing and playback of one or several samples over the range of different pitch or velocity values, for example triggered by a midi controller keyboard. Samples can be recorded with any given setup of microphones, audio interfaces or field recorders. Also the recording capabilities of most smartphones should provide good enough audio quality for the most basic sampling situations. The process of editing (inside any DAW) is often dependent on the complexity of the sample-based instrument, of how many dynamic layers will be included and how various ranges of pitch will be realized within the sample player.

The easiest approach of creating a sample-based instrument resembles the mapping of a single

[1] Ryan Lott, "Ryan Lott: Designing Sample-Based Instruments," Soundfly, accessed July 24, 2025, https://soundfly.com/courses/ryan-lott-designing-sample-based-instruments.
[2] "Robert Dudzic," Warner Chappell Production Music, January 28, 2022, accessed July 24, 2025, https://www.warnerchappellpm.com/whats-new/robert-dudzic/ODA5NDktN2VjOGRl.

audio file across the whole range of the keyboard. In most sampling environments, different pitches can be achieved by adjusting the speed of playback, lowering or increasing the pitch relative to the sample's duration (modulation of wavelength).[3]
While achieving the different pitch values of an instrument, this also results in longer or shorter versions of the sampled audio file when played higher or lower notes on the keyboard.[4] In some sampling situations, this either might be the starting point for the creation of unique and unheard versions of a sound, or it might not fit the idea behind the instrument at all.
In those situations, most samplers provide an option to pitch the audio regardless of its length and playback speed, using pitch shifting algorithms or granulation.[5] Either way, algorithms of pitch shifting and time stretching will most likely introduce sonic artifacts to the signal while the approach of adjusting the playback speed can provide the best overall audio quality.

Up to this point, we have only discussed software instruments that are based on the playback of one-shot samples, triggering a single audio file once a note is played on the keyboard. To achieve a sustained character of sound, the composer must define a part of the sample that will be looped until the note gets released. Therefore, many samplers offer the possibility to adjust the region of the loop and its behavior within their editing window, also allowing for crossfades or reverse playback.[6]

When approaching a sample-based library from the perspective of the convincing simulation of a real acoustic instrument, solely relying on one sample will most likely not convey an organic and realistic sound. While pitching an audio file over the whole range of the keyboard can result in different speeds of playback, this approach also doesn't allow to play the sample-based instrument in different dynamic articulations.
A solution for this problem can be the concept of multi-sampling, providing various samples for different notes, velocities, articulations, release triggers and sometimes further instrument specific aspects.[7] Imagining a piano, the sampling environment would allow to implement every note in 127 dynamic layers that could be mapped to the aspect of velocity on a MIDI controller. Resulting in the recording of 11176 audio files, this approach doesn't seem very practical and is also not necessary to create convincing software versions of acoustic

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[3] Griffin Brown, "Making a Custom Sampler Instrument," iZotope by Native Instruments, January 30, 2019, accessed July 25, 2025, https://www.izotope.com/en/learn/making-a-custom-sampler-instrument?srsltid=AfmBOorklw5OQooGPQJ3Aez7hMiYXd4BUsQOBGLJ9fa7ZQtsf-0gw2qs.
[4] Ibid.
[5] Ibid.
[6] Ibid.
[7] Ibid.

instruments. Furthermore, the sample-based instrument will include the recording of several notes across the pitch range of an instrument, for example every 3rd or 5th, in various different articulations and playing styles, for example in three to four dynamic layers.

Fig. 07: Native Instruments Kontakt Sampler

Extended Playing Techniques, Inventing Instruments and Digital Resampling

In the introduction to this chapter, we have now determined the fundamental aspects of digital sampling and the creation of playable software instruments (applicable to most sampling environments, i.e. Native Instruments Kontakt or Apple Logic EXS24). In previous chapters of the book we have already discussed the workflow of virtual orchestration and MIDI programming of sample-based instruments, also regarding the individual expressive and dynamic possibilities of every instrument. In this context, we have also determined various instrumental articulations and how they are implemented in most orchestral libraries while also mentioning alternative sampling approaches of performance-based sample recordings and expressive sustains. When designing an own sample-based instrument, the most potential for creativity can lie in non-traditional approaches of recording, extended playing techniques, the invention of instruments through the combination of unusual sound sources, or the introduction of digital resampling and creative signal processing.

As we have determined different instrumental articulations that are dependent on performance aspects of bowing, breath or tonguing, sampling alternative playing techniques of an instrument can be all about the players performance also. According to the unique physical characteristics and sonic possibilities of an instrument and the traditional ways of performing, the audience often has a strong sense of expectation when it comes to the sonic and tonal range an instrument could reproduce.
But as there are different ways to begin the creative process of musical composition, either by

applying or following a set of rules or by exploring more experimental approaches, the same can be said when performing an acoustic instrument. And when exploring the instrument from an experimental perspective, the composer can break those expectations to overcome an instrument's traditional limitations.
Sampling those alternative playing techniques can result in a unique sonic palette, creating a playable version of them within a sample-based software instrument. Another possibility lies in the recording of instrumental textures, harmonics, crescendos or individual combinations of rhythm, rather than sampling distinctive notes and single articulations.
Also, the goal is often to perform the instrument in a unique way, introducing performance aspects that normally would have been avoided by the player. Sometimes this also implies to perform rhythms and repetitions as random as possible, creating a more natural and realistic result within the samples.[8] While performing alternative playing techniques on various instruments can be very quiet in character, sampling those can demand for a professional recording setup or studio environment and total silence while recording.

According to Samuel Adler, in his book about 'The Study of Orchestration', alternative playing techniques of string instruments can implement unusual placements of the bow, such as over the fingerboard (sul tasto), on the bridge (sul ponticello), behind the bridge or on the tail piece.[9] The strings can also be played with the wood side of the bow (col legno), either sustained in character or short and percussive, comparable to the articulation of spiccato.[10] Adler also mentions that the player can also create coloristic effects without the bow, introducing the technique of pizzicato, played with the fingernail and snapped against the fingerboard (Bartók pizzicato).[11] Playing harmonics on a string instrument can either be achieved through the traditional technique of natural harmonics, which can be produced by lightly touching a string on specific positions on the fingerboard, or alternatively through the introduction of artificial harmonics, played by stopping a pitch with one finger and slightly touching the note above with an interval of a perfect 4^{th}.[12] Beyond the determined techniques, the family of string instruments can offer even more variations of extended playing techniques. But since this book can only include a view examples, every composer can go ahead and individually explore the further sonic capabilities of his instrument.

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[8] Spitfire Audio, "Grow Your Own Samples - How to Make a Sample Library," September 25, 2016, accessed July 26, 2025, https://www.youtube.com/watch?v=Yvco_DWMV_g.
[9] Samuel Adler, The Study of Orchestration: Fourth Edition (W. W. Norton & Company, 2016), 35–55.
[10] Ibid., 35–36.
[11] Ibid., 39–40.
[12] Ibid., 45–50.

When it comes to woodwind and brass instruments there are also various possibilities to perform them in unique and distinctive ways, producing sonic textures and tonal characteristics that would not have been possible with traditional playing techniques. This implies, for example, softly played woodwind effects, glissandi, trills, tremolos and various methods of muting the instrument.[13] One example of a sample library, featuring experimental playing techniques of woodwind instruments, would be the free Orchestral Tools instrument 'Lucent'.[14] Within the sampling session of this library, composer and flutist Claire Wickes has performed the flute with alternative techniques of breath control, playing the instrument with very much air, resulting in a textural and lucent sonic character.[15]
Also another experimental approach was introduced during the sample recording for the software instrument of 'Lucent', playing the flute into the reverberant space of a sustained piano, capturing the resonance and harmonic overtones of the strings.[16] Coming back to the sonic stereotypes of screen scoring, the same approach was used by Hans Zimmer to create the signature 'Braam' sound for 'Inception', recording ten brass players that are performing around and into a sustained piano in the middle of the room.[17]

While not being an acoustic instrument in itself, the human voice is also capable of creating almost infinitive variations of unique and distinctive sounds that also can become a great sound source and starting point for the creation of individual sample-based software instruments. This can also imply, for example, the articulations of humming or glissando, but also breathing or whistling. One example of creative voice performances can be found in the online course 'Designing Sample-Based Instruments' on Soundfly, in which composer and musician Ryan Lott creates unique loops and playable software instruments out of the recorded improvisation of singer Hanna Benn.[18]

To come from extended playing techniques on various instruments to the invention of new instrumental approaches, one way can be through the modification of already existing

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[13] Adler, The Study of Orchestration: Fourth Edition, 313–35.
[14] "SINEfactory," Orchestraltools, accessed July 26, 2025, https://www.orchestraltools.com/sinefactory.
[15] Orchestral Tools, "The Making of Lucent—free Flute by Claire Wickes," May 4, 2023, accessed July 26, 2025, https://www.youtube.com/watch?v=dX0IsapOfJY.
[16] Ibid.
[17] Vanity Fair, "How 'Dune' Composer Hans Zimmer Created the Oscar-Winning Score | Vanity Fair," March 17, 2022, accessed July 22, 2025, https://www.youtube.com/watch?v=93A1ryc-WW0.
[18] Ryan Lott, "Ryan Lott: Designing Sample-Based Instruments," Soundfly, accessed July 24, 2025, https://soundfly.com/courses/ryan-lott-designing-sample-based-instruments.

instruments or their combination with alternative tools and objects. Also acoustic instruments can be the inspiration for totally new instruments, recreating them out of different materials and everyday objects to come up with unique and distinctive sound-producing combinations and mechanisms. In addition, every field recording of a sound effect can be used as the basis of a sample-based instrument, which will be further discussed in the following chapters.
Techniques and ideas that can be applied in the process of inventing an instrument can be the modifications of detuning, preparing the strings with dough, paper or poster putty, or using metal objects like screws or nails that will sonically respond to the instruments resonation. Another method can be through the performance on the instrument with alternative objects and triggers like, for example, brushes, elements of metal, rubber balls, mallets or hand ventilators. A very interesting and inspiring reference of the approaches and methods that where mentioned above can also be found on the YouTube channel of sound designer and composer Robert Dudzic.[19]
The inventing of instruments out of any objects from our surroundings can also be described in the tradition of experimental percussion music. According to John Cage, "any sound is acceptable to the composer of percussion music."[20] He further states that the use of unusual percussive instruments was capable of transitioning the musical language from the overly used influence of the keyboard towards contemporary musical applications that consist all possible sounds.[21]

There are also situations where the composer doesn't need to come up with totally new ideas and individual recordings and can rather use already existing digital audio sources as a basis for the invention of sample-based instruments. In this case, everything can be done in the box, using methods of resampling and digital signal processing to create new versions out of already existing sounds. By applying modification and modulation effects on a resampled audio file, it can be used in a totally different context, for example creating a pad out of a drum sound or introducing a rhythmic loop out of a noisy signal. This also brings us to the creative possibilities of recording accidents and how they can be used in the musical context of the creation of sample-based instruments.

[19] "Robert Dudzic," YouTube, n.d., https://www.youtube.com/@RobertDudzic.
[20] John Cage, Silence: Lectures and Writings, PDF, Wesleyan University Press eBooks, 1976, 5, https://monoskop.org/images/6/6b/Cage_John_Silence_Lectures_and_Writings_1973.pdf.
[21] Ibid., 5.

Creative Possibilities of Recording Accidents

When recording an acoustic instrument or alternative sonic event for later use within a sample-based instrument, there might be situations where something doesn't play as intended, often resulting in sounds that are even strange and unpleasant in character. While the composer, in most cases, wouldn't use such a sound directly within his musical composition, those recording accidents can sometimes provide hidden potential for sampling approaches and become the source of a sonic idea or the inspiration for an alternative musical application.[22] Within the software environment of the sampler, the composer can then experiment with playback speeds, reverse playback and looping options and further modification with filters and effects.

Having in mind the possibility of hidden sounds within the library-recording of samples, the composer also might establish a workflow where unconventional performances and sonic incidents can be repeated and rerecorded at any time. But since some sonic events may only occur once within the sampling session, it can be also a good idea to keep it running as long as possible and to edit the different performances afterwards.

At this point, it can also become important to introduce a few technical recommendations for the recording process of sample-based instruments. To remain as flexible as possible within the postproduction and processing of the audio, it can become advantageous to record everything in the highest possible sample-rate and bit-depth, allowing for further tweaking and manipulation of the recordings.
A flexible bit-depth like 32 bit float, for example, can offer significant advantages in the dynamic range of the recording, allowing the recordist to capture a wider range of audio levels, reaching from very quiet signals all the way to very loud sound sources. The application of a higher sample-rate, for example of 96 kHz or higher, on the other hand can provide further possibilities of signal manipulation and modification, also allowing to play the audio back much slower without loosing too much information in the higher frequency spectrum. This approach also allows to make sounds audible that previously could be found within the ultrasonic range of a signal, 'pitching' them down into the sonic region of human perception.

[22] Lott, "Ryan Lott: Designing Sample-Based Instruments."

Making Music with Noise and Experimental Field-Recordings

"Every manifestation of our life is accompanied by noise. The noise, therefore, is familiar to our ear, and has the power to conjure up life itself. Sound, alien to our life, always musical and a thing unto itself, an occasional but unnecessary element, has become to our ears what an overfamiliar face is to our eyes.
Noise, however, reaching us in a confused and irregular way from the irregular confusion of our life, never entirely reveals itself to us, and keeps innumerable surprises in reserve.
We are therefore certain that by selecting, coordinating and dominating all noises we will enrich men with a new and unexpected sensual pleasure."[1]
Luigi Russolo (**1913**)

In the last chapter we have determined various creative resources for the invention of individual and unique sample-based software instruments, including the recording of extended playing techniques, experimental approaches with other materials and sonic elements and the concept of resampling. To implement even more experimental approaches into the creative process of musical composition, the composer can also integrate elements of noise and sound design with organic sonic characteristics into his music. This way, he can establish unique sounds and musical qualities that only appear within a real-world scenario while replicating them in an environment of synthesis or software instruments can become difficult. In this sense, the following chapters will discuss the aspects of noise and experimental field recordings in music, delineating the background and creative use cases of alternative microphone techniques, and creative methods of spectral shaping recordings of ambient sound effects and bringing noise into the musical context.

[1] Luigi Russolo, "Luigi Russolo - the Art of Noises," ed. Peter Weibel, Ubu Web Papers, accessed July 27, 2025, https://www.ubu.com/papers/russolo.html.

Creative Use of Experimental Microphone Techniques

When approaching field recording from a musical perspective, having the goal of discovering unconventional and unique sonic elements, the composer can extend the possibilities of traditional recording devices through the introduction of more experimental approaches of using microphones and sensors. While the typical microphone (passive or active), as an electroacoustic transducer, is most likely designed to bring sound waves that are transmitted through the air into the domain of an electrical signal, experimental microphone techniques often allow to go beyond the sounds that are audible to the human ear. In this sense, the following sections will be all about the capturing and recording of vibrations that occur inside a solid material of an object, in the seismographic movement of the earth, in the acoustic environment of underwater surroundings, and in the sonic background of electromagnetic fields.

Contact Microphones and Geophones: To record the resonating character of an object or instrumental body, attaching a microphone directly to the surface of the object can often result in a most direct signal without including the sounds of the surroundings. In most cases, contact microphones are build on small crystals that are attached to a thin ceramic disc or diaphragm, using the piezoelectric effect to produce an electrical voltage dependent on the pressure of sound.[2] To get the most out of the relatively weak signal of the piezoelectric microphone, it often will be paired with an amplifier that allows to connect an high impedance input.

In the context of experimental field recordings for later use within a musical piece, contact microphones can provide much creative potential when it comes to the aspects and ways an object or instrument can be recorded. In an instrumental environment, the composer can experiment with various microphone positions all around the reverberant body of the instrument, coming up with alternative and individual acoustic sounds. Another option is to record impulse responses from the instruments body, allowing to use the resonant qualities of the instrument in another context, using a custom built convolution reverb.

Besides the use of contact microphones in the context of instrumental recordings, they also can be used to sonically interact with everyday objects or mechanical machines. Attaching the microphone, for example, to an object out of metal or wood, can allow you to capture the resonant frequencies of the object when playing it with your fingers, a pencil, mallets or a bow.[3] When thinking of individual impulse responses, you could also capture the reverberant

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[2] Herbert Bernstein, Elektroakustik: Mikrofone, Klangstufen, Verstärker, Filterschaltungen und Lautsprecher, eBook (Springer-Verlag, 2019).

[3] David Hilowitz Music, "The $8 Microphone That Every Musician Should Own," December 7,

space of your washing machine or introduce more constant but organic sounds as creative sources for convolution purposes.
Often piezoelectric microphones also can be used in places where a traditional microphone can not be used due to its sensibility. One example can be to freeze the microphone into a block of ice, enabling the composer to sonically capture its unfreezing over time.[4]

In contrast to contact microphones that, in most cases, are more broadband in character, the geophone is generally more suited to capture ground movements and vibrations in the lower end of the frequency spectrum. Originally geophones were used within geo-scientific approaches, recording and measuring the beats and vibrations that happen in the underground, for example to obtain seismographic views of how the ground has moved during an earthquake.[5]
In the context of experimental field recordings and musical approaches, geophones can be used within the usual recording environment to expand the range of frequencies to capture the low-end content of an instrument or sonically interesting object. Alternatively, they can also record various sources of low frequency signals, such as heart beats, vehicles bumping on roads or rails, or the sand movement according to crushing waves on the beach. One popular commercial example of a geophone for the specific use in recording environments, would be the 'Geofón' from LOM audio.[6]

Underwater Recordings with Hydrophones: Another unique and inspiring source for experimental field recordings that can be used in a musical context, can be the capturing of sounds that occur below the water surface through the creative use of hydrophones. As with most contact microphones, also hydrophones are, in most cases, constructed upon piezoelectric transducers while being sealed inside a waterproof case. Like geophones, they were also originally used in the context of science, for example to explore the animal behavior of wales and other marine species through their sonic communication that have been captured underwater.[7] One commercial example of hydrophones that both can be used in the context of scientific approaches and field recording are the underwater microphones from Ambient.[8]

2024, accessed July 27, 2025, https://www.youtube.com/watch?v=08zjuuPhya0.

[4] Ibid.

[5] "The Geophone - How We Listen to the Earth," Earth Sciences, February 17, 2021, accessed July 27, 2025, https://www.essearth.com/the-geophone-how-we-listen-to-the-earth/.

[6] "Geofón," LOM, n.d., https://store.lom.audio/products/geofon?variant=29549909442647.

[7] Christine Erbe and Jeanette A. Thomas, Exploring Animal Behavior Through Sound: Volume 1, Springer eBooks, 2022, 20–32, https://doi.org/10.1007/978-3-030-97540-1.

[8] Ambient Webshop, "Hydrophones," n.d., https://ambient.de/en/collections/hydrophones?srsltid=AfmBOoq4qKJ8D4I6E390Sd_BxF_bXXkxdXOSucl5yDC2XqD3dO6-SncK.

When using hydrophones in experimental and musical use case, it either allows to capture the underwater environments of nature, such as ocean ambiences, rivers or waterfalls, or more industrial spaces like the underwater soundscape of a harbor. Alternatively, the hydrophone can not only be used outdoors, but also in a studio environment. This way, you could create sound effects using the hydrophone within a glass or bowl, experimenting, for example, with sparkling water, ice cubes or soda powder.

Recording Electromagnetic Fields: To get even more experimental in the context of creative field recording, specialized sensors and devices can be used to sonically capture electromagnetic fields and to make them usable, for example, as sound effects or musical sources of granular synthesis, pad like sounds or percussive elements. While the sensors that are being used for those approaches can not be defined as microphones in the overall sense, they are often described as electromagnetic listening devices or wide-band receivers with a character of an anti-radio, capturing all the interferences and odd signals that a traditional radio would have normally already filtered out.[9]
Commercial examples of those experimental electromagnetic sensors can be found from the companies SOMA Laboratory (Ether) or LOM audio (Elektrousi, Priezor or Elektrosluch). Also worth mentioning is that in the field of musical applications electromagnetic sensors can not only take place within experimental approaches, but are also widely used in the context of electric guitar pickups, always being depended on the magnetic properties of the strings.

Regardless of the background of application, the electroacoustic sensor can be able to capture very unique and unusual sounds that can be used in a variety of musical compositional ideas. Every electric object, spinning hard drive, blu ray player or field recorder can result in very individual sonic responses and often unexpected sound effects or drones. Also worth experimenting with are all kinds of vibrating or spinning objects like, for example, electric toothbrushes or massage devices.

All of the mentioned recording techniques and experimental microphones or sensors can result in very unique and sometimes unusual sonic elements that can provide the composer sounds that normally would not have been audible. These individual elements of sound design can then be used within the context of musical composition, either resembling creative starting points for the creation of sample based instruments, or functioning as textural element in the background of a cue.

[9] "Description / Ether," SOMA Laboratory, accessed July 27, 2025, https://somasynths.com/ether/.

Tuning Noise and Shaping Ambient Field Recordings

As we have determined the definition of music above, including the concept of sound, creative compositional ideas do not only have their source in the musical language of the past centuries, but also in the sonic environments all around us. And like we have previously discussed various examples of experimental field recording techniques, the sonic dimension can provide the composer almost infinitive musical resources to explore and establish his own and unique sonic palette.

While experimental approaches of field recording can often result in unconventional, unheard or inspiring sounds that usually function as starting points for further signal processing and sound design, also ambient field recordings of natural and urban surroundings can offer various creative options within the context of musical composition. Through the tuning of noise and ambient sound effects that naturally occur all around us, we can take the soundscape of our world, shape it in relation to other musical elements, and integrate it into musical (sample-based) instruments, textural elements or distinctive and sonically interesting rhythmic figures.

One way of tuning an ambient field recording in a musical manner can be through the introduction of equalization, exploring and bringing out fundamental frequencies and the harmonics above. For the purpose of an easier explanation, we could look at a signal that is comparable or equivalent to a random noise (white noise or pink noise), like it is often the case with natural ambiences of rain, waterfalls or ocean waves.
And because signals of noise contain all frequencies of a spectrum in an equal amount, you could use a steep notch filter to sort out or amplify any frequency band as the harmonic fundamental of a tone. As most tonal characters do not only imply one frequency band, but also the even or uneven harmonics above it, the equalizer effect could also amplify the multiples of the fundamental frequency, allowing to create more complex and realistic musical elements that can further be used in an environment of sampling or as background textures of a cue.

This was also the approach of composers and producers Leo Wyatt and Dan Keen in the process of inventing the sample-based instrument 'Organic Textures' for the platform of Spitfire Audio LABS.[10] To create playable pad-like software instruments out of field recordings Dan Keen has captured in the country side garden of his parents house, they used the effects of equalization and granulation to bring the soundscapes into a tonal dimension.[11] What is interesting about this approach is that the goal still was to preserve the natural characteristics

[10] Ableton, "Loop Create | LABS by Spitfire Audio Studio Session," November 30, 2021, accessed July 28, 2025, https://www.youtube.com/watch?v=Bnq2NBtNLEc.
[11] Ableton, "Loop Create | LABS by Spitfire Audio Studio Session."

of the outdoor environment, remaining the constantly occurring bird songs while the ambience is tuned to a specific note.[12] Another option to use field recordings in the creative environment of musical composition, is to apply the spectral and dynamic information of one sound onto another, creating a version of a sonic element that is dependent on the frequency range and dynamic arc of an other audio source. This process is called spectral vocoding, using the possibilities of digital signal processing and the capabilities of analysis and signal manipulation within the application of a FFT (fast Fourier transformation).

One example of this approach was the creative sound design process of Tom Holkenborg for the movie '300: Rise of an Empire' (USA / Bulgaria, 2014).[13] To achieve a cohesive soundscape, he collaborated with the sound designers of the audio postproduction team of the movie, exchanging bounces of the sound effects of waves crashing onto a boat.[14] These sound effects he then combined with percussive rhythms and drum figures, creating unique musical elements out of the wave sounds that still remained in the rhythm of the programmed drums.[15]

Alternatively, field recordings can also be chopped up into small fragments of transient audio samples, using them to create organic drum patterns while manipulating the individual samples with various methods of digital signal processing. In any case, it is all about the audio source and the characteristics of the field recordings, allowing the composer to use them in various scoring situations and musical genres.

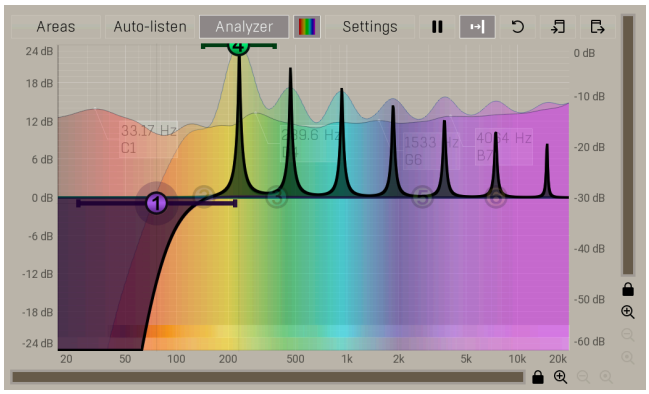

Fig. 08: Tuning Noise within the MeldaProduction MEqualizer

[12] Ableton, "Loop Create | LABS by Spitfire Audio Studio Session."

[13] Production Music Association, "Finding Your Voice: Sound Design W/Tom Holkenborg (Aka Junkie XL)," July 9, 2020, accessed July 28, 2025, https://www.youtube.com/watch?v=nY4dyJNCwlE.

[14] Ibid.

[15] Ibid.

05 Wrap-Up: Bringing It All Together

Looking Back on the Digital Composer's Workflow

This thesis set out to explore the creative and technical dimensions of the digital composer's workflow, with a particular focus on the interplay between traditional musical composition and contemporary sound design practices in the context of audiovisual media.

In the introductory chapter we have stated the following questions:

- How can we meaningfully define the compositional process in screen scoring today?
- Should it be understood through the formal principles of tonal music, or approached as a form of sound design rooted in timbre, texture, and atmosphere?
- Is screen composition best viewed as a personal artistic expression, or as a systematic organization of sonic elements in service of narrative and emotion?

Throughout this work, it has become evident that the modern act of composing for screen cannot be confined to a single definition. The compositional process today exists within a constantly shifting musical and sonic landscape—one that stretches from the structural logic of harmony, rhythm, and form to the exploratory realms of sonic experimentation and the boundless possibilities of modern music technology.

Rather than choosing between the musical language and sound design, this thesis has demonstrated how both domains influence and enhance one another. While the formal principles of tonal music can offer foundational coherence and provide direction within a cue, sound design—through the manipulation of timbre, atmosphere, and texture—is capable of adding a vital narrative dimension that extends beyond the limits of conventional composition. Screen music, therefore, is not merely composed—furthermore, it is the organization of sonic elements that are being sculpted, layered, and designed, while always keeping the overall aspects of storytelling in mind.

The book has also emphasized that screen composition is not solely a matter of personal artistic expression, but is always dependent on the cooperation with other audiovisual departments, foremost with the director or producer of the production. Within the audiovisual environment, composers are continuously challenged by the demands of various genres within the fields of film, television and video games, which often call for distinctive and adaptable

sonic approaches across a wide range of storytelling contexts. To meet these expectations, screen composers are not only required to master technical workflows, but also to develop an understanding of how sound can influence narrative perception—supporting, altering, or redefining the emotional and structural meaning of a scene.

The exploration of the digital composer's workflow—covering everything from foundational musical storytelling to advanced production methods like modular synthesis, sampling, and experimental field recording—has revealed that today's screen composer must be as much a sound designer and engineer as a musician. These roles are no longer separate but are instead part of a unified creative identity.

In bridging the gap between musical and sonic approaches, this book offers a framework and a set of tools to inspire new approaches. It is an invitation to continue the journey: to question, to experiment, and to develop a unique sonic palette capable of speaking both musically and sonically to the stories we tell on screen.

Further Steps and Resources on the Journey Towards a Unique Sonic Palette

Blurring the line between tonal and sonic elements within the context of musical composition, digital composers today not only must be talented musicians, but also have to gain knowledge about the technological background of music production and be open minded about sonic exploration and experimentation. While formal musical education still remains relevant, developing an individual musical language and an adaptive and unique sonic palette can become equally important for aspiring screen composers.

Today, the digital composer has access to a wide range of resources that can bring him forward on his journey of musical composition, sound design, music production and recording. This can be, for example, in the form of books giving you insights into the background and application of music theory, storytelling or sound engineering. Another inspiring resource can lie in interviews and making of content of various screen composers, music producers or other departments of the audiovisual production, revealing their creative or technical workflows and the basis of cooperation and teamwork within the process. Also, the composer can participate in online courses or emphasize self-learning, encompassing a wide array of materials in a setting outside traditional educational frameworks. This also implies various tutorials and breakdowns of creative processes, often being available for free on platforms like YouTube or on the individual websites of composers or educators.

Nevertheless, the process behind musical composition and sound design is also always about taking action, making music and networking with the other departments of film, television or video game production. Therefore, the essence of screen scoring can often be found in the concept of learning by doing, taking part within a wide range of projects to get practice and to find your niche where you can grow and achieve success. In many cases, this also implies to look beyond your own horizon, creatively thinking outside the box or taking part in other aspects of filmmaking or video game production. In this way, you are getting familiar with the aspects of visual storytelling, the workflows on set or the various parts of postproduction, creating a basis for a better understanding and collaboration between the different roles and positions within the environment of a team.

One last thought about the future of musical composition for audiovisual media also must consist the question of how artificial intelligence will influence the work of the digital composer, encompassing the chances, risks and creative possibilities of AI application in music production. While this is not the primary focus of this book, it will provide a brief overview over the actual discourse and give a few examples of opportunities for sound design within the context of musical composition:

Artificial intelligence today can be found in a wide range of settings within the context of music production, reaching from the creative assistance in the compositional process, over the domain of mixing and mastering, towards the integration in various tools of digital signal processing. While there is a general discourse about the question of copyright, regarding musical pieces that were entirely created by AI (also with the background of how the neural networks and deep learning algorithms were trained), there are also creative possibilities in the cooperation with tools that use artificial intelligence, for example, in the creation of infinitive variations of a musical motive, or in the generation of new and uniques sonic elements. Methods of style transfer and neural synthesis can also transform the digital workflow of a composer, offering him new and efficient tools within the context of screen scoring. Also it is possible to use a prompt to generate loops, sample packs or sound effects that can then be further used within the creative process of musical composition.

While this all sounds great, also artificial intelligence can make mistakes, or in a worst case scenario even infringe the copyright of another artist. In this sense, it can be still important to not solely rely on the tools that are provided today, to remain an evaluative perspective, and to imply artificial intelligence into your workflow mostly in a cooperative manner. And like it is in the other aspects of the creative workflow, also the mistakes or sonic accidents that occur in using artificial intelligence can provide new possibilities and starting points of creativity.

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The Digital Composer's Workflow explores the creative process of musical composition within the domain of audiovisual media, unfolding within the dynamic field of tension between the established terminology of classical music and the boundless sonic possibilities of modern music technology. Navigating within a constantly shifting musical and sonic landscape, this book negotiates the structural conventions of musical form alongside the experimental textures and timbres of contemporary sound design.

It provides a structured overview of the digital composer's workflow—from foundational concepts in music theory and audiovisual storytelling to advanced production methods involving the workflow inside the digital audio workstation (DAW), virtual orchestration, modular synthesis, and experimental field recording.

This book has the goal to bridge the gap between the musical and sonic background of scoring for audiovisual media, inviting aspiring screen composers, sound designers and already established musicians to further dive into the fascinating world of sound design, while providing inspiring sonic ideas and resources to guide them on their journey towards a unique sonic palette.

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