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Growling, Cooing & Rumbling with Dino-Bone

The Domination of dinosaur's vocalization beyond performer's expectation

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Abstract

Dino (2022) for “Dino-Bone,” 3 percussions and prepared strings by Piyawat Louilarpprasert is work scored for a combination of extended acoustic instruments that aims to recreate and reimagine the vocality of dinosaurs through acoustic instrument. “Dino-Bone” is an extended instrument comprised of a metal pipe and plastic tube attached to a trombone with a total length of 1.5 meters. The mouthpiece of the trombone is replaced and alternates between bassoon reed and saxophone mouthpiece. Due to the methodology which reforms the mechanism of a trombone – the acoustic of the instrument is being augmented and enabled to create a series of complex spectrums, timbres, and several frequencies that are not possible on a regular trombone.

This paper discusses: 1) The sonic possibilities that were discovered (both expectedly and unexpectedly) during the rehearsal and performance of *Dino* (2022). 2) A compositional analysis and interpretation remarks from the performer, with a focus on how the sound of dinosaurs were recreated and reanimated through compositional notations and the use of this extended instrument.

Furthermore, this paper also explores more broadly possibilities of recreating the sound of both living and extinct animals with acoustic instruments.

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Introduction of the instrument: construction and sonic result

Dino-Bone is an innovative and experimental amplified trombone created by Piyawat Louilarpprasert for his composition *Dino* (2022) (see figure 1 & 2). The instrument is designed to produce a wide range of sonorities by means of metal pipe and plastic tube extensions for amplification and alternate sound-generating devices, including the bassoon reed and various saxophone mouthpieces. The instrument's amplified sound is activated through the extensions, which allow for the exploration of new timbral possibilities. (see figure 3 & 4)



Figure 1 - 2: Recording session of *Dino* (2022) composed by Piyawat Louilarpprasert, performed by Princess Galyani Vadhana Institute of Music Youth Orchestra with Peter Veale, conductor

The unusual sonic possibilities offered by the alternate sound generators in *Dino-Bone* include high single tones produced by playing with a tight embouchure and lower pitches with buzzy growl sounds created by loosening the embouchure, similar to the sound of playing a bassoon reed. The sonic effects of various sizes of saxophone mouthpieces (soprano, alto, tenor, and baritone) and trombone (small and large bore) are explored through this work. The combination of an alto saxophone mouthpiece and small bore trombone enables the player to produce compressed, low, buzzing and growling sounds and also to shift to high, squeaky, and buzzy sounds simultaneously by adjusting the oral cavity and position of the embouchure. The latter is the preferred sound of the composer (Louilarpprasert). Additionally, playing with a saxophone mouthpiece offers a larger dynamic range compared to playing with a bassoon reed. For example, shallow playing creates very soft, compressed sounds, while deep playing creates louder and projected sounds, along with unexpected squeaky sounds and shifted high pitches.



Figure 3 - 4: Dino-Bone – amplified trombone with an extension of metal pipe and plastic tube with alternate mouthpieces of bassoon reed and saxophone mouthpiece as a sound generator

Visualize the sound of Dino-Bone:

For this study, spectral analysis was employed to investigate the sounds produced by the Dino-Bone. The aim was to understand and differentiate the sonic characteristics of Dino-Bone from those of an ordinary trombone. The spectral analysis of the ordinary trombone (see figure 5) is based on the fundamental of the overtone series, whereas the spectral analysis of Dino-Bone reveals a distinct deviation from the overtone series observed in the ordinary trombone.

Two forms of sound were observed when Dino-Bone was played with a bassoon reed. The spectrogram analysis showed that the entire spectrum of the sound produced covered frequencies ranging from below 10Hz to 7,000 Hz, with a single tone relying on frequencies between 600 Hz and 1,200 Hz. The distorted and clustered sound, on the other hand, was characterized by a group of frequencies ranging from 600 Hz to 1,200 Hz, with a nearly equal amplitude (see figure 6). This resulted in a complex frequencies and made it difficult to discern the upper pitches of the overtone series. A different form of sound was observed when Dino-Bone was played with a saxophone mouthpiece. The spectrogram analysis revealed two distinct forms of sound. The first form was characterized by a low buzzing sound, which covered a wide range of frequencies from below 10Hz to 7,000 Hz without an obvious outstanding exact frequency. The second form was a squeak sound, which

covered a frequency range between 1,000 Hz and 2,000 Hz and exhibited a higher amplitude compared to the low buzzing sound (see figure 7).

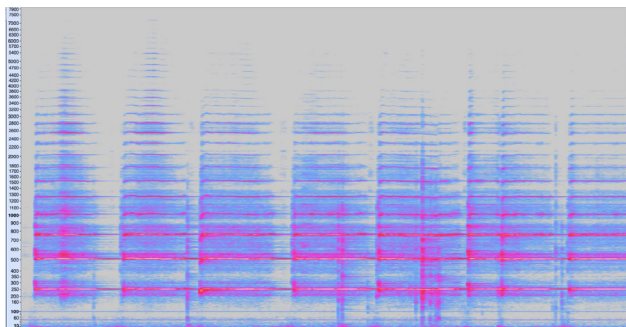


Figure 5: Spectrogram of trombone playing middle C pitch

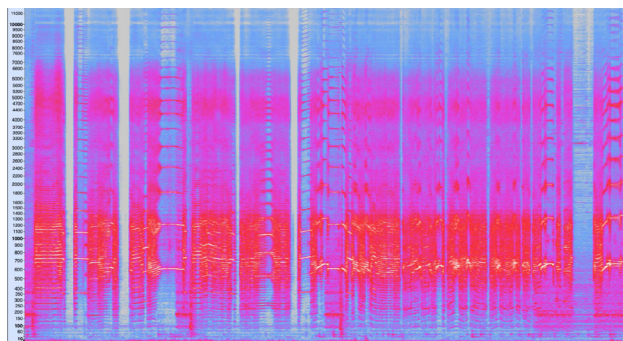


Figure 6: Spectrogram of Dino-Bone playing with bassoon reed

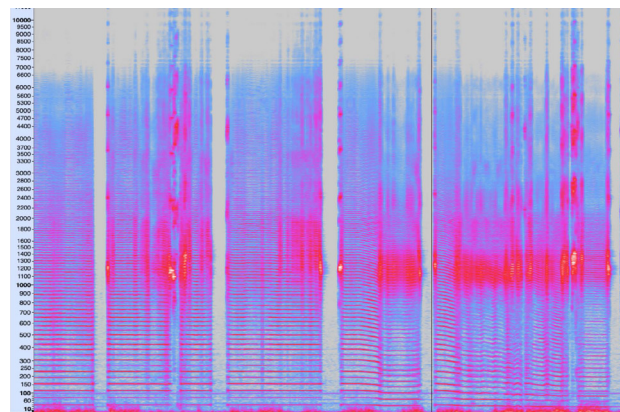


Figure 7: Spectrogram of Dino-Bone playing with alto saxophone mouthpiece

Compositional of *Dino* (2022) and performing analysis of Dino-Bone techniques

In the solo part of *Dino* (2022), the entire 16 scenes demonstrate the unique sound of the Dino-Bone and showcase its versatility in both solo and ensemble contexts.

Scene 1 - 8: Dino-Bone (bassoon reed playing) with the orchestra

Scene 9 - 10: Dino-Bone (saxophone mouthpiece playing) Cadenza

Scene 11 - 12: Orchestra only

Scene 13 - 16: Dino-Bone (saxophone mouthpiece playing) with the orchestra

In scenes 1 to 8, Louilarpprasert utilized the bassoon reed (see figure 8) to imitate the roaring characteristics of dinosaurs and convey a progression from slow to medium to fast pacing. He begins this section with a single tone and then becomes multiphonic. However, I as a player decided to interpret it in the opposite way. I decided to present the unique multiphonic sound at the beginning then changed the timbre at the end of the opening section as a cue for the orchestra. With the progression from slow to medium to fast pacing, Louilarpprasert gives a lot of latitude to the performer through his notation. For instance, in the slow section, he notates a variety of timbre and sound gestures with sustain notes such as fermata and longer note values (see figure 9) while medium and fast pacing, he writes shorter notes (8th note and 16th note) as well as description such as, “*short, repeating/improvise and have some rest between sound and building up the energy*” (see figure 10 & 11). Although there are some similarities in the musical notations between these three sections, to differentiate them further in my playing, I played the slow paced section with slow glissandos while I played the medium and fast-paced sections with medium and medium-fast glissandos and slide tremolos. In addition, I played rhythmically together with short fragments and repetitions of materials in order to build up energy. These choices are consistent with the indications of the composer.

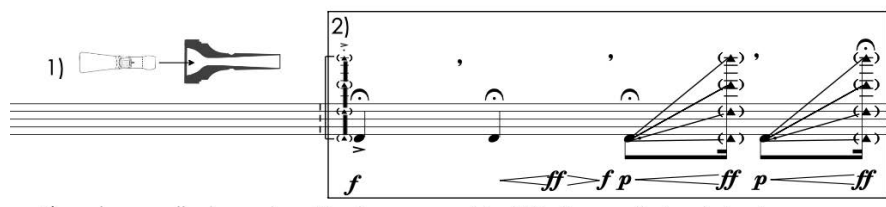


Figure 8: 0.00 - 0.20 minutes from *Dino* (2022) Roar/approaching

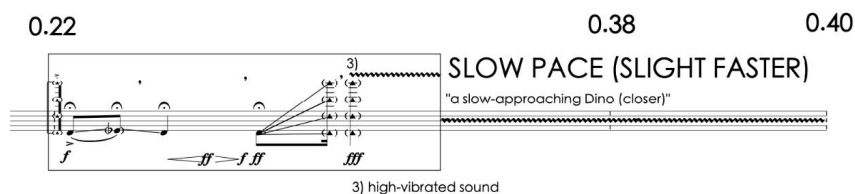


Figure 9: 0.22 – 0.40 minutes from *Dino* (2022) - slow pace

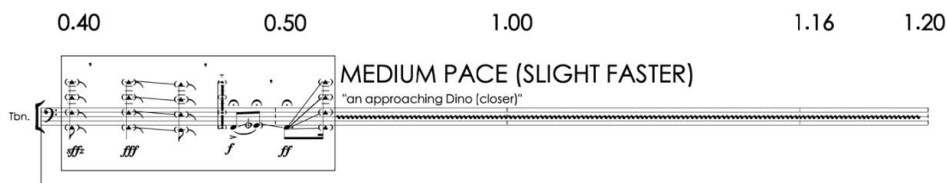


Figure 10: 0.40 – 1.20 minutes from *Dino* (2022) – medium pace

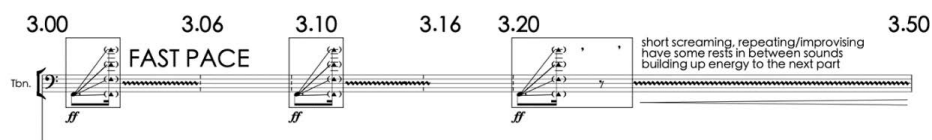


Figure 11: 3.00 – 3.50 minutes from *Dino* (2022) – fast pace

The following sections (scene 9 – 10) represents another sound made by the Dino-Bone, this time through the use of a saxophone mouthpiece. These scenes were written in cadenza form precisely to showcase the uniqueness of sound and sonic transformations on this instrument (see figure 12 & 13).

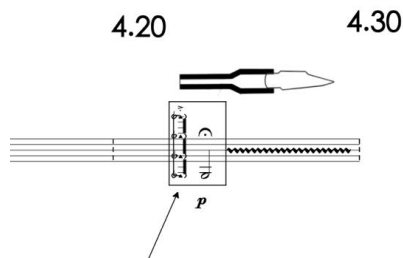


Figure 12 - 13: From *Dino* (2022) – notation and performing picture with saxophone mouthpiece

In this cadenza section (scene 9), Louilapprasert indicates five characteristics in the solo part: *static motion*, *quasi-static motion*, *dynamic motion*, *more dynamic motion*, and *even more*. These five characteristics were indicated with different musical notation, for instance, the *static motion* was notated with sustain notes (half notes) and soft dynamics while *quasi-static motion* contains faster notes (16th notes) and louder dynamics. The further systems of Dino-Roar, *dynamic motion*, *more dynamic motion*, and *even more*, use the same materials as previous systems with addition of faster notes (16th and 32nd notes) as well as rhythmic figures, glissandi, and articulated playing. Louilapprasert indicates that in all these sections the squeaky sound must be used according to the performer's judgement of the characteristics of each system (see figure 14 - 18). With this open notation, I interpreted these sections by providing slow glissandi and few squeaky sounds in *static* and *quasi static motion*, then I increased the speed of glissandi and added more fast rhythmic motives as well as squeaky sounds in order to transition into the increased dynamic motion of the angry dino-roar in the next section.

The figure displays a musical score for Tbn. (Tubon) across five systems, each representing a different characteristic of the solo part. The first system, 'STATIC MOTION', spans from 4.30 to 4.40 minutes and features a single half note with a 'p' dynamic and a note head containing a '5'. The second system, 'QUASI-STATIC MOTION', spans from 4.40 to 4.50 minutes and includes four measures with notes marked 'p', 'f > p', 'fp', and 'f > p', with note heads containing '5', '4', '3', and '2' respectively. The third system, 'DYNAMIC MOTION (Dino-Roar)', spans from 4.50 to 5.00 minutes and contains four measures with notes marked 'f', 'f > p', 'fp', and 'f', with note heads containing '5', '4', '3', and '2'. The fourth system, 'MORE DYNAMIC MOTION (Dino-Roar)', spans from 5.00 to 5.20 minutes and includes four measures with notes marked 'f', 'f > p', 'ff', and 'f', with note heads containing '5', '4', '3', and '2'. The fifth system, 'EVEN MORE', spans from 5.20 to 5.30 minutes and consists of a single half note with a 'fff' dynamic and a note head containing a '5'. Each system is accompanied by a horizontal line with a wavy, 'squeaky' texture.

Figure 14 - 18: 4.30 - 5.30 minute of Dino (2022) - *static motion*, *quasi-static motion*, *dynamic motion*, *more dynamic motion*, and *even more*.

With the indication of “*angry dinosaur*” the orchestra responds to the solo cadenza in the following scenes (scene 13 – 16). At this point, the soloist is instructed to play with fast and rapid glissandi using 32nd notes and to match the sound of the solo instrument to that of the orchestra, which includes extended sounds of prepared strings and percussion (see figure 19). In this section, the same sound materials from the cadenza section are used with increasingly loud dynamics, faster rhythmic motives, and more rapid slide movements. This is the most enraged part of the entire work. At the end, Louilarrprasert writes long sustained sound with decreasing of dynamics as well as the description, “*try to make high frequency from the low fundamental as much as possible, sharp, squeaky, and itchy*” (see figure 20). The performer interpreted this ending with fading sound of Dino-Bone together with lethargic glissandi, very soft dynamics and fewer squeaking sounds.

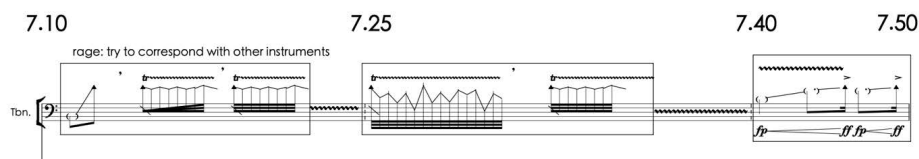


Figure 19: 7.10 – 7.50 minutes from *Dino* (2022)

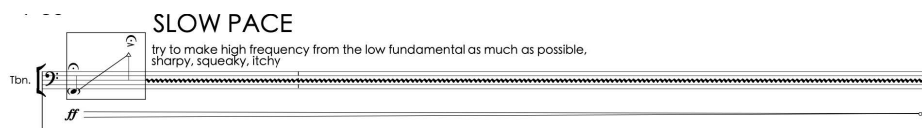


Figure 20: 9.30 till ending from *Dino* (2022)

Performing analysis and interpretation

Due to its open and indeterminate notation, performing on Dino-Bone requires improvisational skills, particularly with respect to texture and gesture.. This instrument provides a unique and challenging musical experience for performers. Unlike traditional instruments, the Dino-Bone places a greater emphasis on timbre preference and the gestural aspects of sound production rather than exact pitch recognition. This is due to the deviation of the sound produced by the Dino-Bone compared to the traditional overtone and harmonic series of the un-extended trombone. The placement of the bassoon reed in the cup of the trombone and the attachment of the saxophone mouthpiece both cause instability in sound production. This instability, which contains both predictable and unpredictable aspects, requires

a high degree of improvisational skill, adaptability, and multi-instrumental skill, including proficiency in playing the bassoon reed, saxophone mouthpiece, and slide trombone. Overall, the Dino-Bone instrument offers a distinct and unconventional musical experience for those who seek to explore new forms of musical expression.

In conclusion, when performing on Dino-Bone, sound materials, timbre, and gesture are important elements to consider. Due to the complexity and instability of these elements, it is necessary to organize and execute them at a certain level in order to improvise and allocate the proportion, duration, temporal division, and characteristics of the sound materials accurately. This will ensure that the performer's musical interpretation and the composer's desired outcome match.

Further discussion: Aspect of sonic possibilities and performative function through extraordinary instruments.

The Dino-Bone instrument was created specifically with the purpose of reimagining the acoustic experience of dinosaur vocalizations. However, the instrument has its own unique sound that can be interpreted and utilized in other ways. There is great potential within the Dino-Bone instrument. Future performers may wish to expand its performative capabilities and increase the diversity of sonic possibilities it can produce. This can be accomplished through two complementary avenues of inquiry. The first approach involves utilizing the discipline of paleo-acoustics to investigate and re-imagine dinosaur vocalizations, resulting in a more accurate representation of these sounds. The second approach involves exploring the unique sound and performance techniques of the instrument, including experimenting with extended playing methods and modifications to its size and resonant properties. Both approaches are focused on uncovering previously undiscovered sonic potentialities and enhancing the instrument's performance capabilities.

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