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Jazz Μουσική και Αυτοσχεδιασμός με Νέες Τεχνολογίες

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ΣΥΝΟΔΕΙΑ ΤΟΥ ΚΟΝΤΡΑΜΠΑΣΟΥ ΚΑΙ ΤΕΧΝΟΛΟΓΙΚΕΣ ΚΑΙΝΟΤΟΜΙΕΣ ΣΤΗ JAZZ ΜΟΥΣΙΚΗ

Παναγιώτης Κ. Χαραλαμπόπουλος

Επιβλέποντες: **Αναστασία Γεωργάκη, Αντώνης Λαδόπουλος**

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Double Bass Accompaniment and Technological Innovation in Jazz Music

Panagiotis K. Charalampopoulos

Supervisors: Anastasia Georgaki, Antonis Ladopoulos

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ΔΙΠΛΩΜΑΤΙΚΗ ΕΡΓΑΣΙΑ

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Παναγιώτης Κ.
ΧαραλαμπόπουλοςΑ.Μ.: 18210

Τριμελής Επιτροπή: **Αναστασία Γεωργάκη,** Καθηγήτρια

Αρετή Ανδρεοπούλου, Επίκουρη Καθηγήτρια

Χριστίνα Αναγνωστοπούλου, Αναπληρώτρια Καθηγήτρια

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Abstract

Few instruments have had such an influence on establishing the jazz aesthetic and sound as the double bass. One of the most crucial elements of swing music definitely is the walking bass line; the pattern of a quarter note on every beat, provides a trademark pulsating rhythmic drive, setting up an ‘underground’ melodic layer in the music.

Technology, on the other hand, has had a critical impact on the double bass approach over the evolvement of jazz music: from early Mechanical Innovations to Performance/ Recording Techniques, digitalization of the signal (midi) and sound effects.

In this essay, Section 1 outlines the role and evolution of the double bass as an accompanying instrument through the history of jazz. Then, Section 2 presents an analysis of the technologic impact on the double bass approach, including performance techniques and recording tools. In Section 3, we examine the possibilities of further implementing technologic advancements to create new forms of expression through the jazz idiom and improvisational music, in general. Section 4 is dedicated to the musical performance, that will present, support and prove the outcomes of this research.

1 The Evolution of Double Bass' Accompanying Role in Jazz

Historically, the main role of the double bass was to play orchestral and ensemble parts in sectional unison, amplifying the harmonic richness of the pieces. The instrument itself wasn't rather popular and there was a severe lack of solo repertoire, only until the early 19th century when two of the most important double bass players emerged in the scene: Dragonetti and Bottesini. These two musicians composed solo pieces for their own performance careers and these works are still highly considered, as they require expressive and technical prominence. However, during the 20th century the double bass was highly involved in shaping the jazz idiom, which grew significantly in popularity both among the musicians and the audience. Thorough analysis of this evolving role through the jazz years will be presented in the following subchapters.

1.1 Early Jazz

Background

Jazz music developed from the collective experiences and knowledge of musicians in the Americas. In the late 19th century the 'New World' was in turmoil, as numerous cultural and ethnical elements blended. New Orleans, a rather industrial area at the time*, was no exception to that, as the black

working class communities coexisted with many other migrants, like the Creoles. The term 'Creoles' was used to describe individuals from Spanish or French descent who were born on American land, and the Creole societies carried a strong influence of European education and musical tradition into the cultural 'melting pot' of New Orleans. Racial mixtures caused the emergence of the first 'black Creoles' who were socially equated to the black people after the passage of Louisiana Legislative Code No. 111 in 1894, and as a result they came in close contact with the African-American communities. Creole musicians that were predominantly trained in the European styling of music

integrated with African-Americans who came from a background of blues and folk music traditions (J.W. Skinner, 2016). This situation was definitely one of the major factors which fueled the birth of jazz.

Double bass accompaniment in Early Jazz

The double bass was introduced into the black culture by the Creole societies, it wasn't however the first choice of a bass instrument in music ensembles. The tuba corresponded to the marching bands' mobility and sound more than the double bass and it was the original instrument used to supply the harmonic foundation. Together with the bass drum, they comprised the 'rhythm section' of the much popular marching bands during the very Early Jazz era.

In the later years, musicians started performing indoors, mostly in bars and pubs, and the mellow sound of the double bass was more suited in that context. The double bass served solely as reinforcement for the left-hand function of the piano at first, but as the idiom developed, that role was emancipated: the bassist was required to go beyond playing roots and fifths on the strong beats of the bar, to playing on all four beats in a walking bass style.

The *walking bass* revealed new directions in accompanying the other musicians. Playing with a bow was fast replaced by fingerstyle playing, which gave the bassists the opportunity to improve their articulation by using a more percussive sound. In addition, the walking bass line was improvised, so it pushed the players through this creative process of combining their hearing with their knowledge of harmony to provide a functional and creative bass layer for the music. It is worth mentioning that during the Early Jazz years, bassists utilized the 'slap' (or 'pluck') technique as well: this technique can be described as the physical act of the palm hitting the fingerboard, characterized by slightly indistinctive pitch and percussiveness. This technique dominated until approximately the 1930s when pizzicato technique took over.

However, walking bass was not perfected yet, as the note selection was narrow. Basslines in the Early Jazz era altered between 2/4 (two-beat) and 4/4 (four-beat) time feel, using almost exclusively *triadic chord notes* which seem stationary for today's standards. An indicative example of this transition is shown in these 2 excepts of Wellman Braud's bassline in "Rockin' in Rhythm" by Duke Ellington (Figure 1 and Figure 2), as Braud uses both two-beat and four-beat feel in the same recording, underlining the change of pace regarding accompaniment.

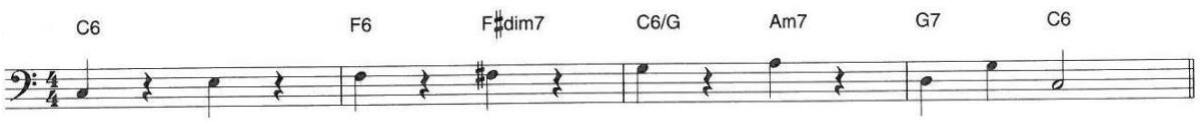


Figure 1: Segment from "Rockin' in Rhythm" (1931, Braud): two-beat feel

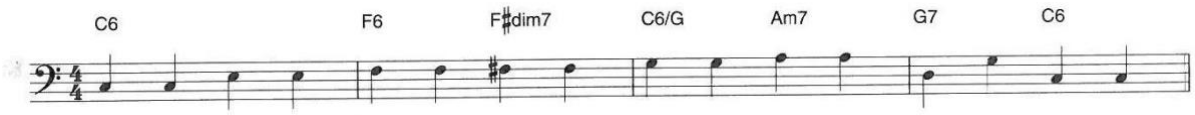


Figure 2: Segment from "Rockin' in rhythm" (1931, Braud): four-beat feel

Many bass players stand out from that era, like Slam Stewart, Walter Page, Wellman Braud and George 'Pops' Foster. Each of them contributed to different areas and collectively, they all had a vital part during this transcending period of jazz bass playing. Foster, a dominant figure in Early Jazz, is considered the grandfather of jazz bass playing (Goldsby, 2002), as he incorporated most of the early double bass techniques and made several innovations himself. As the years progressed, bigger bands were forming and the need of a good bass player was becoming essential.

1.2 Swing Era

Background

Music was coming to the spotlight of entertainment, as most spectacles, theatrical plays and dancing events required live music. Big bands were on the rise: compositions became more detailed and tighter and arrangements were used as a creative tool by the great bandleaders of the time, like Count Basie, Benny Goodman and Duke Ellington. Duke's big band was one of the best of the era and had some of the most prominent bassists of the time.

Double Bass accompaniment in Swing Era

Wellman Braud was the main Ellington's bassist from 1926 to 1935 and one of the Swing Era great pioneers, but the most acclaimed –even to this day- is Jimmie Blanton. He was a member of Duke's band after Braud, and his contribution to bass playing is remarkable.

Unlike other bassists, Blanton developed a more lyrical and melodic playing style. The way he accompanied the band was unique, as he often provided a countermelody to the soloist using a more scalar approach. He often included rhythmic embellishments in these basslines and his rhythmic vocabulary embodied the 'swing feel' as we know it today: Blanton was the first to play long connected notes in his lines, shaping in a great way the later well-established walking bass style.

Besides, his high-level technique allowed him to experiment using a broader part of the fingerboard, including harmonics and high-register notes for the first time. A good example showcasing Blanton's walking bass style is presented in Figure 3, a segment from his bassline in "Bojangles" by Duke Ellington, which contains several of the aforementioned innovations:

high-registry notes (measures 4, 7 and 8), use of chromaticism (measures 6 and 7) and scalar note choices.

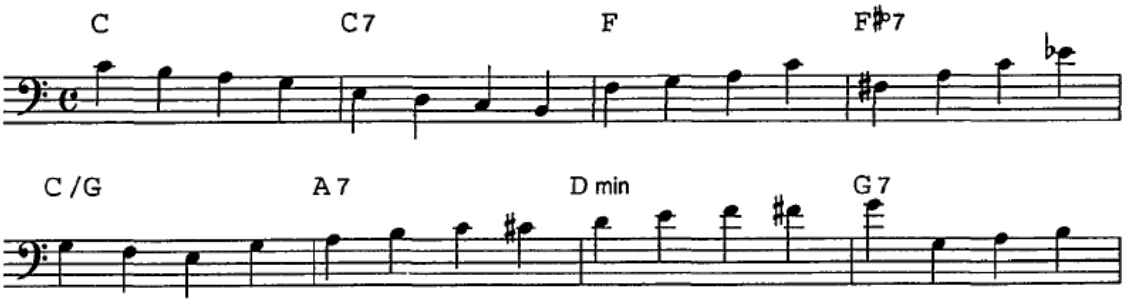


Figure 3: Segment from "Bojangles" (Blanton, 1940)

Ellington soon recognized Jimmie's talent and the arrangements brought him on the spotlight, either with brief solo parts or with rhythmic modulations based on Blanton's playing. One of the most important Ellington recordings with Blanton was a set of piano & bass duets ("Duke Ellington: Solos, Duets, and Trios"). These recordings, made in 1940, presented the bass on a high artistic level and displayed Blanton's brilliance and soloing skills. Another significant recording of Blanton is "Jack the Bear", with a short bass intro and a coda-solo later on the piece.

Despite his early death at the age of 23, Blanton managed to revolutionize the role of the double bass in jazz and influenced the next generations of players.

1.3 Bebop Era

Background

Bebop came like a spontaneous reaction of the musicians to the growing popularity of swing music, an act of rebellion (T. Gioia, 1997) against the trappings of swing music: the simple riffs, the accessible vocals, the orientation toward providing accompaniment to social dancing. In a few words, melodies became more sophisticated, harmonies were altered and soloing became more technically demanding.

According to many historians, this could be called the classical age of jazz (D.L. Wilner, 1995). A text book definition of music of the Classical period contains striking similarities with that of bebop. Wold (1973) writes that music of the Classical era *"is characterized by a symmetry of form. Musical periods are perfectly balanced, usually in units of four measure phrases. Chordal structure was often the basis for melodic configuration. Melodic devices such as ornaments, sequential patterns, became formalized to the point of being clichés. Because the bass no longer served a melodic function, the Baroque polarity between soprano and bass disappeared... The most commonly used cadence was the IV, V, I, with the final tonic on a*

strong beat". Some of the best jazz performers emerged during that era, with the examples of Charlie Parker, Dizzy Gillespie, Thelonious Monk, Bud Powell and Miles Davis being most notable. Bebop showcased the musician's technical skills, while soloing over innovative chord changes.

Double Bass accompaniment in Bebop

Regarding the double bass, the transition through the Bebop Era was vastly driven by the drummers. Because of the fast tempi of bebop, the continuous bass drum hit was replaced by a continuous cymbal hit. This innovation gave space, and therefore allowed bass players to be more audible by the audience than before, providing basslines with a more linear approach, using chromatic passages and having a sense of 'floating'. Bebop strengthened the bond between the bassist and the drummer, establishing them as the rhythmic and harmonic foundation of jazz groups, as they created tension- release sequences (e.g. irregular accents and rhythmic patterns) according to the phrases of the soloist and the musical form of the piece. This dynamic is documented in many bebop recordings of that age (e.g. Ray Brown's playing in "What is this thing called love" recording with Charlie Parker in 1952).

With the change in drum style, more responsibility was also given to the bassist with regards to time keeping, and driving the band became a fundamental task. For piano players, they were not needed anymore to double the bassline with their left hand, and so 'rootless' chord playing was gradually applied to bring balance to the band's sound.

Oscar Pettiford and Ray Brown were two of the first bassists to fully explore the bebop vocabulary, carrying innovations of Blanton's playing and evolving them over time. Other famous bass players of that time were Eddie Safranski, Curly Russell, Gene Ramey and Tommy Potter (Goldsby, 2002).

1.4 Post-bop Era

Background

During the years after bebop, jazz was led by the rise of smaller groups (4tets and 5ets mostly) where some of the greatest jazz bandleaders made their appearance. The rhythm section's frenzy tempi of bebop were toned down, orchestrations gained a more minimal approach and compositions focused on the group's interaction more than ever. Emphasis was given on discovering the potential of timbre of sound and experimenting on new music forms, with recordings often including interludes and carefully arranged sections.

Two of the most important post-bop styles were Cool Jazz and (Post) Hard Bop, where some of the greatest bassists participated in. Percy Heath, Paul Chambers and Ron Carter made numerous recordings with Miles Davis' groups, while Red Mitchell, Jymie Merritt and Wilbur Ware were also members of some of the greatest jazz ensembles of that time (Art Blakey's, Hampton Hawes's and Benny Golson's groups).

Double Bass accompaniment in the Post-bop Era

Bass was empowered by new sound amplification techniques that were totally implemented in every situation (described in Section 2). Bassists, who were all of a high technical skillset, they inherited the jazz tradition of their predecessors, like Blanton and Page, establishing the traditional manner once again. This manner (playing almost exclusively chord tones and not deviating from the harmonic structure) was providing what was necessary for the whole band to sound tight and musically coherent.

The most important factor of that period was the spectacular improvement of sound equipment, which liberated the bassists from the struggle to be heard by the audience and rather focus on the interpretation and expressive techniques.

By the early 1950s the traditional harmonic and time keeping functions of the double bass had been firmly established. In conventional jazz, the primary contribution of the bass was referred to as the 'walking bass line', creating "a feeling of regular quarter note movement, akin to the regular alteration of feet while walking" (Friedland, 1995). There are two features implied in the term 'walking bass line': a steady duple rhythm comprising four notes to the bar and pitch successions that are highly directional, conveying intended harmonic targets. These bass lines employ a mixture of arpeggios scale tones and passing notes to delineate chords. The melodic shape of the line generally rises and falls in pitch over several bars and often moves in stepwise motion between successive chord roots, further intensifying the walking illusion and creating the impression of purposeful ambulation. The ability of double bass players to provide this style of harmonic underpinning was a crucial feature that every player needed to be able to perform. The example below (Figure 4), taken from "At the Café Bohemia" recording by Art Blakey's 'Jazz Messengers', presents a typical bassline of the post- bop era: diatonic and chromatic intervals, rhythmic embellishments, melodic approach of the bassline.

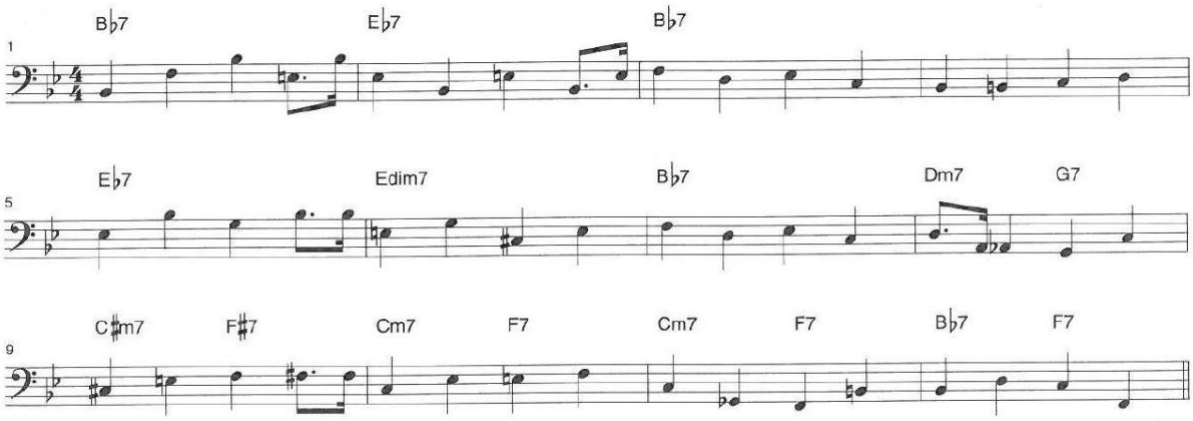


Figure 4: Segment from "Soft winds" (Doug Watkins, 1955)

Overall, by the late 1960s jazz had developed a distinct sound through multiple aesthetic contexts, reaching a peak on many levels. This collective artistic fulfillment fueled the departure from popular music forms and diatonic clichés. Players started exploring new artistic areas, which also had a big effect on bass playing. The main concept was the creation of continuous tension-release sequences, where tension could be dissonance (harmonic and melodic), high volume/intensity, use of big intervals in melody, solving into a release, brought with consonance, mellow tones and diatonic melodies.

The most notable example of this shift has to be Miles Davis' 2nd quintet (with W. Shorter, R. Carter, H. Hancock, T. Williams), where music tended to focus mostly on interaction between the musicians, creating in that way abstract soundscapes as a basis for the soloist. Ron Carter developed a unique playstyle at that period, using countermelodies and building parallel basslines as an accompaniment. The note choices were unconventional, with wide use of chromaticism, implied harmony and repeated patterns. The example below (Figure 5) is taken from the Baker/Mulligan group recording "Carnegie Hall Concert" (1974), almost all the aforementioned elements are presented in Carter's bassline: chromaticism, use of patterns, parallel basslines.

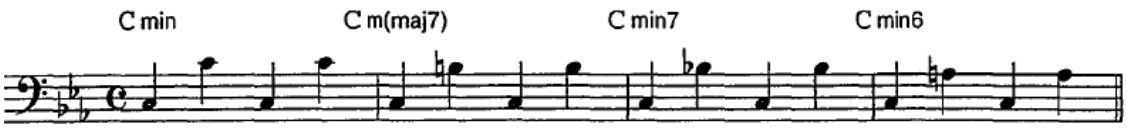


Figure 5: Segment from "My funny Valentine" (Carter, 1974)

This approach was partially inspired by the rise of free jazz, which guided many players through the concept of limitless possibilities of expression through music. Charlie Haden's performance in the 1959 recordings of "The Shape of Jazz to Come" (Ornette Coleman) is a clear example of this direction. In the broader Avant-Garde genre, Charles Mingus presented a

series of works where he acted as a composer, arranger, bandleader and performer, which introduced an avant-garde perspective in jazz. His recordings display his unique style in composing, arranging and accompanying the band.

Special mention must be made for Scott LaFaro, who implemented new musical concepts to bass accompaniment. Mostly famous for his recordings as a bass player for the Bill Evans Trio from 1959 to 1961, LaFaro is widely regarded as a pioneer of the modern style of jazz bass playing (R. Clark, 2014). The Bill Evans Trio (Evans, LaFaro, Motian) was based on a three-way spontaneous improvisation approach between the musicians, allowing them to explore the boundaries of jazz.

LaFaro used a number of techniques and approaches in his performances to create this new sound as a bassist. His use of repetitive rhythmic motifs and polyrhythmic devices played a significant part in allowing LaFaro to abandon the common walking bass line as the predominant component of his accompaniment to Bill Evans' piano soli. By discarding the traditional walking approach, he filled his accompaniment with scalar and arpeggiated patterns that would simultaneously outline the harmonic progression of the piece whilst also creating melodic phrases. The examples below (Figure 6, Figure 7), taken from Bill Evans' Trio "Live at the Village Vanguard" (1961), present LaFaro's approach in two different settings, yet they both prove his unconventional style.

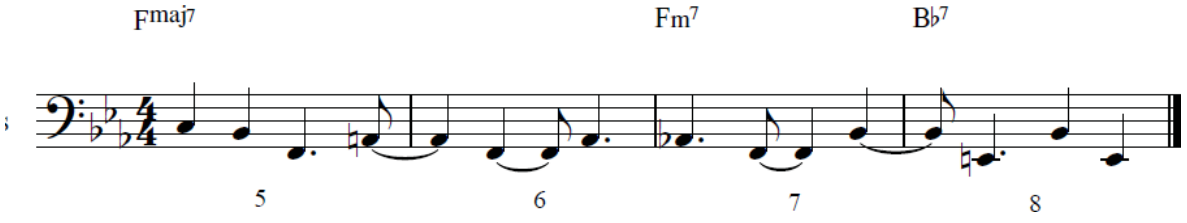


Figure 6: Segment from "Solar" (LaFaro, 1961)

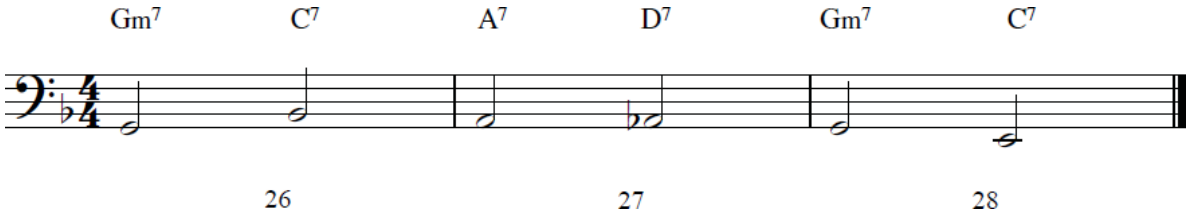


Figure 7: Segment from "Waltz for Debby" (LaFaro, 1961)

La Faro's approach encouraged jazz bassists to engage in improvised counterpoint accompaniment, liberated from the constraints of walking bass, and influenced next generations of players (such as Gary Peacock, Steve Swallow and Charlie Haden) to further develop and evolve the role a jazz bassist plays as a part of a small ensemble.

1.5 Modern Era (1975 – present)

By the mid-seventies, technologic advancements had already made a big impact on music in many levels. As the expressive palette for musicians was becoming wider, many bass players switched to electric bass in order to explore these new possibilities and features. Several great electric bassists emerged over the years, with Jaco Pastorius being the most notable example, influencing bass playing and music in general since then.

Until very recently, as far as the double bass is concerned, the traditional jazz accompaniment hasn't had any significant musicological innovation. For this statement to be accurate, we could except any ethnic traditional elements that jazz has assimilated over the years. All great bass players that followed (with Gomez, Reid, Holland, McBride being the most notable examples) relied mostly on incorporating and reviving the traditional double bass approach, which is still the ultimate point of reference to this day. Nevertheless, new elements have been incorporated to the already existing forms and notions of the past: the use of bass continuo from classical music, rhythmic elements from latin music, atonal approaches from the free impro genre, etc. are all shared knowledge between contemporary jazz bassists and are used contextually. New players contribute in making jazz relatable up to this day, yet again, most experimentation from a musicological point of view is based vastly on the aforementioned great players of the past (e.g. Blanton, LaFaro, Mingus, Haden, etc.).

At the same time, double bass players have been applying new technologic tools on their bass accompaniment, respecting and renovating the jazz tradition. Bassists such as Dan Berglund (E.S.T. Trio), Nick Blacka (Gogo Penguin) and Reid Anderson (The Bad Plus) have made extended use of effects and pedals in their performances and have further evolved the timbre and function of the double bass. In this way, jazz itself evolves as a genre through the spectrum of new technologies and transforms itself into a wider concept of music which can comprise of countless - seemingly irrelevant - musical elements.

From a wider point of view, the introduction of the electric bass as well as the more recent development of MIDI protocol have both been significant milestones for the evolution of bass instruments, as well as music in general, and will be reported below.

As a conclusion to this first Section, a comparative report of the double bass' accompanying role in jazz through the 20th century is presented in Table 1 below. In the following Section we will examine the impact of technologic innovations on these evolvements.

Table 1: Qualitative features of double bass accompaniment in jazz history

	Note Choice Features					General Bassline Features			
	I – V Notes	Chord Notes	Scale notes	Chromatic notes	High registry	Advanced Motifs	Melodic Development	Rhythmic Embellishments	Counter Melodies
Early Jazz	✓								
Swing Era	✓	✓	✓					✓	
Bebop Era	✓	✓	✓	✓	✓	✓		✓	
Post-Bop Era	✓	✓	✓	✓	✓	✓	✓	✓	✓
1975 - Present	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes on Table 1

- The indications reflect on the general playstyle approach of each period, e.g. Blanton introduced ‘high registry’ and ‘chromatic notes’ during the Swing Era but these elements were assimilated gradually and were used widely in Bebop Era.

- It is worth mentioning that during the last 2 periods examined (Post-Bop Era, 1975 – Present) several advanced musicological concepts regarding jazz accompaniment were developed and perfected (Advanced Motifs, Counter melodies, etc.). These 2 periods are also characterized by a wide implementation of significant innovations in music technology - analyzed in Section 2. Hence, it is safe to conclude that these innovations fueled the musical developments.

- ‘Rhythmic Embellishment’ as a feature becomes more complex and sophisticated through the years, with wide use of unusual and unorthodox rhythmic variations (e.g. dotted quarters, passages with 8th and 16th notes).

2 Innovations and Technological Aspect

The double bass is an instrument with significant presence and has a dominant role in the low frequency spectrum of music. Apart from providing the harmonic basis for any ensemble, it has the potential to resonate with the other instruments and amplify naturally the music's sound when

performed acoustically. The double bass' tone also has a characteristic mellow timbre which facilitates the homogenization of sound, blending in and combining all frequencies produced by the other instrument (Daino, 2010). In this Section we will examine the various techniques and technologic innovations used, which shaped the accompanying role of this instrument in jazz.

2.1 Contemporary Performance Techniques

Bowing

The bow has traditionally served as a primary activator of sound in double bass performance. Similar to the violin, viola, and cello, the arco sound gives the string instrument family its characteristic tone, warm and full of expression.

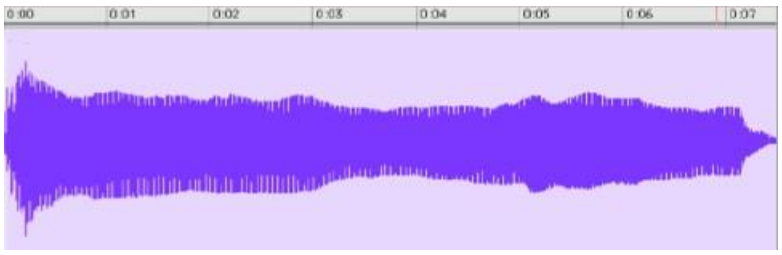


Figure 8: Waveform of Bowing technique

As presented in Figure 8, bowing technique offers a continuous sound signal with slow attack and controlled sustain and decay. However, this technique lacks clarity in high speed tempi due to its slow attack. Many variants of the arco technique exist, and have been used extensively throughout the history of double bass music. In jazz, the first double bassists used the bowing technique for accompanying the ensemble in ballads and slow tempo pieces in general, where expression was a priority over articulation of the musical phrases. Many bassists used the arco for medium or fast tempi but the richness of that technique could not be depicted in the

recordings –especially the early ones. Bowing was fast replaced by pizzicato in jazz, but it is still preferred in appropriate settings.

Despite the development of pizzicato and slap styles, arco technique may have been the earliest form of double bass accompaniment in New Orleans jazz (Booker, 2019). Slam Stewart is a prime example of a jazz bassist performing with a bow, and his recordings have contributed immensely in shaping the jazz vocabulary and sound.

Slap

In the years before amplification, pioneering jazz bassists explored a unique percussive performance technique that increased the instrument's sonic profile: 'Slapping' the bass, or the physical act of the right hand hitting the fingerboard along with the string.

Figure 9: Waveform of Slapping technique

As documented in Figure 9, slapping technique offers a very quick attack, while sustain/decay are almost non-existent due to the 'palm mute' of the bassist. There are several sub-classifications to this technique (single, double and triple slap, flam, etc.) used according to the rhythmic pattern of the song performed. It was used to accompany the band in a percussive and rhythmic manner and gave a distinct sharp sound effect to the music. According to Milt Hinton, "Bill Johnson was the first person I saw do it. Pops Foster and Wellman Braud did it, and so did Steve Brown" (Booker, 2019). In 'Bull Fiddle Blues' we encounter Bill Johnson employing the slap technique with a one-chorus solo over the blues form, representing a landmark moment in the recording history of the double bass in jazz, as it is the first "full-fledged pizzicato bass solo on records" (Chevan, 1989). As for an accompaniment technique, an excellent example of slapping is performed in the 1929 recording of "Freeze and Melt" by Wellman Braud. Braud begins the piece by slapping his way through the introduction in a call- and-response with the band, utilizing the New Orleans style rhumba pattern.

Slap technique was replaced by pizzicato (just like the bowing technique), but did not entirely disappear. It simply moved on to other forms of music, beginning to be featured in various genres by the 1950s like rock-n-roll (Stokes, 2008). Besides, slapping is a trademark technique for rockabilly and country bassists to this day, while in late jazz slapping was merely used to revive the sound of the early jazz recordings.

Pizzicato

In classical music, plucking the strings with the fingers has long been a quick and easy switch to create an entirely new timbre on string instruments. This technique has been used by many classical composers specifically for its unique timbre in comparison to bowed strings, a well-known example being the second movement of Tchaikovsky's Fourth Symphony titled Pizzicato Ostinato (Daino, 2010). In jazz, which is a music that relies on melodic articulation and rhythmic precision, pizzicato was soon established as the most common technique to produce sound on the double bass.

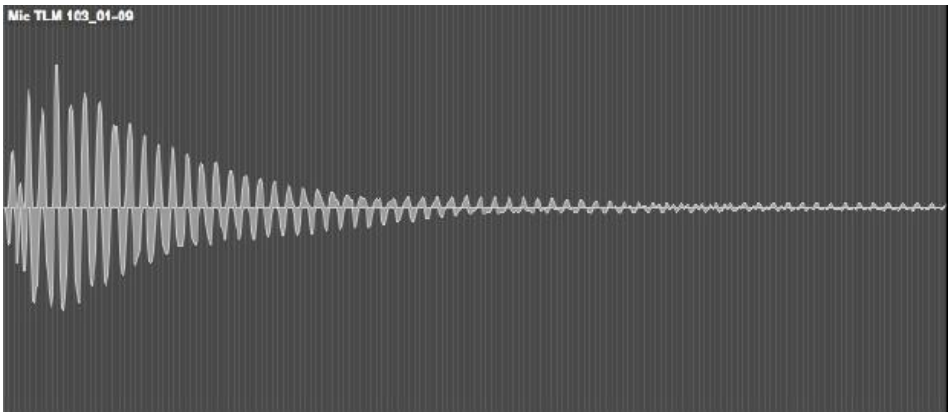


Figure 10: Waveform of Pizzicato technique

Pizzicato technique waveform (Figure 10) indicates an attack time that is slower than slapping and faster than bowing technique, providing a sustain of medium velocity compared to Figure 8 and Figure 9. Therefore, its qualitative features are more balanced compared to bowing and slapping.

By the early 1900s, the rhythmic style of pizzicato bass playing became synonymous with the harmonic development of New Orleans jazz. It gave the music a forward propulsion and became a radical departure from the longer arco sounds of the bass. Pizzicato wasn't

differentiated much from slapping, until Jymmie Blanton established the plucking technique which is most commonly used to this day.

Blanton utilized the “across the fingerboard” pizzicato (Campbell, 2002) which permitted the string to move in a greater vibrating circumference -compared to slapping technique- allowing for increased duration, amplitude and timbre variation. This technique allowed bassists to improve their articulation and perform fast passages with detailed syncopated rhythm.

The pizzicato technique itself varies among bass players, as it requires a balance between producing the maximum sound possible while maintaining a steady pulse, and not forcing the right hand to a degree that may cause physical injuries. Through the years, there have been numerous variations on the right-hand technique, as players experimented with a) one finger and two fingers plucking, b) hand placement of 90 degrees and 45 degrees (Wilner, 1995), c) overall movement of the arm (movement coming from the shoulder or the wrist), and many more. The bass amplification in the mid-20th century showcased this technique overall, as we are going to examine in 2.3.

Apart from the common practice techniques described above, it is worth mentioning the ‘extended’ techniques as well. These techniques can be described as non-traditional or

unconventional ways to produce sound, utilized widely by bassists of Free Jazz, Avant Garde Jazz (e.g. Haden, Mingus) and Modern Jazz. Three popular extended techniques are:

- Col Lengo: producing sound with the stick of the bow
- Flipped/Inverted Playing: a technique where the bow is played in the low registry of the instrument and the left hand is usually in the mid/high registry. In this technique, the player utilizes the string length from the keys to his left hand which can produce an entirely new set of sounds.
- Inverted bow: the bow is put between the instrument’s body and the strings, being able to play E and G strings simultaneously; this technique gives the opportunity to play E/G

‘double stops’ and harmonics which are unable to produce using traditional techniques.

2.2 Mechanical Innovations

The mechanical innovations applied on the instrument itself cannot be overlooked. Over the years, many manufacturing and set up refinements have been applied on the double bass to address the players’ needs. These modifications focus on physical attributes associated with the setup of the bass, including string height, use of adjustable bridge and types of strings. All

these technical alterations were directed towards facilitating the players during their performance.

One major example of the double bass improved by technology is its strings. Traditional gut strings were hand-made, so they had inconsistencies in density and circumference which influenced gravely both the playing and the sound. Although they were excellent played with a bow, when the bassist decided to play pizzicato their characteristics were far from ideal as they required a big effort from the bassist just for the bassline to be audible. The introduction of steel strings contributed in a great way to the evolution of jazz bass style in the late 1950s, as the new steel strings were sonically more powerful and provided more stability in varying climates. Their consistent thickness delivered more reliable intonation to the players and offered a brighter and more distinct tone to the instrument.

This innovation helped the players to explore their harmonic choices and clarify their timbre from the rest of the ensemble, easing the other musicians as they could rely more on the basslines.

The adjustable bridge was also introduced at this time, eliminating the need for extreme string height to compensate for the low tension of gut stings (Brun, 2000). Using an adjustable bridge and higher tension steel strings allowed bassists to bring the strings closer to the fingerboard, resulting in greater dexterity and speed. In the meantime, during the 20th century luthiers perfected many processes in the production level, perfecting the mass production of the double basses and increasing the popularity of the instrument.

Besides that, most of the innovations regard the signal amplification and recording, as we are going to examine into the next subchapter.

2.3 Technologic Innovations

Technology has served music from a very early stage, both in performing and in the recording process. The double bass specifically has been one of the few instruments that have been benefited so much from technology. While earlier live performance and recording media were not capable of depicting the frequency spectrum of the double bass, later innovations assisted this instrument to be noticed and widely appreciated.

It is considered that the act of recording itself influenced the very development of the art form:

“The machine that turned the intangible sound of music into a material object was also to register huge changes in interpretation and performance styles, for which it is largely itself responsible.” (Chanan, 1995)

Early Jazz – 1930s Technology and Innovations

By today’s standards, the sound of Edison’s phonograph cylinders, the acoustic recording industry’s earliest medium, was extremely basic. The device was inherently noisy and scratchy, incapable of storing more than two and a half minutes of sound and severely limited in the scope of frequencies it could transcribe (168 to 2000 Hz) (Morton, 2004). The limitations of this early recording device affected the jazz bassist in two major ways. Firstly, the double bass’ lowest note is at 41Hz and therefore the basslines performed in the low registry of the instrument could not be recorded in an acceptable way. A second limitation refers to the medium itself: the cutting stylus of the phonograph was rather sensitive, as it bounced off its trajectory often when exposed to low frequencies. This affected the recording methods of the time and, as a result, the musicians were carefully distributed at various distances from the recording horn to approximate a realistic ensemble balance. Bass players and drummers were dispatched to the back of the room, a fact that contributed to a disassociated and poorly focused rhythm section, while the overall result of the early jazz recordings lacked significantly in mid-range frequencies. Bassists tended to use simple harmonic phrases as an accompaniment, to simply assist the high-pitched instruments and assist the band’s overall recording performance. After all, the role of the double bass was mostly rhythmic due to the circumstances. Doubling the double bass with a brass instrument, such as the trombone, was not rare for that time as they were reproduced with a much better quality by the phonograph.

The first electrical recording methods appeared in the mid-1920s, with the introduction of microphones to capture the sound (Morton, 2004). This innovative process substituted the old acoustic horn, while vacuum tubes were used for signal amplification and an electromagnetic record head was used to register the sound to a disc. This technology brought a significant widening of the frequency spectrum response (100 to 5000 Hz), and an increase in playback volume. In addition, these new electrically recorded discs were compatible with the old playback devices, a factor that helped their intrusion into the marketplace.

This new recording method alleviated many of the problems associated with recording the double bass, giving a broader frequency response of recordings and resulting in a vast quality improvement especially for the low frequency instruments. The use of microphones played an

active part in allowing the vision of the composer and the aspirations of the performers to be realized, and brought a sound balance that was not possible with the old equipment. In that new landscape, bass players – like Blanton- could showcase their playstyle and the overall sound texture gained increased fidelity and more precise depiction of the timbres. Another important element was the utilization of studio ambience as a valuable sonic enhancement: large buildings such as churches and theatres were adapted and used as recording studios because of the fact that the naturalness of the recordings was able to be taped and recreated in the playback devices of the era.

The importance of the introduction of microphones and electrical recording technology regarding the enhancement of bass performance is illustrated by comparing two Louis Armstrong performances recorded two years apart. 'Gully Low Blues' was recorded on an acoustic system in 1928, while 'Mahogany Hall Stomp' was recorded in 1930, after the switch to the electrical recording system. The difference in quality and fidelity of the double bass is easy to recognize.

These early recording and performance media established the early jazz sound, rendering a more fluid and contrapuntal bass line possible and necessary for the jazz aesthetic identity. Moreover, this was the first stage in the evolution of the rhythm section, in which the double bass, drums, piano and guitar came to form a musically and sonically coherent unit. Doubling music phrases for emphasis was abandoned and replaced in favor of more autonomous contributions from each, as technology allowed that approach. These elements can be recognized in the first jazz rhythm sections which appeared in big bands.

1930 – 1945 Technology and Innovations

As bass players improved their technical abilities and embraced a more nuanced expressivity, they began to impact upon the roles of the other instruments (especially within the rhythm section), growing a sense of autonomy within instrumental function. The employment of the microphone along with associated technologies developed in the broadcasting industries brought the double bass into focus. The increasing importance of the double bass is summarized in the following statement by Benny Goodman:

"…in the old recording studios on Thirtieth St. we'd have maybe three microphones one for guitar and bass, one for the overall band and one for the saxophone section…" (Goodman, 1979).

However, the audibility of the double bass in live performances was threatened by large audiences which almost always included dance ensembles, a factor that underlines the difference between the improving presence of the bass in studio recordings compared to its struggle to assert itself on stage.

In live performances, on the other hand, such electronic aids were not usually available: there was not a microphone dedicated to the rhythm section but to the whole band instead. Performing in big bands among crowded horn sections was forcing the bassist to put immense effort to be heard. In the days before amplification, the bass required the cooperation of the rest of the band, as Ray Brown states:

"When I started, [mid 1940s] there were no amplifiers, and hardly any microphones. I mean, you just stood in the back of the band, and you never got to play over the microphone. So you had to be heard; you had to play with a lot of strength and dexterity. But I think that orchestras were aware of that, and you always heard the bass player. They blew so that you could, for some reason. I remember standing in front of Lunceford, Basie, Ellington and all those bands, and I could hear the bass as good as everybody else." (Surber, 2009).

Brown conceded that the need to prioritize sound projection with the unamplified bass presented a physical challenge that seriously reduced the bassist's facility on the instrument. This partly explains why most of the bassists of the era appeared to be technically unsophisticated.

Examining how the lack of technological mediation in bass performance on stage influenced the stylistic aspects of jazz in the 1930s and 1940s, the following statement about Walter Page (Count Basie's bassist) provides a good answer:

"Walter Page saw things differently when he created the Basie rhythm section. He would constantly tell them to remember that that drum is not supposed to sound any louder than the piano of the unamplified guitar… You listen to Basie's rhythm section – it was all balanced, the drums didn't sound any louder than the guitar, the piano or the bass." (Ramey, 1980)

To bring further balance to the ensemble, the drummer tended to play quarter notes on the bass drum, but lightly, to help the bass sound get bigger and fatter as the bass drum resonance fills out the timbre of the bass. This technique ('feathering') became widely popular and coped with this technical obstacle using a natural and innovative solution.

Another solution incorporated by the bassists was the 'revival' of the Early Jazz 'slap' technique, which gave the bass a more percussive and distinct sound among the other

instruments. This, of course, undermined the musicality of the bass lines, simplifying the note choices. In other words, the role of the bass was oriented to a more rhythmical one, rather than a solid harmonic foundation as we know it to this day, but made the instrument more audible to the audience.

As mentioned in Section 1, the Ellington-Blanton duet recordings are of a major significance in the history of the jazz bass. By adapting the prevailing jazz vocabulary to his instrument, Blanton delivered solos and basslines of such sophistication that they rivalled those of the great horn players of his era. They featured unprecedented rhythmic variety, extensive use of syncopation and exploited an extended range on the double bass (Goldsby, 2002). Although he performed on gut strings with no amplification (but with elaborate use of microphones in the recording session),

Blanton produced long, connected notes and fluid melodic lines in comparison to the shorter 'thump' of his peers. These recordings increased awareness of the bass by presenting it in a more prominent role. Quality of home playback equipment permitted the audience to acknowledge the string bass as a solo instrument too, but most importantly introduced the instrument's capabilities and highlighted its accompanying importance.

Impact of Early Amplifying Techniques on Double Bass Evolution

As the popularity of jazz blossomed in the 1930s, the noisier and larger urban venues led bandleaders to question the viability of the unamplified double bass and consideration was given to technologies introduced to address the problem. Amplification helped mostly in two ways. First, it made the bass more audible, although the sound fidelity of the early microphone and speaker combinations was not rather high. Second, it permitted bassists to engage with the music in a more appropriate way, no longer obliged to play aggressively, and gave them the opportunity to use subtle expressive nuances when it was considered necessary, for example when playing ballads.

Amplification technology gave bass players an increased dynamic and emotional range and more control over their capabilities.

Due to the microphones initially not being able to cover the full frequency spectrum of the double bass, the amplification helped partially but adequately nonetheless. Some issues – still encountered to this day- were the nature of the instrument itself, as the double bass does not focus its sound into an area into which a microphone can be placed. The large body of the bass

also tends to resonate with nearby sounds, making it impossible not to have ‘spills’ from other instruments.

The development of the early piezo-electric pickups did much to increase the signal-to-noise ratio, but unfortunately they produced a sound timbre much different from the natural tone of the unamplified bass. Apart from the signal input, a rather important element is the speaker used to recreate the sound of the double bass, and the primitive equipment used at the time did not produce a satisfying outcome. However, the ensemble’s sound balance was a problem that had been partially solved.

Advanced Innovations and Impact (until 1940)

As technology advanced, inventors focused their efforts in optimizing the overall sound amplification techniques overall, especially those pertaining to the double bass. Following this direction, the Ampeg was a specially designed microphone attached to a bass endpin and placed into the interior of the double bass. It was introduced in 1946 parallel to the ‘Bassamp’ (a specially voiced bass amplifier) and represented one of the first commercial products aimed specifically at satisfying the need for enhancing the double bass amplification. It excluded external sound ‘spills’ from interfering with the bass signal but it lacked in sound clarity, as the positioning of the microphone was not ideal for that case.

Another innovation was the electric upright bass, which was introduced by Vega and Rickenbacker (Hopkins and Moore, 1999) in late-1936: the large body of the double bass, responsible for many of the technical difficulties in isolating and amplifying the sound, was replaced by a slender stick with a much more compact body. This instrument had electronic devices able to amplify the sound more adequately than the traditional double bass, but was received with mixed feelings as many players did were not satisfied with this major change. The electric double bass may had offered a practical solution for live performing but it lacked the authentic sound and characteristic timbre of the instrument and was abandoned by most players.

Impact of the Tape Recorder and Emerging Recording Technologies

Few years later (late 1940s), the tape recorder was introduced into recording studios and it revolutionized the recording process and broadcast industry. Apart from the crucial innovations implemented generally in music by the tape recorder, low-frequency sound was increasing even more in fidelity as production quality erupted.

Another technological development that allowed even further increase of the low-frequencies transferred to discs was the RIAA EQ curve, a worldwide phonograph quality standard which was implemented in 1955. This convention did much to increase the sound quality recorded on the discs produced, using complementary equalization processes for the first time. As playback home equipment was becoming more advanced, producers came to a point where they had to handle the low-frequency spectrum with the appropriate attention. Bass became more distinct and its contribution to the rhythmic underpinning of music became more apparent (Howard, 2009).

This quality boost of the bass frequencies influenced double bass players in many ways. First, there was no longer the need to force their sound as the new media had facilitated their way into bringing a balance via amplifying and mixing. Second, every nuance and expressive element could be easily transcribed both during live performances and the studio recordings, giving bassists the space to experiment on new musicological styles and concepts (as we examined in Section 1) and helping the band in making extensive use of their dynamic range. Moreover, musicians in general had the chance to review their recordings on the spot and decide if they needed to repeat the takes. A new element that emerged was the concept of multi-layering during a piece, allowing players to use two or three separate channels for their musical ideas.

Digitalization of Analog Signal – Double Bass and MIDI

The most recent groundbreaking innovation regarding music technology is the introduction of MIDI (Musical Instrument Digital Interface) in 1983. MIDI protocol was developed as a means of communication between synthesizers from different manufacturers and initially was used primarily to achieve more interesting and complex timbres. In time, however, it became increasingly employed in music production, where synchronization is involved. This technology gave producers the opportunity to augment the parts of an arrangement in an effortless way and with low production cost. The MIDI protocol also emancipated the composers' work, as they became more complex and multilayered.

Regarding bass playing, Marcus Miller made extent use of the multi-track and MIDI technology in his record "Tutu Revisited" (2011). During this recording, Miller employed multiple bass playstyles that appear in a variety of less conventional applications. In song "Tomaas" a number of independent bass tracks are assembled into tightly layered

performances, using bass overdubbing of melodic lines, percussive string ‘slaps’ and ‘pops’ as well as walking bass parts.

It is obvious that the practical and technical benefits of MIDI are invaluable and countless. As the application of MIDI-based technology grows, the search for new innovative sounds and contexts has become a primary goal for musicians. The experiments in tone color and sound generation can bring countless valuable results, but on the other hand, this also underlines the appreciation of the subtleness and nuances already present in the timbre of acoustic instruments, such as double bass.

Regarding the double bass accompaniment, the ‘walking bass line’ had been widely established as a basic element of the jazz aesthetic, as the high quality recordings and performances had given the audience a clear picture of the musicological aspects of this musical attribute. Along with the rest of the rhythm section, bass players’ possibilities became almost infinite as the older technical restrictions and boundaries no longer existed. Bassists (like LaFaro, Mingus, Haden and many more) took the chance to experiment even further in broadening the harmonic landscapes, providing elements of atonal, free jazz and avant-garde nature to the music.

Future innovations include further optimizations of the technologies described above. The piezo- electric magnet, amplifier and microphone, they all have evolved much since, providing the players with invaluable tools to realize their artistic endeavors and aspirations.

To summarize, the importance of technology to jazz music, and to double bass in particular, is apparent. All these technological innovations described enriched the public’s perception of the double bass and brought a deeper sense of artistic fulfillment to bass players through the facilitation of their efforts. Bassists had acquired a more sophisticated and emancipated role within the rhythm section and technology had made its part to accomplish that.

3 Performance

The group formed for the performance part of this thesis will be a piano jazz trio (piano, double bass, drums). Both compositions performed are thoroughly described below.

- **Blue blues – Panagiotis Charalampopoulos (original composition)**

The first performed song is a 12-measure major blues in the key of F, chosen as a tribute to all the great bassists that have influenced jazz as we know it. The turnaround utilized is the standard "V/ii – ii – V – I" turnaround which is widely used in jazz blues compositions. The concept of the composition is influenced by "Whims of Chambers" of Paul Chambers Sextet, as it is a composition showcasing the jazz double bass.

The leading melody is performed on the double bass and has several rhythmic accents based on jazz articulation vocabulary, while the piano emphasizes on these accents in a chordal and counter-melodic improvisational way. The drummer uses brushes to accompany the piece. It is a traditionally approached arrangement with a minimalistic feel throughout its performance.

The head-in melody will be performed by the double bass, as mentioned, and the piano will take a solo afterwards. Then, the double bass will be recorded live using a looping and flanger effect, playing harmonics as a pattern to create a foundation on which the double bass solo will be built. After 4 choruses of bass solo over the looped passages, the solo will be climaxed to a C pedal, leading to the head out which will be toned down dynamically.

Interaction will be encouraged for all three musicians that will perform Blue Blues, focusing on giving space one another for spontaneity and improvisation on spot. Despite the use of new technologies, the aesthetic direction of the arrangement will be kept true to the traditional jazz standards throughout the whole performance.

- **Lonesome Lover - Max Roach**

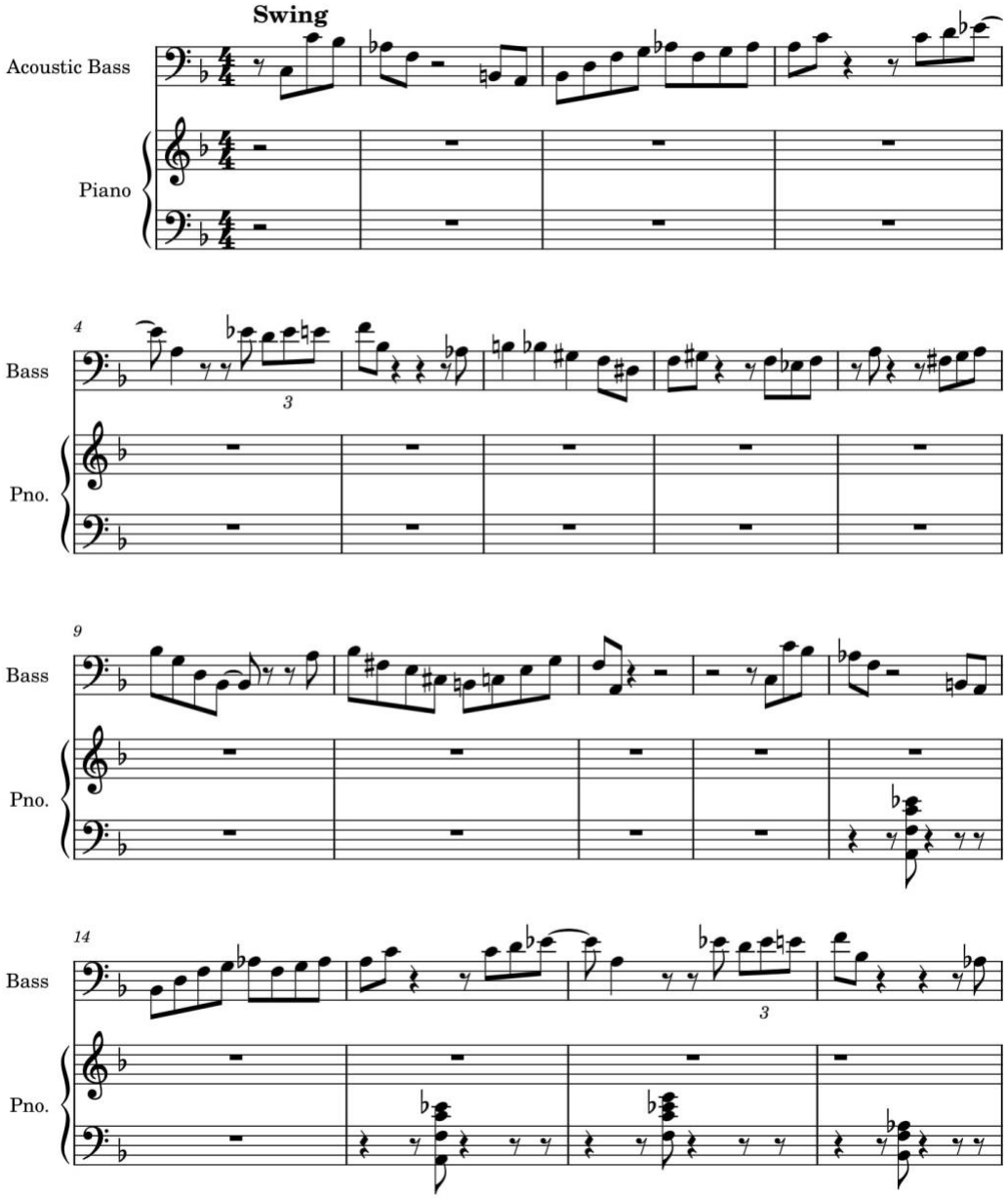
"Lonesome Lover" is the last track of the record titled "It's Time", by jazz drummer Max Roach. It was released in 1962 on 'Impulse!' Records and features trumpeter Richard Williams, tenor saxophonist Clifford Jordan, trombonist Julian Priester, pianist Mal Waldron, bassist Art

Davis, and a vocal choir conducted by Coleridge-Taylor Perkinson. “Lonesome Lover” also features singer Abbey Lincoln, with a characteristic performance of her caliber.

Although its jazz context, “Lonesome Lover” maintains a simple harmonic progression following the AABA jazz form. This simplicity is reflected upon the leading melody as well, with extensive use of the blue note and laconic yet clear musical phrases. In specific, the A parts of the form are characterized by both motivic development and call-response succession. This will be explained over the first A of the form: a motif (measures 1-4) which is then followed by a variation of the same motif (measures 5-8), then the initial motif repeats itself (measures 9-12) which is answered by a conclusive musical phrase (measures 13-16). That conclusive phrase can be considered as an ostinato, as it is performed 3 times in the head-in. The use of call-response and blue scale are characteristic elements of the jazz tradition, which along with the overall aesthetic of the recording act as a revival of the first Work Songs of the 19th century. Last but not least, the choir combines smoothly with the aesthetic direction of the group, often giving an otherworldly feeling throughout the recording.

The melody on the A’s of the head-in will be performed by the double bass, while the piano will take lead on the B part as the double bass with the drums will start playing walking bass with a swing feel. All three musicians will have a solo part (piano, double bass and drums) and the performance will finish with a head-out and a small ritenuto at the end.

Blue blues



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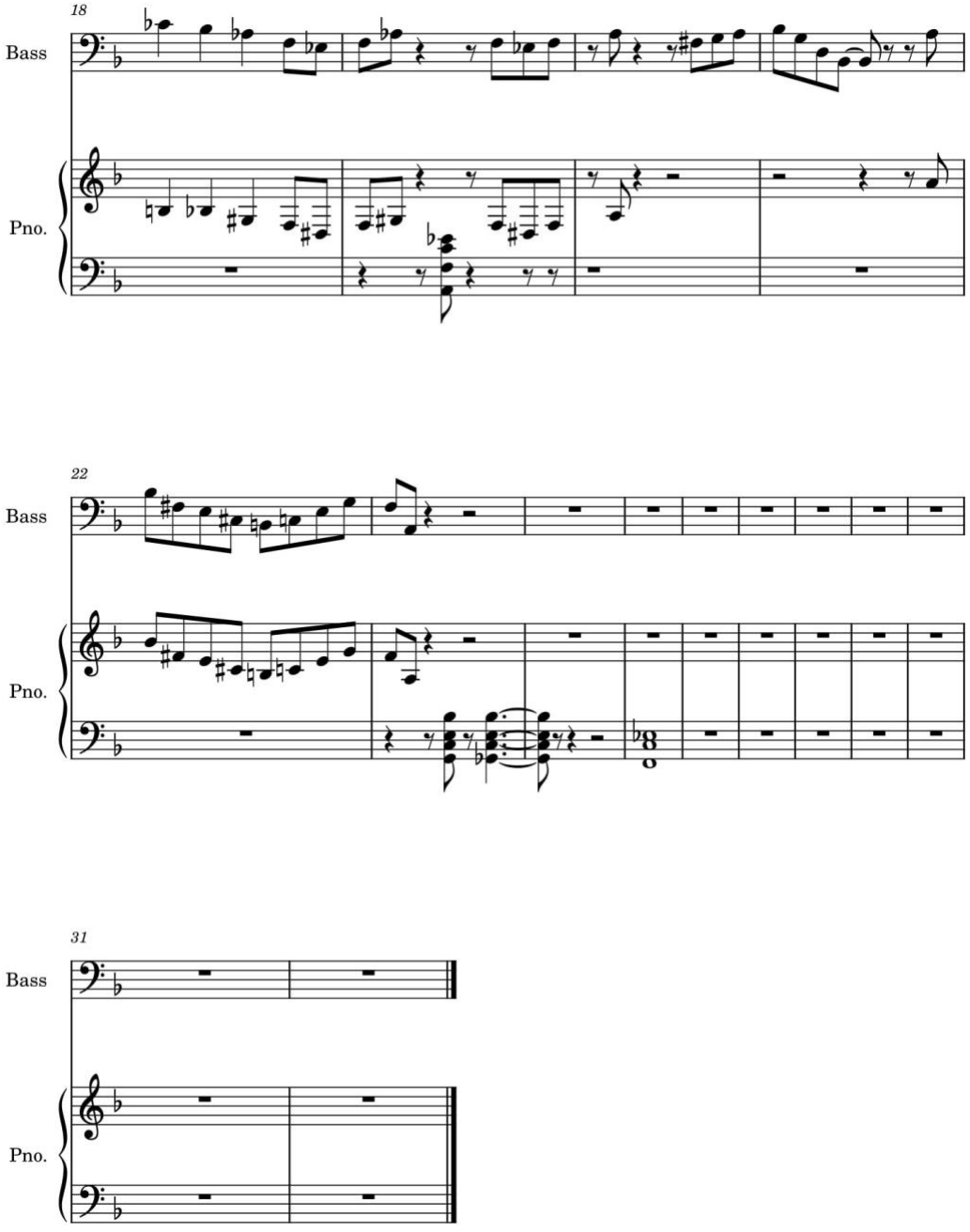
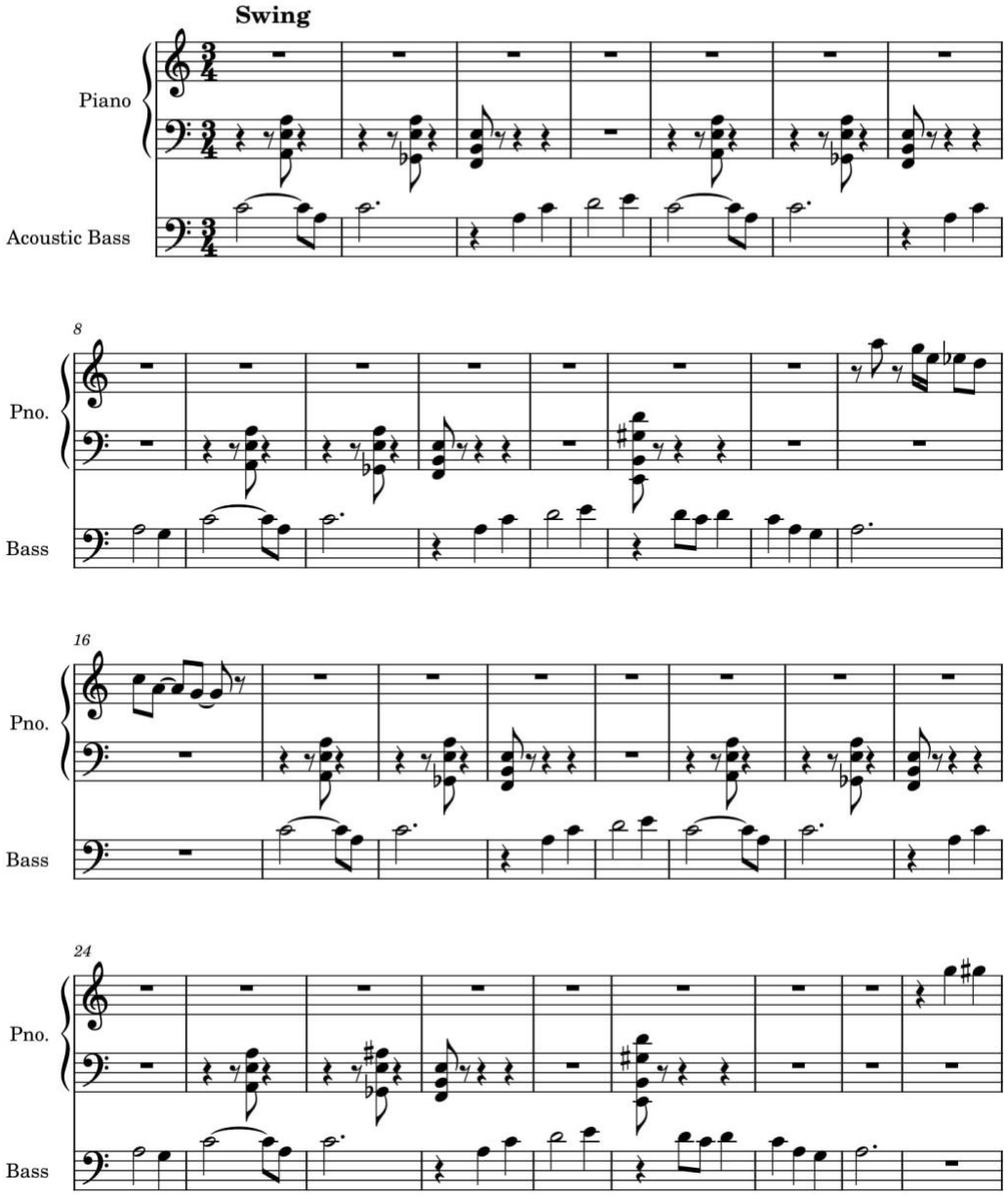


Lonesome Lover

Max Roach



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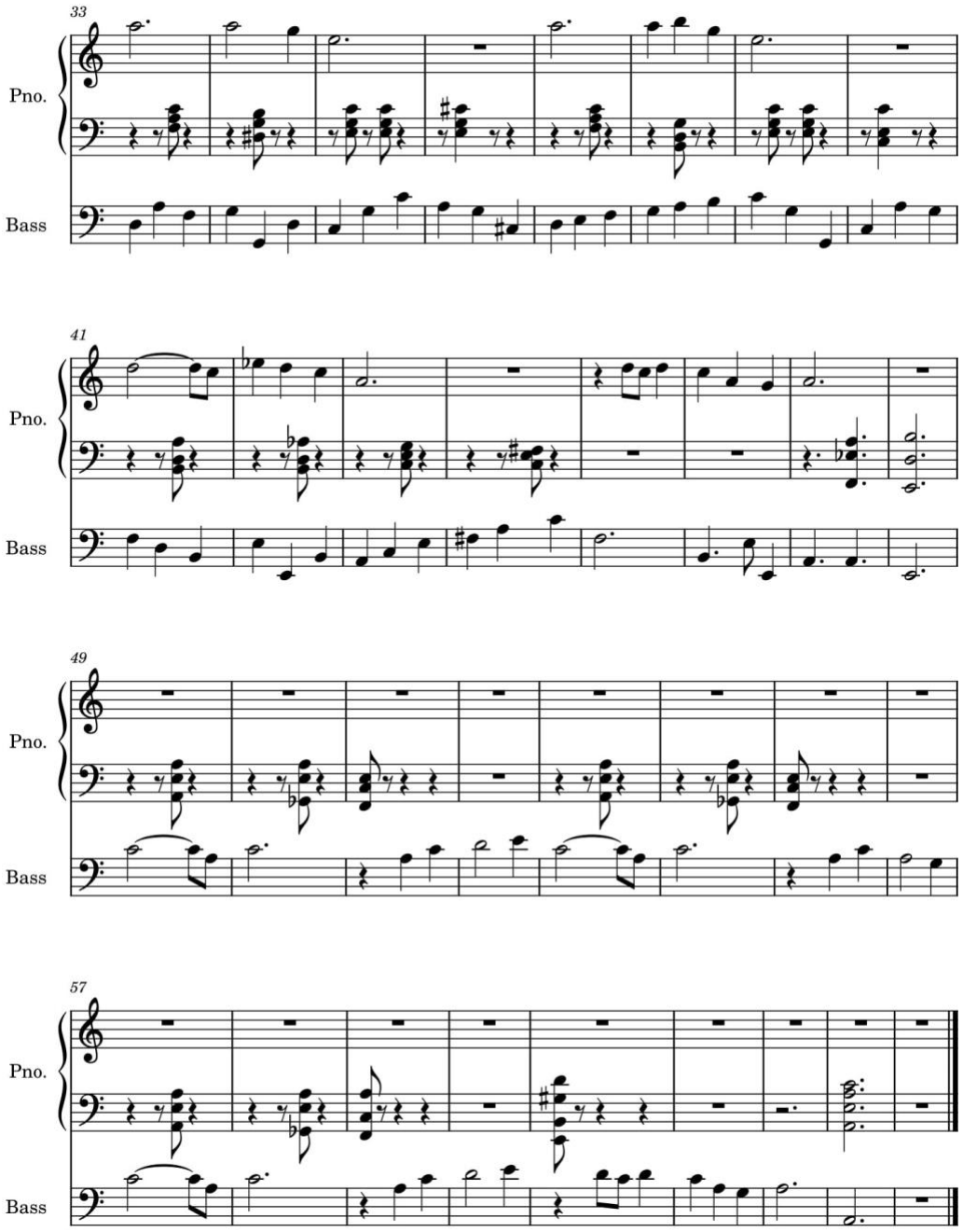

4 Conclusions – Discussion of New Aesthetic Directions

The double bass is a rather versatile instrument and can be included in many musical concepts and genres. In jazz, its role and significance has evolved parallel to the technologic advancements of the 20th century as we've examined in the previous Sections.

The standard techniques and 'fundamentals' established on every era's playstyle include multi-cultural elements and have always been applied according to the recording and performance media available at the time. The sound produced by the instrument itself is naturally rich in harmonics and overtones, therefore the appliance of new recording and performance media has always revealed unexplored and fascinating artistic territories.

Regarding the jazz idiom, the main elements of that music (syncopation, swing feel, music interaction, improvisation) can always be developed further, with the appropriate respect to the roots for each circumstance.

In this Section new possible directions are going to be reported for future notice. Of course, many of these techniques have been applied, but focus is set on the establishment of new jazz sub-genres or idioms overall.

Timbre

Emerging technological advancements regarding the timbre have opened a whole new world to musicians, giving them the opportunity to alter their sound completely, according to their artistic aspirations and needs. The instruments tend to become just the source of sound, departing from the natural timbre of the instruments –if needed.

For the double bass as an accompanying instrument, there are many ways that timbre can become an extra element of the creative process. Bassists now have the opportunity to explore and simulate imaginative ways to modify the instrument's timbre in a way that they can provide new timbres, shifting the background of a composition and setting an innovative soundscape during a solo or an improvisational piece. During that shift, the playstyle may vary: from the traditional 'walking bass line' to an arco-based harmonic foundation. The choices are unlimited and everything depends on the artistic context of each musical project. Some prominent examples of experimentation regarding the timbre of double bass come from the modern jazz scene (GoGo Penguin, Bad Plus, Kamasi Washington, etc.).

Harmonics and Overtones

The double bass is an instrument that can produce sound in numerous ways. Within or even beyond the fretboard, the sound outcome may vary according to the player and his or her imagination. Even in that context, the appliance of the right hand (pizzicato, arco, etc.) is of a major importance to the sound outcome.

With a further use of effects (such as delay, chorus, reverb, and more), the bassist's expressive palette widens in a spectacular way. Thus, the double bass may provide new textures, each one with a different timbre, attack, sustain and decay. Players have the option to enrich their instrument's harmonics, not necessarily in the 'walking bass' context and produce embellishments via overtones or harmonics amplification. Maintaining the jazz identity using these tools is once again up to the player and constitute a debatable matter.

Loopers

Considered an extension of the delay effect, looping has become a very useful tool to every musician of the 21st century. Setting up a multi-layered harmonic foundation based on repetition is a crucial element for many genres of today's music.

As for jazz, this tool may initially seem limiting and harmonically poor, but recent works especially by solo artists have proven to reveal unexplored areas in the expressive spectrum. In European Jazz (e.g. ECM recordings) the use of repeated patterns and building on a simple harmonic basis up to complex multi-layered soundscapes, has gained popularity over the past years.

This element also gives the opportunity for small ensembles to enrich their live performances with extra musical elements, creating numerous melodic, harmonic and rhythmic patterns merging with each other.

General Conclusions

All these new media described above are few of the many tools available today, which provide musicians with an ever-growing set of expressive devices. Arising bassists have the opportunity to assimilate new technological advancements and combine them with the traditional fundamental knowledge that has rendered jazz as a genre with such significance both culturally and artistically. However, any deviations from the roots may occur at the player's will.

The wide availability of high-quality sound equipment has made all these tools available to every musician, and is of high importance for the musical outcome overall. Especially in this

age, where remote music performances have become extremely popular due to the Covid pandemic, technological equipment is a necessity for everybody involved in the music industry.

The possibilities are countless for current and future musicians: the artistic directions disclosed in the implementation of new technologies to traditional and existing elements are unfathomable. The history of jazz so far, has proven that the continued evolution of jazz in all its artistic aspects is inevitable and ever-promising.

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