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HSLU applied jazz research on grooves in jazz

Applied Groove Research
Utilizing the results of groove research to teach groove

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Background

How does one teach a student to groove? This is a challenge for music teachers in almost all styles of jazz and popular music. Musicians often encounter a similar problem in the practice room, for example when confronted with an unfamiliar style or uncomfortable tempo: how can I make this music groove? Playing rhythmically 'correct' does not necessarily imply that the music will groove, and hence, the musical result can be unsatisfactory. For many decades, the common answer to these problems has been to listen to and play along with legendary recordings featuring great players. We do not intend to invalidate this established method of learning to groove, but we additionally propose a new methodology that is based on theory and science in a similar sense as the pedagogy of jazz harmony is based on theoretical ideas. We want to better understand what the great players do, not merely by imitating them, but also through the musicological and scientific analysis of music, records, and performance practices, and through the examination of how groove feels to players and listeners. Groove research investigates exactly these topics but is not focused on the pedagogical application of its results. This paper is the first step to bridge this gap by asking whether groove research can help us teach groove to students, and, if so, how it can best be taught. Simultaneously, the paper serves as an introduction to groove research for those unfamiliar with this academic discourse.

First, let us take a step back and introduce groove research, which methods it employs, and what questions it strives to answer. In a recent overview article on groove research, Câmara and Danielsen (2018) distinguished between three different understandings of the term groove that are found within this multi-disciplinary research:

a) Groove as Pattern and Performance

In this understanding, groove is a purely musical object of study. 'The groove' has been defined as "a large-scale, multi-layered pattern that involves both pitch and rhythmic materials, and whose repetitions form the basis for either a portion or all of a particular tune" (Zbikowski, 2004, p.275). Such patterns are transcribed with musical notation and are subsequently investigated, mostly through music analysis (e.g., Stewart, 2000; Hughes, 2003). Câmara and Danielsen (2018) added the actual performance to the musical object of study, e.g., the exact timing and sound of the music, as preserved on recordings or expressed in performances. Performance scientists investigated these nuances through measurements of audio recordings (e.g., Friberg & Sundström, 2002). Common questions asked in these investigations are what patterns are used, how exactly are these patterns played, how individual are the performances, and how has the music changed over time.

b) Groove as Pleasure and 'Wanting to Move'

This understanding revolves around the perception and experience of music. Previously, ethnomusicologists have described groove as "something that is sustained in a distinctive, regular and attractive way, working to draw a listener in" (Feld, 1988, p.76) which creates a feeling of motion (Keil and Feld, 1994). In music psychology, groove is commonly understood as "that aspect of the music that induces a pleasant sense of wanting to move along with the music" (Janata et al., 2012, p.56). The overarching questions in this field are how and why music makes us move. With this understanding, groove is not inherent in the music, it is not simply the music itself that grooves. Instead, it needs to be experienced as 'groovy.'

Investigations focus on the perception and cognition of musical objects or characteristics, the processes that occur within the listener while listening to music, and on the listener's individual musical background (e.g., Senn et al., 2019). The research in this instance is mostly empirical, i.e., based on experimental findings, for example in listening experiments (Senn et al., 2018, 2021), measurement of movement (Witek et al., 2017), or neuroscientific measurements (Cameron et al., 2019; Matthews et al., 2020). Music that encourages and facilitates body movement is common in many cultures and musical styles, and consequently, the term groove defined in this way is not limited to popular music. Most of the groove research in the past two decades is based on this understanding of groove.

c) Groove as a State of Being

The third conceptual understanding of groove is as a state of consciousness. 'Being in the groove' (Danielsen, 2006) while one listens, plays, or dances is arguably very relatable for musicians. This state is characterized by losing oneself whilst playing music or on the dance floor, feeling removed from time and place, and experiencing pure pleasure. It has been described by musicians as very enjoyable (Berliner, 1994, p.389; Monson, 1996, p.67f), or as a balanced state between effortlessness and concentration (Danielsen, 2006, p.132ff; Bechtold et al., in review). Being in the groove seems hard to analyze and impossible to measure: it is volatile and ends once the music stops or when one starts to think about it. Hence, this research is more theoretical or philosophical. Two in-depth studies are Anne Danielsen's (2006) investigations in reference to the music of James Brown and Parliament, and Tiger Roholt's (2014) phenomenological examination. More recently, research has aimed at combining b) and c) into a new definition of what groove experiences are (Hosken, 2020; Duman et al., 2021).

A practical application of groove research in a band workshop

Ultimately, the question how to groove needs to be answered individually through artistic knowledge and experience by each individual musician. Consequently, we cannot provide simple and universally applicable didactics on how to groove, but we can utilize groove research to support this learning process. Groove research can serve as a guideline or inspiration, and provide a framework for analyzing recordings, compositions, or performances. Therefore, we suggest a research-informed approach to teaching groove skills, centered on the student's personal experience with groove.

Specifically, we conducted a band workshop in which we guided students through an experimentation process with compositional and performative parameters. Our aims were for everyone involved to experience different levels of groove and to find that spot where it feels 'just right.' Through this process each person would then acquire practical knowledge of what to listen to and which 'levers to pull' in order to reach this strived-for feeling.

In our first lesson, we familiarized students with the different concepts of groove, groove research in general, and that we will focus on subjective groove experiences in the course. In each of the following lessons, we first introduced the band to research findings on a particular topic. Then, we instructed and encouraged band members to play in specific ways related to these findings. Afterwards, participants reported how playing in this manner had felt. We then went on to discuss and judge the outcome in the group.

The original class design included 15 such topics (Table 1). For the purposes of this article, we present four of these topics as examples of how to incorporate groove research into music education.

Table 1 *The 15 topics we planned for our band class, each with an example reference for further reading, and a categorization whether the topic belongs to the compositional or performative aspect of music.*

Topic	Example reference	Type
Accents	Traut, 2005	compositional
Complexity	Matthews et al., 2019	compositional
Density & Layering	Senn et al., 2018	compositional
Dramaturgy	Attas, 2015	compositional
Feels	Hosken, 2020	performative
Loudness & Dynamic Range	Câmara et al., 2020a	performative
Microtiming	Kilchenmann & Senn, 2015	performative
Participatory Discrepancies	Keil, 1987	performative
Pattern Interaction	Hughes, 2003	compositional
Pattern Length & Variations	Senn et al., 2018	compositional
Register	Wesolowski & Hofmann, 2016	compositional
Swing Figure	Friberg & Sundström, 2002	performative
Syncopation	Witek et al., 2015	compositional
Tempo	Etani et al., 2018	compositional
Timbre	Câmara et al., 2020b	performative

Four topical examples

Tempo (compositional)

Choosing a tempo for a song is an important part of any composition or performance. Facilitating a groove experience is likely one of the many factors that influence this decision. We can assume that composers choose an 'optimal tempo' for their songs. However, this chosen tempo is not necessarily set in stone during live performances or performances by others. Furthermore, the tempi in which, e.g., arrangements of jazz standards are played vary significantly between versions. In contrast to this, groove research with drumbeats suggests the rather radical conclusion that there is an objectively optimal tempo for experiencing groove between 100 and 120 BPM (Etani et al., 2018).

In our class, we played the same songs and patterns in multiple tempi that differ from the iconic recordings. We discussed how the feeling of groove changed between tempi, how flexible tempo is, and any differing opinions as to what the optimal tempo should be. Mentally overwriting the tempo associated with a particular composition or an influential recorded performance is a challenging task. Our players were particularly uncomfortable when playing only slightly above or below the original tempo. In these cases, they tended to gravitate back towards the well-known tempo. Through these experiments, the students gained several insights into the relationship between tempo and groove. We did not reach a conclusion as to an objective optimal tempo (range), instead, it seemed to depend strongly on a song's compositional characteristics (e.g., the type of subdivisions or the density of the patterns). Not all players always preferred the same tempo for each song. We did, however, find flexibility for tempo and groove: groove experiences can be similarly strong with the same material in different tempi. Yet, a change in tempo could significantly change how it felt to play a song.

Microtiming (performative)

The term microtiming refers to the exact temporal placement of notes below the level of conventional notation. In a wide-spread conception, whether we perceive a downbeat as 'laid-back' or 'rushed' is decided on the exact moment when it is placed. Yet, it will still be interpreted as a downbeat as long as it falls into its so-called 'beat bin' (Danielsen, 2010, p.29).

Where exactly the notes are played is often brought forward by musicians as being of vast importance for groove (Berliner, 1994, p.350ff; Monson, 1996, p.52ff), and preferred microtiming for groove has been described as “tight but not too tight” (Bechtold et al., in rewiew). The idea that such ‘rhythmic nuances’ (Roholt, 2014) are decisive for experiencing groove overlaps with the influential and well-researched theory that “the power of music is in its participatory discrepancies” (Keil, 1987, p.275).

Thanks to modern technology, which allows to measure the timing of note onsets with relative ease, groove research has found such microtiming deviations on recordings in a variety of musical styles: jazz (Prögler, 1995; Benadon, 2006), samba (Naveda et al., 2011), EDM (Danielsen, 2010) or Malian drumming (Neuhoff et al., 2017) to name just a few. Figure 1 shows an example for such a result: 12 bars of a blues played by drums and bass. The transcription uses conventional notation but additionally shows the deviation of each note from the metronomic grid. Measurements like these brought about important insights as to how instructions such as ‘laid-back’ are realized by musicians (Kilchenmann & Senn, 2011), on the discrepancies between individual musicians performing together (Kilchenmann & Senn, 2015), or on swing ratios for different tempi and individual performers (Friberg & Sundström, 2002). In contrast to these theories and findings in music itself, the empirical investigations of the potential effect of microtiming on the groove experience are not at all that conclusive. In some listening experiments, metronomic timing was preferred (Frühauf et al., 2013). In others, microtiming did not seem to have a noteworthy influence at all (Butterfield, 2010), or showed that small microtiming deviations were preferred over quantized rhythms only by listeners with higher musical expertise (Hofmann et al., 2017). These contrasting results between the opinion of musicians, performance analysis and empirical work in music psychology have puzzled researchers for years.

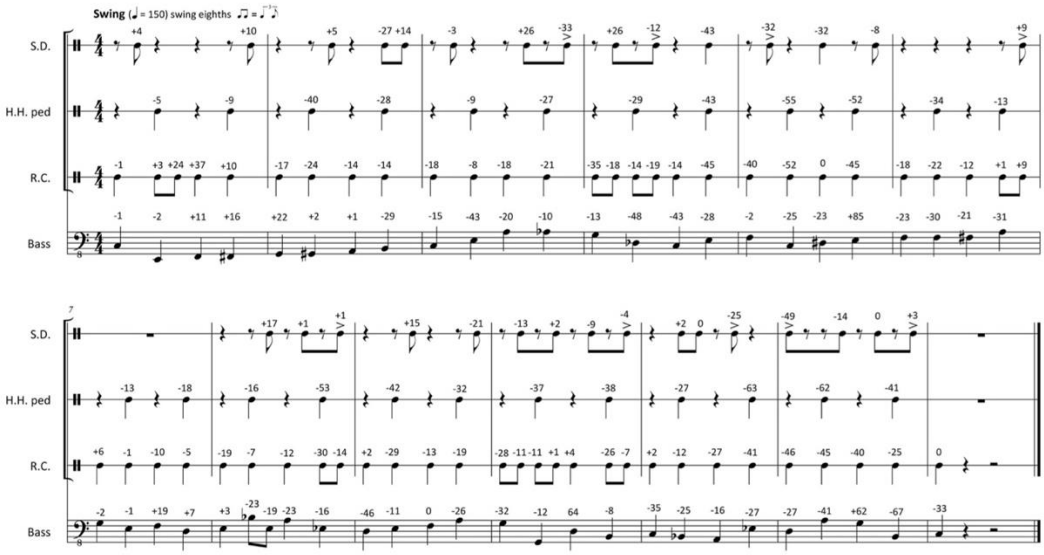

Figure 1 *Transcription of a blues chorus played by drums and bass with the deviations from the metronomic grid in milliseconds above each note (negative numbers = ahead of the metronomic grid, positive numbers = behind the metronomic grid). Originally published as Figure 1 in Kilchenmann & Senn (2015).*

In our band workshop, we simplified microtiming in practice - after all, it is not possible to execute the instruction to play 20ms behind the beat. At first, we had one student play with a specific feel: behind, on, or ahead of the felt beat (or a given beat reference, such as the hi-hat). Consistently keeping this time difference against the other players proved to be difficult. To simplify things, we reduced the band: we started with two players, then adding the others one by one. As a side-effect, this facilitated detailed groove observations by the non-playing members of the band. We further encouraged the students to test extremes in order to uncover

the boundaries between sounding ‘not tight’ or ‘loose’ on one side and sounding plain wrong on the other.
At first, we found that all the instructions diminished the groove experiences. This came as no surprise: forced changes to something as habitual as timing can stress players or make them overthink their playing. Once the band had grown accustomed to the task, and after playing in reduced settings, we noticed positive effects of microtiming. We identified and discussed passages that felt more or less groovy but, as expected, we could not conclude on a specific optimal configuration to suit all situations. We managed to reproduce the finding that too much microtiming deviation harms the experience of groove.

Syncopation (compositional)

In research, syncopation is usually seen as a form of rhythmic complexity. Syncopation is a very common characteristic of musical styles that are associated with groove, such as funk (Danielsen, 2010), EDM (Butler, 2006) or jazz (Gioia, 1997). In a phenomenological theory, syncopation is important for groove because listeners fill in the (missing) beat with their bodies, thus playing an active and enjoyable part in their experiences of groove (Witek, 2017; Stupacher et al., 2022). The relationship between syncopation and groove experiences has been investigated in many studies (Witek et al., 2014; Sioros et al., 2014; Matthews et al., 2019). Often, music with medium syncopation led to a more intense groove experience compared to music with low or high syncopation (Figure 2). One explanation for this is that music with low syncopation quickly becomes boring, whereas it can be challenging to find, let alone to follow, the beat in highly syncopated music. This form of relationship was also mentioned by musicians coupled with strategies to keep music interesting and syncopated, but also accessible (Bechtold et al., in review). These findings sit well with a general theory that complexity and enjoying the music are related in a similar way (Berlyne, 1958).

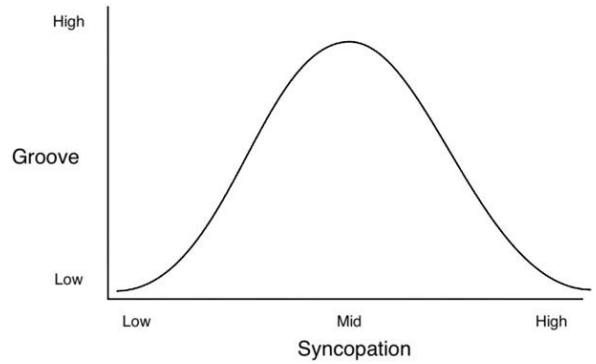

Figure 2 *Schematic visualization of the relationship between Syncopation and Groove*

In class, we varied the amount of syncopation in pattern-based songs, such as James Brown’s “Mother Popcorn” with its endlessly repeatable 4-bar patterns. We then instructed individual players to reduce or increase the syncopation of their pattern by displacing, adding, or omitting notes. As with the topic tempo above, the familiarity with the original composition exerted a pull towards the composed structure which made it hard to keep an objective opinion when judging new outcomes.

Pattern Interaction (compositional)

Above, we mentioned the layering of riffs as a core feature of the understanding of groove as a pattern. Musicological accounts have provided many theories as to how musical patterns can interact to enhance their combined effect and create a sense of forward motion (Hughes, 2003; Zbikowski, 2004; Danielsen, 2006; Attas, 2015). For example, patterns generate a pull when

they strive to resolve at a certain point through rhythmic or harmonic cadences, often leading to another reiteration of itself. In some analyses, the patterns occupy different roles in promoting groove. Some may be considered timekeepers or providers of metric orientation while others provide instability or interesting rhythms. A comprehensive analysis of pattern interaction in polyphonic music would be a difficult undertaking as the possibilities quickly become endless, even after just a few notes. In consequence, musicological analysis tends to focus on music featuring short, repetitive patterns, such as can often be found in the music of James Brown (Stewart, 2000; Danielsen, 2006). Empirically, different simultaneous layers have been shown to be important for groove in drumbeats (Senn et al. 2018). Musicians also mentioned the importance of pattern interaction in relation to the entire band context (Bechtold et al., in review).

Our approach to this topic was rather open. We used spontaneous improvisation of strictly pattern-based music as a basis for exploring this concept. One band member would start with a 2- or 4-bar pattern and repeat it consistently. One by one, the remaining members would join. The aim for each student was to contribute a pattern that would enhance the resulting groove, whilst avoiding pitfalls, such as overcrowding or destabilizing the music. Later, we also assigned specific (sometimes unconventional) roles to each player, such as keeping the time, contributing syncopation, playing an interfering pattern, or providing a (harmonic) backdrop. In practice, this led to a trial-and-error process, where players discovered possibilities and limits through the addition of more, or less effective patterns. This proved to be a good way of stimulating creativity and discovering captivating pattern combinations.

Conclusion

In this paper, we provided a brief overview of groove research that may be of potential interest for music teachers and musicians. We sketched out our approach to teaching and experiencing groove through research-informed playing in a band. We conclude that groove research can be applied for music making or teaching and that it provides a viable approach for engaging with groove. This research-informed approach complements traditional ways of picking up groove skills and may help to shorten the required time needed to achieve musical goals in that regard. Our trial took place in form of an instructed band workshop, but this approach can easily be adapted and applied in individual lessons or even practice sessions.

We hope that this short introduction gives some ideas about the application of groove research in music pedagogy: research can provide guidance for lessons, inspiration for practice, detailed analysis for interesting musical examples, insights into the fabric and structure of music, and training for players to pay close attention to finer details. Or to put it differently: groove research can generate a better understanding and detailed awareness of one's own playing and of the playing of others.

In the future, we plan to repeat this band class with a new group of students. We will aim to incorporate an interview study with the participating students to thoroughly analyze how each student's thoughts, experiences, understandings of groove, and their subjectively perceived abilities change throughout the duration of the course.

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Authors

Toni Bechtold is a saxophonist and teacher. Rafael Jerjen is a double bass player and lecturer. Olivier Senn is a lecturer in research. The course was designed and conducted by Toni Bechtold and Rafael Jerjen. All authors are groove researchers at the Lucerne School of Music. Olivier Senn and Toni Bechtold have also conducted research on jazz.

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