GEOMETRIC-BASED EXTENSIONS TO THE TIME-BRACKETS NOTATION, JOHN CAGE AND BEYOND…

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ABSTRACT

In the last period of his life, John Cage used time brackets in order to define the musical event placement on the timeline. In previous work we modeled these time brackets by parallelograms to build computer interfaces for interpretation assistance in the context of Cage's *Two*[5] and *Five*[3]. Over time, we understood that the shape, used to represent time brackets, brought important information for the interpretation and musical analysis. The main purpose of this paper is to generalize this time bracket parallelogram representation, as a tool for musicological analysis, to enhance performance and, possibly, as a composition notation.

1. INTRODUCTION

In his works, John Cage used time brackets in order to define musical events placement on the timeline. The large variety of works he has composed in the last decade of his life is surprising. This technique permitted him to continue his usual undetermined way of composition, while giving the performer ways to exhibit his (her) skill in real time situations. John Cage used only few types of time brackets, and almost exclusively symmetrical ones. He also filled them with very little musical material (generally only one note). In Cage's *Number Pieces* each individual part contains musical events with time brackets. Generally, an event consists of a score endowed with two pairs of numbers: time brackets (**Figure 1**).

Figure 1. John Cage's *Two*, flute, first event.

This gives the interpreter lower and upper-time bounds to begin and end each event. The composition has a defined total duration and the events are placed on a time line, with a degree of freedom, depending on the performer. Although there are only individual parts, a score for the group is implicitly present and leads to a form.

2. EARLIER RESEARCH

In previous work [8] we modeled these time brackets by parallelograms to build computer interfaces for interpretation assistance in the context of Cage's *Two*[5] and *Five*[3].

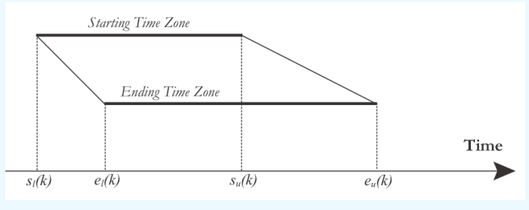

Figure 2. Graphic representation for a generic time event

To obtain a graphic representation of each event in time we consider the quadruple: $(s_u(k), s_u(k), e_l(k), e_l(k))$,
where $(s_l(k), s_u(k))$ is the *Starting Time Zone* and $(e_l(k), e_u(k))$ the *Ending Time Zone*. As the two intervals have, in our case, a designed superposition, we prefer to distinguish *starting* and *ending zones* by using two parallel lines. (**Figure 2**)

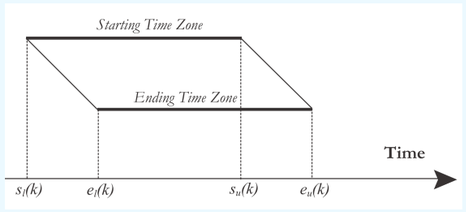

Figure 3. Graphic representation for a time event in Cage's *Number Pieces*

An alternative way to present a quadruple will be: $(s_l(k), \partial_s(k), \partial_e(k), \gamma(k))$, where $s_l(k) + \gamma(k) = e_l(k)$. This representation can easily display the regularity in the time brackets construction (**Figure 4**).

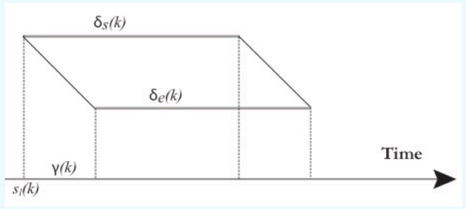

Figure 4. An event represented as $(s_l(k), \partial_s(k), \partial_e(k), \gamma(k))$

3. MUSICAL SCORE, AN APPLICATION

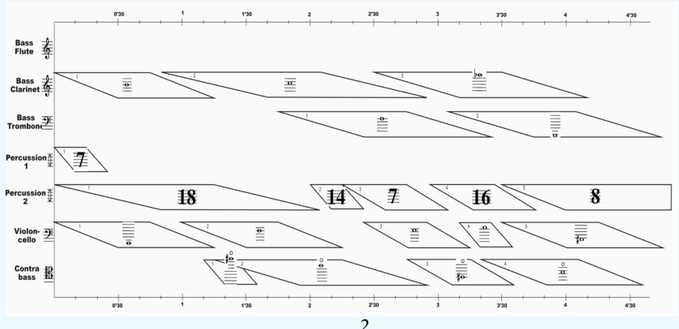

Figure 7. Cage, *Seven*[2], first 4 minutes.

For the sake of studying the composition, a score representation is needed, even if the precision of the tracks' relationship has to consider the free parameters the composer had incorporated in his work. For this reason, we have developed a score-like presentation to cover John Cage's Number Pieces and related works. (**Figure 7**)

4. EXTENDING THE NOTION OF TIME BRACKETS

4.1. Positioning the starting and ending time zones

In Cage's works, the two time zones are symmetrical, the values are equal, and the overlap is positive, as for example **Figure 3**. From here on we consider the asymmetrical case. The first generalization consists of shifting these zones on the timeline. By the definition of $\gamma(k)$, its value is smaller than $\partial_s(k)$ in Cage's works. This fact creates the above-mentioned overlapping (which is in fact $\partial_s(k) - \gamma(k)$) as in **Figure 8**.

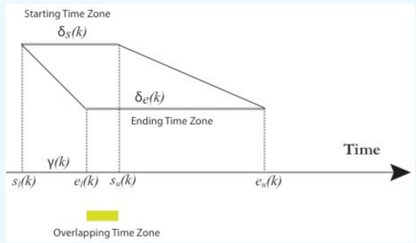

Figure 8. A generic non-symmetric music event

Another case is "no overlapping", when $(\partial_s(k) - \gamma(k)) \leq 0$ (**Figure 9**). An event of this kind must occur, as there is no way the ending point will be earlier than the starting point, $\gamma(k) > \partial_s(k)$.

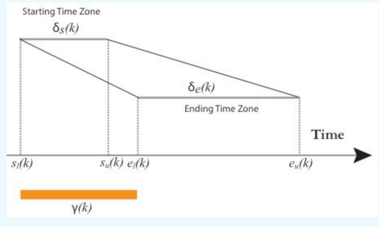

Figure 9. A music event with disjoint *starting and ending time zones*. No overlapping.

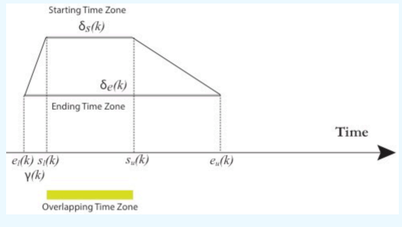

Figure 10. A music event represented as a trapeze form. $\gamma(k) < 0$.

All these considerations are geometric oriented, studying abstractly the figures. The practical implications will follow later. For example, in the last case (**Figure 10**), the trapeze's far-left, right-angled triangle is superfluous unless the event won't occur.

4.2. Combining fixed and flexible time brackets

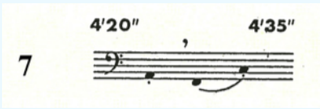

Figure 11. Interlude from *Music for__*, trombone part.

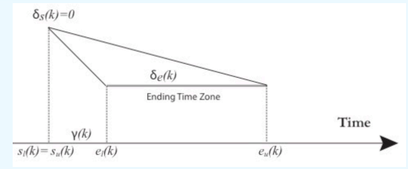

Figure 12. A music event represented as a triangle form. A fixed start.

5. CONCLUSIONS

We use here a graphical representation of Time Brackets notation, in order to generate a score of John Cage's Number Pieces, works conceived individually, having only separate parts. This is done aiming at performing, studying, and analyzing the works in consideration. John Cage's use of just a few types of Time Brackets, leads to the idea of generalizing the figures, creating a large variety of geometrical figures, thus creating musical tasks for the performers that extends those time management asked by Cage. At the same time, the compositional techniques involved are not limited. One could use various graphical figures and different filling methods (**Figure 17**).

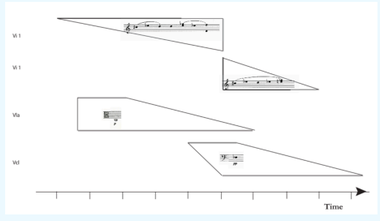

Figure 17. Example of a theoretical string quartet

This last example is a compositional exercise using geometric figures to extend those of John Cage. However, the material to fill the figures is taken from different John Cage's pieces. The two violins represent musical material passing from one to another in a precise way dependent on the performer. The low strings form a background, whose time definition is not strictly defined.

This example was conceived in the traditional way: starting from a score (for string quartet) and extracted individual parts using time brackets.