


# Identifying New Parameters Informing the Relationship Between Silence and Sound in diverse musical performance practices and perception

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## ABSTRACT

While it was Cage who foregrounded the significance of silence as an act in his groundbreaking composition 4'33", it was Miles Davis who made the performative value of the silent space or absence of sound even more explicit when he drew attention to the notes one does not play. This article examines the significance and role of silence in music. However, a number of questions remain about how musicians use, perform and understand silence in relation to sound and how silence potentially plays a role in the listener's perception of the player's authorial or expressive voice. The aims of the study reported in the article were threefold: (i) to identify how silence is manifest in performance practice; (ii) to identify whether silence in a musical excerpt can affect the listener's perception; and (iii) to further our understanding of the role of silence as a parameter of performance creativity. We explored the ways in which two musicians perform silence in relation to sound, Miles Davis in *Round Midnight* and Glenn Gould in the *Aria* from Bach's *Goldberg Variations*. We made qualitative analyses of transcriptions of their recordings and conducted an online survey of listeners' perceptions of the difference between two recordings of the same piece played by the same performers. Converging evidence from an interdisciplinary literature review and the empirical studies identifying new parameters informing the relationship between silence and sound in diverse musical performance practices and perceptions will be discussed along with implications for new conceptualisations about how silence acts relationally to sound in performance practice.

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## 1 Introduction

Modernist composers such as Anton Webern and Salvatore Sciarrino have scrutinised silence, seeing it in intimate relation with sound or, as with John Cage, have sought to erase the line between silence and sound and thereby between music and sound (Metzer, 2006). The COVID-19 pandemic and the impact of lockdown strategies across the world has given an even greater significance to studies, such as the present one, that attempt to engage with the salience<sup>1</sup> of silence. As performances in the presence of physical audiences have ceased, musicians have sought to develop new ways to create and share music with listeners, taking innovative approaches to spanning the gulf of silence. Along with finding ways for music to be heard, musicians have also needed to cope with the experience of playing to virtual audiences, where the absence of the physical presence of listeners has exposed the significance of the shared silences embodied in performance.

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<sup>1</sup> The state or condition of being salient (or relationally significant).

In the intimacy of silence and sound, the fine line between the interior of a person and the exterior social world is a space of silence that for the composer Luigi Dono carries deep feelings, and for Salvatore Sciarrino, madness and spirituality (Metzer, 2006).

In Indian classical music, there are pauses and interruptions, but the sublime moment of silence is a heightened moment of acute senses, a moment of suspended animation, when time seems to stand still. The pause in Indian classical music is an opportunity for the artist to do something new, something fresh, something of higher quality; it evokes a heightened sense of anticipation in the listener, priming them to form a heightened state of listening, whereby the pause can be a spectacular entry or a glorious interruption.

Whether improvised or notated, silence is not an absence of music; silence is directly related to sound, a formative element of music involving “the coordination of sonorities and silences” (Clifton, 1983, p. 163). Music psychologists recognise that the silence between notes may be as important for what makes music as the notes themselves, and they have investigated empirically how silences affect the perception and experience of music, for example, in anticipating the end of a phrase or perceiving a dramatic moment, by experimenting with the placements of silences and their lengths (Margulis, 2007).

Yet, despite rich historical and cultural depths of expressing silence in music, silence tends to be defined in the West as “the absence of sound” (de Visscher, 2014, p. 197) and is often signalled by the instruction that an instrument should not play or a voice should not utter. This suggests a simple relationship between sound and silence, a binary that privileges sound (e.g., playing) over silence. This relationship is rendered more complex when we consider other terms that are used to represent a silence in music, for example *rest* and *pause*, which differ from *tacet*, which is the instruction not to play at all. A rest is a notational device indicating silence for a specific duration of time, the signs for rests correspond to the duration of notes. A pause is defined as “a short silence”, indicated by a sign placed over a note, chord or rest which “is to be prolonged at the performer’s will” (Scholes, 1964, p. 433). The composer Harrison Birtwistle (personal communication with N. Sorensen, November 1, 2019) sees a distinction between a pause and a silence in which the difference has to be felt, as it cannot be prescribed.

From the arts we gain further richly complex understandings of the role of silence in creative processes: silence *suspends time* and opens dialogic spaces for contemplation with others and with self; silence is *flow*; silence can *extend movement beyond the moment*; and silence is *flexible*, available for many possible meanings in reciprocity with words, actions, and sounds. These may be added to the parameters of silence in music.

In sum, silence is much more than the simple absence of sound. These parameters of silence in creative performance drawn from literature, painting, dance, theatre, tea ceremony, and music, are recognisable across these diverse creative practices and cultures, and offer fertile ground for investigating musicians’ use, performance and understanding of silence in relation to sound, and the potential role of silence in the listener’s perception of the player’s creative and authorial, expressive voice.

In the 20<sup>th</sup> century, John Cage foregrounded silence as music, most famously in his composition 4’33” in which he positioned silence as a creative force. In the discussion that follows, we reflect on the conceptual perspective of John Cage (1994), who questioned the binary distinction between silence and sound, and in contrast, the jazz musician John Stevens (1985), who proposed that music and silence are equal and opposite, so as to interrogate the mechanism of silence in the context of music and performance practice and discuss how silence can be manifest, intentional or unintentional, relational, collaborative, and underpinned by the musician’s authorial voice.

Characterising the salience of silence in relation to sound, as evidenced in diverse practices, requires attention to:

- a) the particularity of the space of silence in music;
- b) the localisation of silence and sound in physical and perceptual space; and
- c) the creation of senses of virtual space and sonic-spatial movement and evolution both between and within sound objects.

While silence has been treated as a quite uniform entity in musicological studies, the complex structure of sound and silence gives rise to a number of different kinds of questions about how silence is put to work in different performance practices. For example, and elaborating further from the previous questions, what differences are there between compositional-based performances, as found in Western classical music, where silence is largely determined by the composer prior to the performance, and jazz performance practices (which are improvisational) where silence can be utilised by the performer in the moment?

This suggests that the different parameters of the performance of silence, such as temporality, spatiality, interpretation, intentionality, and non-intentionality are present in both scripted (compositional) and unscripted (improvisational) performance practices; however, the extent to which they give agency<sup>2</sup> to the performer is a matter of degree. We can hypothesise that in the case of scripted performance there would be less variation in the location and duration of silence in relation to sound, whilst there would be a greater variation in unscripted music; furthermore that, as listeners, we have expectations of these relations, which affect our perception and experience of the qualities of the musical performance and its meaning.

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<sup>2</sup> Agency: the capacity to act or take action according to the conditions of a given environment (Sorensen, 2014).

## 2 Problem Statement

There is a tension at the heart of the discourses that characterise the relationality between silence and sound. First, there is the binary approach, which perceives silence simply as the absence of sound, which we call the *tacet* perspective, and which privileges sound (i.e., playing) over silence (i.e., not playing). Second, there is the perception that sound and silence have an equal relationship. Central to this performance practice is the aim to make musicians aware of the silence into which they are placing their sounds. The third view is that temporal silences act as structural frames within which music can exist. The score no longer represents the musical ideas heard and intended by the composer but delineates a time frame within which sounds may occur.

The relationship between sound and silence is clearly fundamental and central to the way that we perform and perceive music. This leads us to the question of how we pinpoint the manifestation of silence in diverse performance practices as an expressive parameter that contributes to the formation of an authorial voice or performance creativity.

## 3 Methodology

After sorting and sifting the characterisations of the relationship between sound and silence from the literature review, we designed an exploratory mixed-methods methodology from which to gain a greater understanding of the varied manifestations of silence in the practice and perception of real-time and recorded performance across two contrasting performance practices. These performances were selected on the basis that they lie at opposite ends of the continuum between improvisation and composition. Improvisation is represented by a live jazz performance and composition by a performance of Western classical music created in a recording studio. We used qualitative analysis to examine the way in which silence has been manifested and how it contributed to the authorial voice of two iconic musicians, the jazz trumpeter Miles Davis and the classical pianist Glenn Gould. In accordance with Stevens' and Cage's notions discussed above, we sought to illuminate the issues that deal with aspects of silence that, on the one hand, provide an individual space to the audience but also, on the other hand, create a unique environment for the performer and contribute to their own authorial voice as performers. We then took a quantitative approach by conducting a field trial in the form of an online survey of listeners' perceptions of the difference between two different recordings of the same piece played by the same performers. Here, we tested the hypothesis that silence plays a role in the listener's perception of the player's creative and authorial voice.

The purpose of the qualitative analysis was to understand the contribution silence makes to specific musical performances and how this is utilised by particular performers. Our choice of the jazz trumpeter Miles Davis and the classical pianist Glenn Gould was based on the general acceptance that both of these musicians used silence in ways that contributed significantly to the audience's experience of the piece as well as to the performer's authorial voice.

### 3.1 Materials

For each of these musicians a signature piece of music was selected, where multiple performances allowed comparisons to be made. In the case of Miles Davis we chose the tune *Round Midnight* and for Glenn Gould his performances of Bach's *Goldberg Variations*. We sampled an eight-bar extract from each piece for detailed study. For *Round Midnight* we selected the first eight bars of the theme (i.e., the first iteration of the A section of the tune) as this short extract provides an excellent example of Miles's rubato playing in his live performances in which he uses silences to stretch the time frame of the theme. For the *Goldberg Variations* we selected the first eight bars of the opening Aria as this also provided a similar use of space, which was not afforded in the subsequent complex and busy variations. The clarity and calmness of the Aria matched the quality of the statement of the *Round Midnight* theme. A comparison of the two studio recordings of the *Goldberg Variations* seemed an appropriate choice for the study of salience of silence given that the tempo of the 1981 performance was radically slower.

We specifically selected the first bars as openings are important for establishing one's authorial, performative voice and both represent signature musical performances for Gould and Davis. As this was an exploratory study, we chose to analyse only eight bars. However, the analysis of those eight bars allowed us to make meaningful analyses of and insights into two excerpts.

### 3.2 Procedure

For the three Miles Davis recordings the analysis took the form of repeated listening to the three samples, the first eight bars of the theme statement, in order to transcribe the trumpet part. Once the transcriptions had been completed the recordings were

listened to again to check the accuracy of the notation, giving particular attention to the silences between the phrases and to the silences, or pauses, within the phrases. A comparative analysis was made between a studio recording made in 1956 and two live performances in 1967 in order to determine similarities and differences.

The recording files were then transferred into Audacity<sup>3</sup> software in order to obtain a visual display of the soundwaves, which allowed the length of the silences when Davis was not playing to be determined precisely. Screen shots of the Audacity-derived soundwaves were then taken and the transcriptions were rewritten, aligning each note with its corresponding soundwave in order to provide a visual comparison.

A similar process was used to analyse the Glenn Gould samples, taking into account that these performances were based on an interpretation of a written score. Gould's performance aesthetic aimed to create an accurate representation of the composer's intentions; therefore, Bach's written score was copied out and the notes were aligned with the Audacity screenshot.

As argued above, the patterning of silent segments within a musical piece may play a crucial role in the performer's performance practice and the listener's perception of the player's authorial voice. We sought to further examine this effect in the Glenn Gould and Miles Davis excerpts presented above. To this end, we produced a short online survey. The survey was implemented using a voluntary response sampling technique, mainly through social media platforms and email lists used to spread the link to the online study. The ethics committee of the University of Haifa's Faculty of Social Welfare & Health Sciences granted ethical approval for the study. We targeted individuals with and without formal musical experience, defined as formal musical training received from elementary school age onwards, in order to obtain the broadest possible response and to be able to make connections between the results of the study and musical expertise. We collected responses from 193 adult individuals ( $M_{\text{age}} = 43.2$  years,  $SD = 12.6$  years, age range: 18–76 years; 118 females;  $M_{\text{formal music experience}} = 13.9$  years,  $SD = 11.8$  years, formal musical experience range: 0–56 years). These participants listened to two different performances of Glenn Gould and Miles Davis as described above (Gould: Bach's Aria from the *Goldberg Variations* and Davis: Round Midnight), without being told the identity of the performers. After the presentation of the two versions of each piece, participants were asked to state whether the identity of the performer in the two excerpts was the same or different and to rate on a scale from 1 to 5 the speed (1 = *slow* and 5 = *fast*), quality (1 = *bad* and 5 = *excellent*) and their experience of being moved by the performance (1 = *indifferent* and 5 = *highly moving*).

The findings of the two phases of the study were then triangulated in order to articulate the relationship between sound and silence in the perception of performance creativity (Burnard, 2012).

## 4 Results and discussion

### Qualitative Phase: Analyses of Miles Davis and Glenn Gould

#### *Analysis of Miles Davis's Performances of Round Midnight*

Round Midnight is a 32-bar ballad composed by Thelonious Monk in 1943. Miles learnt the tune from Monk in 1945 and he made his first studio recording of the tune in 1953. The tune became a staple of Miles's concert repertoire until 1969 and became closely associated with him following his performance of Round Midnight at the 1955 Newport Jazz Festival, which led to a recording contract with Columbia Records. The studio recording made on 10 September 1956 became the title track of his first Columbia LP, known as the "consensus classic" (Blumenthal, 2000). We used this recording as a benchmark to compare and contextualise two live performances recorded on Davis's 1967 European tour: concerts on 31 October in Stockholm, Sweden and 6 November in Paris, France.

#### **Example 1: Studio Recording, 10 September 1956, the Consensus Classic.**

As the title track of Miles Davis's first LP for Columbia Records, this version is probably the one that his audiences would have been most familiar with. The performance is played at a consistent tempo of 67 bpm throughout, and Miles adapts Monk's original tune, omitting (i.e., silencing) some notes of the original composition. This is most noticeable in the omission of four notes at the end of the first phrase (P1) and the way he simplifies the chromatic pattern at the end of the second (P2). This personalisation of the theme is a significant characteristic of Miles's authorial voice. The eight bars consist of four phrases (P1–P4) and there are two characteristic ways in which he uses silence. First, by leaving out notes at the end of the phrases Miles accentuates the silence *between* the phrases and second, in P2 and P4 he inserts small silences within each phrase. The rhythm section consisting of piano, bass, and drums accompany his statement of the theme.

<sup>3</sup> Audacity is an open-source digital audio editor which provides a visual representation of audio waveforms (<https://www.audacityteam.org/>).



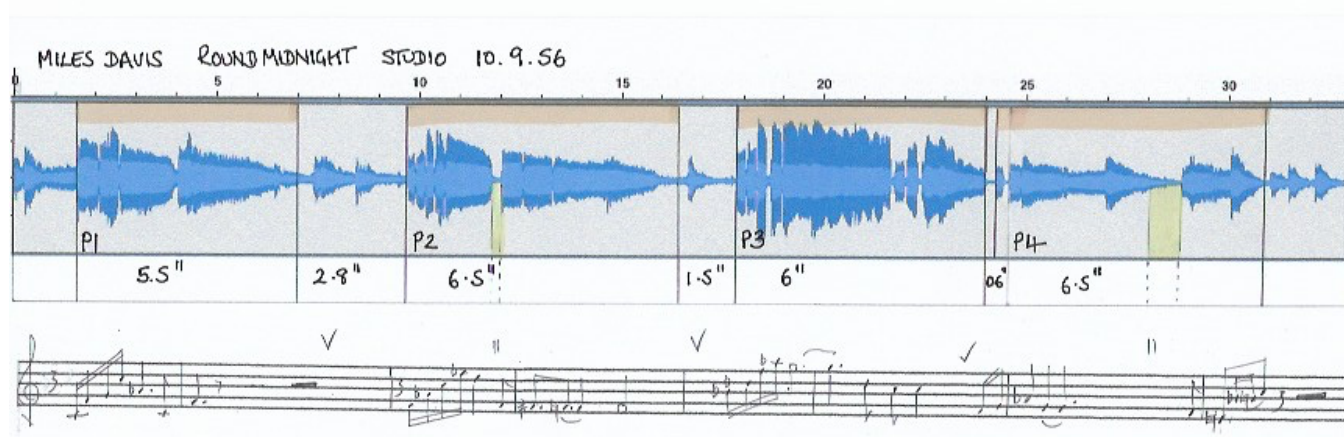


Figure 1. Transcription and Audacity File of Round Midnight Studio Recording, 10 September 1956.

## Example 2: Live recording, 31 October 1967, Stockholm, Sweden.

By the time Miles came to give these concerts the personnel in his band had changed, as had his performance practice in concerts. Wayne Shorter (tenor saxophone), Herbie Hancock (piano), Ron Carter (bass) and Tony Williams (drums), known as the Second Great Quartet, had “become almost too accomplished at playing Miles’s classic repertoire – still the same old Round Midnight, Funny Valentine and So What” (Mercer, 2004, p. 108). The solution to this situation was provided by the drummer, Tony Williams: “Hey what if we made *anti-music*. Like, whatever someone expects you to play, that’s the *last* thing you play” (Mercer, 2004, p. 108). This approach, tested at the Plugged Nickel club in Chicago in December 1965, set the parameters for Miles’s performances for the quintet for the rest of the 1960s. This approach defined the performance aesthetic for small group jazz since then (Mercer, 2004), making innovations that remain fundamental to small group improvisation today.

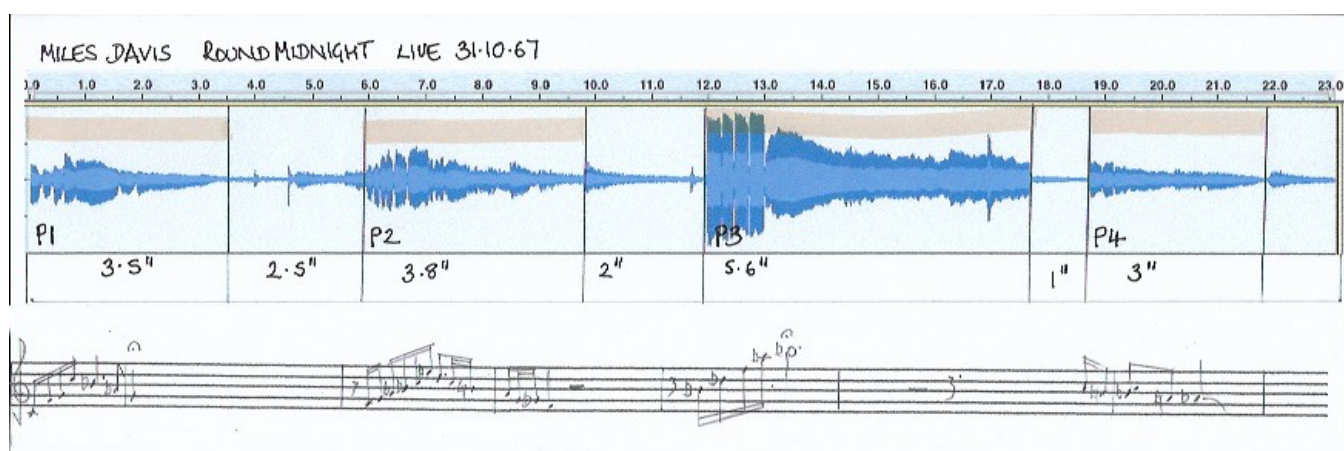


Figure 2. Transcription and Audacity File of Round Midnight Live Recording, 31 October 1967.

In this example Miles plays the theme out of tempo, very freely and accompanied only by pianist Herbie Hancock whose subtle and remarkable improvisations fill the spaces, or silences, between the phrases; the bass and drums are *tacet*, waiting to come in when the theme has been played. Miles makes the most of the gaps between the phrases, taking his time over the statement of the theme. On the one hand, there is a further simplification of the tune, which is particularly noticeable in P3 and P4. On the other hand, he embellishes P3. The use of silence gives the perception that Miles is taking his time in playing the tune; the silences suggest an openness and freedom that is emphasised by his minimal exposition of the theme. It is this sense of holding back, of playing the bare minimum of notes, of exploring the silences, that contributes to the aura of Miles Davis as a performer.

## Example 3: Live recording, 6 November 1967, Paris, France.

The third example, performed six days later, shows how the overall architecture and approach to the tune was being adhered to. The silences between the phrases establish the sense that Miles is taking his time, reflecting on every note. The introduction of a small silence in P1 breaks the phrase up and contributes to the improvisatory feel of Miles playing. This small addition does give the sense that every night the performance was different.

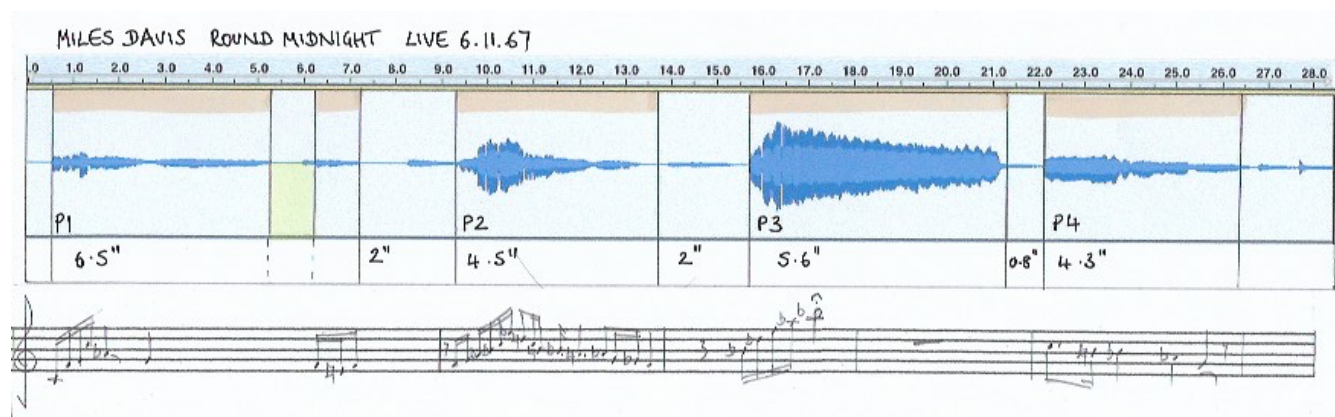


Figure 3. Transcription and Audacity File of Round Midnight Live Recording, 6 November 1967.

### Summary

These three examples illustrate how silence was used by Miles Davis and how it contributed to his authorial voice. His deliberate use of silences between phrases (especially in concert performances) created the perception of being in the moment; by taking his time with the tune, he established control over the musical moment. This created a sense of expectation and tension, making the statement of the theme dramatic. This contributed to the sense of Miles's authorial voice. Silence gave Miles thinking space, so that he could play the tune differently and not rely on patterns or phrases that he had used in the past. This is evidenced by the small adjustments that he made to the theme which put him into a different space. In Example 3, the opening arpeggio, which as written rises and falls, rises up to a note an octave above the starting note. Furthermore, the addition of small silences within phrases is a device to provide variation to Miles's statement of the theme. The transcriptions show the process of reducing the tune to its essential elements, as seen when we compare the studio version with the live recordings, by omitting or silencing inessential notes. There was relatively little variation between the notes that he played in the two live performances. A sense of improvisation was achieved through what he omitted to play, an approach that runs counter to what other improvisers might do, which is to embellish and add to the tune. It is interesting to note that the time Miles took to play the phrases and the length of silences between the phrases was longer in the studio performance whilst the sense of the use of silence was increased in the live performances.

For Miles Davis, silence was a purposive performance act, contributing to his authorial voice, derived from his interpretation of the theme, which was an adaptation of Monk's composed version, and re-adaptation (see variations in Figures 1, 2 and 3).

### Analysis of Glenn Gould's Performance of the Goldberg Variations

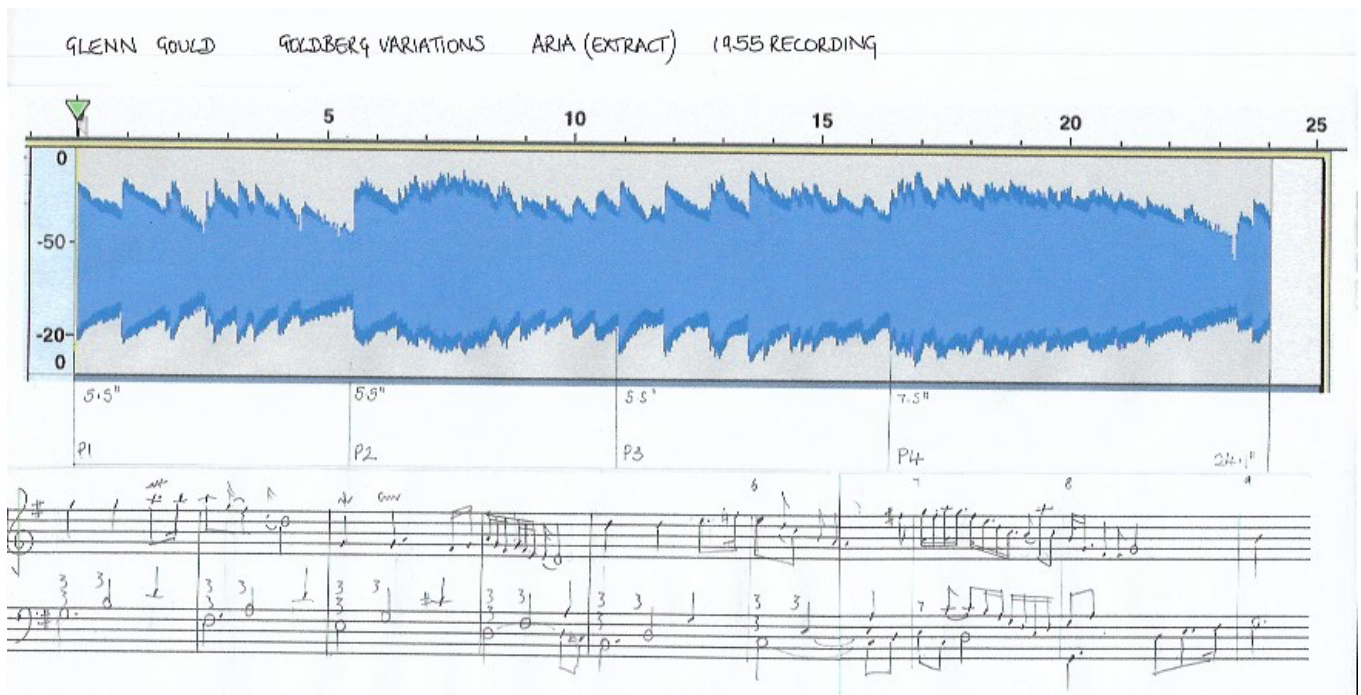
We selected the first eight bars of Glenn Gould's playing of the Aria from the *Goldberg Variations* for analysis, as shown in Figure 4.



Figure 4. Unit of Analysis from the Goldberg Variations.

Two performances of this extract were compared in order to determine how silence informed Glenn Gould's authorial voice. The two performances are from 1955 and 1981; both are studio performances and the final versions of each were compiled from multiple takes. They offer "piano playing of astonishingly high musical and technical order. Both performances are acts of profound artistic creativity" (Clements, 2002, p.24).

**Example 4: The 1955 Studio Recording.** This earlier recording of the *Goldberg Variations* in 1955 established Glenn Gould as a pianistic force with exceptional gifts. His performance of the entire work took 38 minutes and he omitted all of the repeats. Gould made 21 takes of this opening aria before he was satisfied.



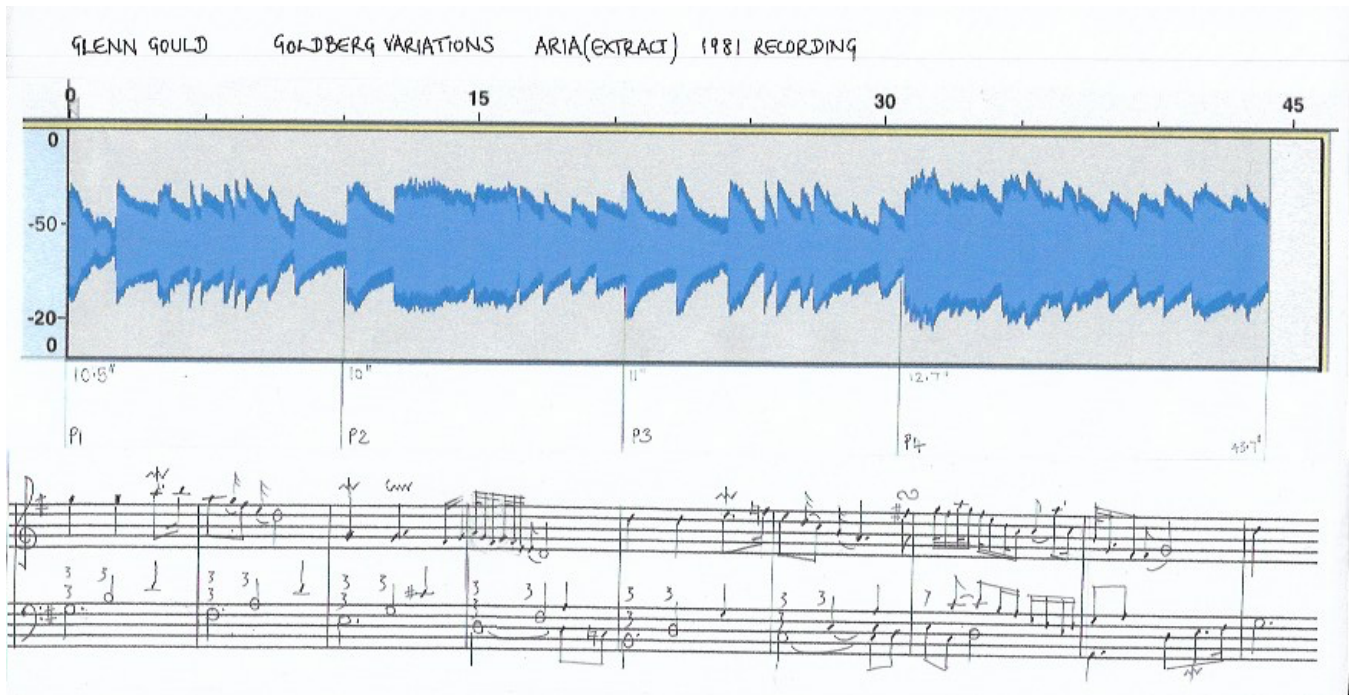
**Figure 5.** Transcription and Audacity File of Goldberg Variations Aria, 1955 Studio Recording.

This earlier recording acts as a benchmark for comparison with the later version. The extract is characterised by an absence of explicit silences. There are appropriate breathing points between each phrase but these are not accentuated. The extract is played at a brisk tempo and, consequently, there is no sense of space or silence. Its duration is 24 seconds.

### **Example 5: The 1981 Studio Recording.**

This recording was made on Gould's last visit to a recording studio and released in September 1982, days before he died. This performance of the *Goldberg Variations* lasts 51 minutes and includes some but not all of the repeats.





Gould adopted a significantly slower tempo for this performance. The duration of the extract is 43.7 seconds, nearly twice as long as the earlier version. The slower tempo gives each note a greater significance, especially in bars 1, 3 and 5, and there is a careful placing of the notes. Greater attention can therefore be given to the detail of the music; for example, the articulation of the embellishments and ornaments, such as the inverted turn in bar 3 and the lower mordent in bar 8, and the harmonic movement, such as the move from D<sup>7</sup> to G major in bars 4–5).

Gould's approach to interpreting Bach's music is concerned with aligning his performance with Bach's intentions. In this respect he represents an opposing view to Cage's, which acknowledges and accepts non-intentional sounds. However, Gould's habit of singing along with his playing does offer an unintended contribution which will not have been ignored by listeners influenced by Cagean perspectives.

## Summary

The purpose of this qualitative phase of the study was to identify how silence is manifested in two contrasting performance practices. We can summarise our findings on sound and silence as follows:

1. Miles Davis and Glenn Gould have different approaches to the way that silence is used. These differences appear to stem from different performance practices that are grounded in aesthetic judgements relating to the agency that each musician allows themselves in relation to dialogue and interpretation.
2. Miles Davis's performance practice appears to be primarily concerned with his own sound, interpretation, and aura as a jazz musician. The intentionality underscoring his performance practice appears to have a unique quality informed by in-the-moment decisions that mark each performance out as being different from previous performances, allowing him greater interpretative leeway, which includes permission to adapt the tune. Glenn Gould's performance practice, by contrast, is also concerned with interpretation but this is confined within the parameters established by the composition, which provide limited opportunity for adaptation.
3. Miles Davis, as an improvising musician, appears to be able to create new silences that were not in earlier performances. These seem to be made in the moment by sensing when silences can interrupt the temporal flow. This creates anticipation and tension within the music. These could be called macro-silences and are used intentionally, an example of the musician's agency. Glenn Gould does not create silences in the music in this way and there are certainly no extended pauses between the phrases. Given that his purpose is to be faithful to the written score, his attention is to the micro-silences that separate one note from another in an attempt to give each note its due and appropriate attention. The precision in Gould's playing is a consequence of his attention to detail, especially in the relationship between one note and another. He was able to achieve this in the recording studio, recording passages several times until he achieved a take that he was happy with.
4. Miles Davis's interpretation of the theme allows him to leave notes out (i.e., to silence them), adapting Monk's original theme to create his own interpretation, a personal and minimal account of Monk's original tune. Glenn Gould's aesthetic



does not allow him to remove or extend the written passages. However, he does permit himself to play the music at a slower tempo, expanding the amount of time in which to play the piece. This could be seen as expanding the frame of silence into which he places the notes. The greater amount of time and space in the later recording allows him to attend to the way that the notes are placed in relation to each other.

As the most potent amplifier of silence in performance practice, Miles Davis's use of silence could be characterised as the art of subtraction in which silences are introduced into the music and notes are left out. Visual evidence for this can be seen in the Audacity files (Figures 3 and 3), for example, the gaps of over two seconds between P1 and P2.) In contrast, Glenn Gould's use of silence is more subtle. His attention is given to the micro silences, the space between the notes which, in the later recording, allows him to give greater attention to the detail of the music.

### Quantitative Phase: The Listeners' Perception Survey

Only 39% of listeners thought the performer was the same in the two Gould excerpts, 61% of them judging that they were two different performers. Only 47% of listeners thought that the two Miles Davis excerpts were performed by the same person, whereas the other 53% thought they were played by two different performers. Interestingly, we found no correlation between the level of formal musical experience and the choice of whether or not the excerpts were played by the same performer, for either the Gould or Davis excerpts ( $r_{\text{Spearman}} = -.006, p = .93$ , and  $r_{\text{Spearman}} = .11, p = .19$ , respectively). When we examined the other variables, we performed paired samples t-tests to compare participants' ratings of speed, quality, and the experience of being moved. For the Miles Davis recording they rated the excerpts from the October and November 6<sup>th</sup> recordings significantly different in terms of (1) speed ( $M_{\text{speed}} = 2.29$  and  $2.62$ ;  $SD = .81$  and  $.83$  for the two excerpts respectively,  $t(192) = 5.54, p < .001$ ); (2) quality of the piece ( $M_{\text{quality}} = 4.01$  and  $4.22$ ;  $SD = 1.01$  and  $.82$ ,  $t(192) = 3.31, p = .001$ ); and (3) their experience of feeling moved ( $M_{\text{experience of being moved}} = 3.33$  and  $3.53$ ;  $SD = 1.1$  and  $1.2$ ,  $t(192) = 3.05, p < .003$ ). For the Gould recording, participants rated the excerpts from the 1955 and 1981 excerpts significantly different only in terms of *speed* ( $M_{\text{speed}} = 1.99$  and  $3.25$ ;  $SD = .84$  and  $.85$ ,  $t(192) = 15.74, p < .001$ ).

Thus, even though the same excerpt was played by the same performer, it is clear that the majority of listeners perceived the excerpts by both Gould and Davis to have been played by a different performer.

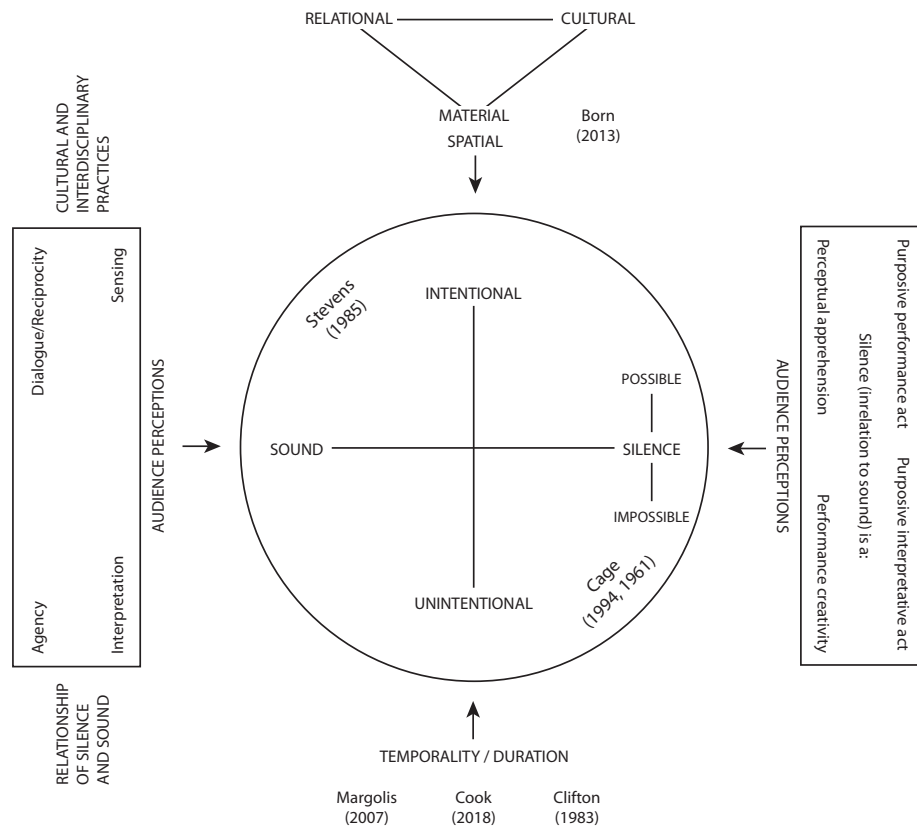
## 5 Conclusion

In this article, we have investigated how silence is manifested in two music performance practices. We have explored the way in which performers utilise silence in relation to sound as a potential parameter of authorial voice, and how silence affects the listener's perception of the player's authorial voice.

We found that the performance of silence is a purposive performative act. The recognition of silence is scripted and scored in the perceptual apprehension of the bodily experience of sounding silence. Silence, performance practice and performance creativity come together as sound and silences that count as something new, original, fresh, refreshed in the authoring of a performance. The silence of the ensemble gives meaning to the performance of solo instruments. This is an example of the silencing of all but a few possible sounds, based on culture, so that the remaining sounds have meaning due to the silences, as creative spaces stretching the time frames that have been created around them. We have provided examples of techniques for identifying silence in the course of performance and we have underscored the function of silence as indices of creativity in performance.

We conclude by presenting a model that illustrates the parameters informing the relationship between silence and sound (see Figure 7). We argue that silence has multiple interconnected parameters and that these interconnected parameters have an impact on the perceptual salience and generativity of performance creativity.

The key methodological questions and suggestions for further research concern the role of silence in composed and improvised performance practices and the impact this has on performative freedom. Performers, having internalised idiomatic features of a given style, skilfully generate works in real time that, to the uninitiated listener, are virtually indistinguishable. Further research should involve talking to performers about how they use silence and engage with how audiences perceive silence. It should also go outside the mainstream Western genres so as to explore cultural practices of silence in music performance. Methodologically, we have identified the need for the design of new analysis platforms, tools and techniques that enable us to identify and compare the multiple interpretations of pieces that we can access so easily on YouTube. How and why performances and performers sound different is less clear at this stage. This requires a new discourse which builds on manifestations, potentialities, musical communication, and the materiality of silence in relation to sound.



**Figure 7.** Parameters Informing the Relationship Between Silence and Sound.

Figure 7 presents a synoptic, componential model that explains silence in relation to sound more comprehensively, taking into account the various contexts related to performance practice. We hope that this model, alongside the other contributions made in this article, will inform and extend understanding of the parameters that relate sound and silence in music perception and music performance. The feature of silence, and its analysis, in performance studies programmes, pedagogies and assessment, can support performers to find their authorial voice within silence.

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