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Controlling the pacing of retards and accelerandos in piano performance: A roller coaster solution?

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Performers of a musical work generally well understand how to control steady tempos carried by the musical beat. More problematic for the performer, however, is controlling the graduated pacing of flexible tempos such as retards and accelerandos that depart from, yet link, the established tempos. According to Epstein (1995), the pacing of retards and accelerandos in performance is among the least accomplished events in our concert halls; indeed it is often left to chance. In this article, I propose that the performer may control the pacing of the ascent and descent of the melodic curves which characterize *Bruyères*, a prelude from *Book 2* for piano by Debussy, by using a subtle application of retards and accelerandos following the principle of the roller coaster. However, the retards and accelerandos, like the roller coaster, also require some means of support. I shall suggest too that Debussy's deployment of cadences is intended to give support to that pacing. But how may the performer achieve this?

Keywords: piano performance; accelerations; retards; cubic curve; roller coaster

There are few systematic studies on either retards or accelerations. While Sundberg and Verillo (1980) have dealt with the retard as a gesture during the closure of a work, perhaps more relevantly Epstein (1995) has proposed in an empirical study that retards or accelerations may be best performed if they fit within a mathematical equation known as the cubic curve. However, this is a pilot study that does not investigate how retards and accelerations, which are inverse forms of each other, may be paced smoothly one to the other. Kinetic and potential energy—which are exemplified in the pacing of the retardations and accelerations of the roller coaster—may provide, in part, a simpler solution, as will certain aspects of the "rethink" which has taken place in recent years in musical academic circles, notably Berry (1989) and Rink (2002) who have looked afresh at the relationship between performance and analysis. These changes have made possible the informal analysis at the end of this article, which seeks to demonstrate that the graduated pacing of the ascent and descent of the melodic curves in *Bruyères* requires a subtle application of retards and accelerations following the principle of the roller coaster. Informal tools of analysis such as découpage, diagrams, and historical evidence are used to support this approach.

MAIN CONTRIBUTION

The cubic curve

Retards and accelerations are governed by the principle of graduated change in the pacing of motion. As such, they do not proceed toward "ad hoc goal tempos" but rather link tempos that are already predetermined. Describing the retard/acceleration process, Epstein (1995) states that:

> The initial tempo from which the change starts, the number of steps though which the change must move, a related tempo to be achieved at the end of the time series: these elements set the temporal framework within which an retard/acceleration must be shaped (Epstein 1995, p. 418).

He suggests, also, that the cubic curve, while mathematically complex, can describe an act of timing such as the retard and acceleration which not only "feels natural and seemingly effortless to effect, but is compatible with our own musical intuitions" (Epstein 1995; see Figure 1 below). From this mathematical concept, Epstein extrapolates the idea that the shape of the curve could represent a "possible timing trajectory in the moulding of a retard and accelerando" (p. 419).

In this pilot study, Epstein transferred performances of retards by Szell and Stravinsky and accelerations by Karajan and Herrara de la Fuente onto an analog audio tape and timed the "durations of their successive beats with the tape measure technique" (p. 417). This enabled him to assemble a "highly correlated model" of a retard and accelerando performance from which he observed that their trajectory fitted within the model of the cubic curve with striking similarity. This, he suggests, means that they all had a good comprehension of the "boundary tempos" that frame the "timing path" of their retards and accelerations. Finally, a computer programme revealed that the

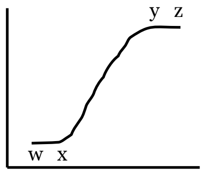

Figure 1. A reproduction of Epstein's (1995) diagram which shows: first, two horizontal lines between w-x and y-z. These lines represent the steady, or predetermined, tempos. Second, an s-shaped ascending curve links the horizontal line w and x to the horizontal line at the uppermost point of the curve marked y and z.

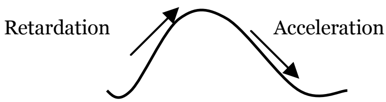

Figure 2. A general representation of the curve of a roller coaster. The arrow on the left shows the path of the retard of the roller coaster as it ascends toward the peak of the curve. The arrow on the right shows the path of acceleration of the roller coaster as it descends on the downward side of the curve.

retards and accelerandos measured in the study consistently fitted within the cubic curve model with less than 7% variance. Epstein concluded that the "cubic model does about as well as it is possible to do" (p. 423).

The roller coaster

Since the time constraints on a performer's life may discourage the study of the models described above in detail, it may be more effective for him or her to observe the similarities between the shape of a melodic curve in *Bruyères* and the path of the roller coaster as it rises and falls (this being closely related to the cubic curve). The energy of the roller coaster, during its fall, is transformed from potential energy to kinetic energy (energy in motion) and, during its rise, from kinetic energy to potential energy (stored energy). Thus, during the ascent of the roller coaster there is a retardation as it draws toward the top of the curve, and an acceleration as it descends on the other side of the curve (see Figure 2).

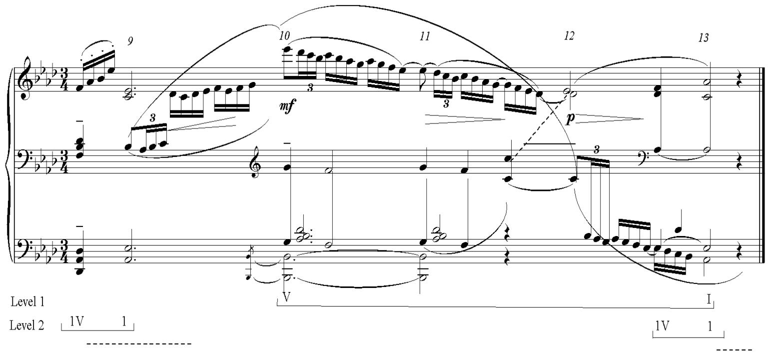

Figure 3. An informal analysis of bars 9-13 of *Bruyères* by Debussy. (1) Above the score, the contour of the melodic curve is highlighted with a black line to expose it more clearly, (2) level 1 shows the prolonged cadential memory device, (3) level 2 shows the deployment of the cadences irregulières at an intermediate level of hearing, (4) the dotted lines on both sides below level 2 are an approximation of the area of the predetermined tempo, 66 to the quarter note.

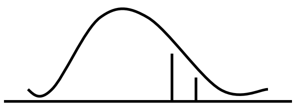

Figure 4. The curve represents the path of the roller coaster as it ascends and descends. The vertical lines below represent the hypothetical cadential points of support.

The analysis

This informal analysis seeks to expose elements that will support the pacing of the ascent and descent of the melodic curves in *Bruyères*. Since the aim is to apply a subtle application of retards and accelerations following the principle of the roller coaster, it will, first, expose the shape of the melodic curve between bars 9-13, since "curves not angles are the very nature of this composition" (Schmitz 1950, p. 172), and second, demonstrate that the role of the perfect cadence and the *cadences irregulières* support the pacing of the curve. *Découpage* and a diagram will be employed as part of the analytical process. For example, in bars 9-13, the vertical bar lines have been removed to expose a complete melodic curve. Its contour is highlighted above with a black line (see Figure 3) to reveal the similarity of the rise and fall of the musical curve with the ascending and descending path of the roller coaster. Thus, just as the energy of the roller coaster is transformed from kinetic to potential energy as it draws toward the peak of the curve, bars 9-10 may be performed with a subtle departure from the predetermined tempo of approx 66 to the quarter note, and a retardation applied toward the E*b* at the top of the melodic curve.

In the same way in which the roller coaster uses kinetic energy during its descent of the curve to "fuel the rest of the ride" (Epstein 1995, p. 27), performers may plan their descent of the curve with a graduated accelerative pacing through bars 10-13 and gradually rejoin the predetermined tempo of 66 to the quarter note smoothly in bar 13.

However, the pacing of the ritardando and accelerando, like the roller coaster, needs some means of support or stability. This article suggests that this is provided by Debussy's deployment of a hierarchical arrangement of cadential points (see Figure 4).

At level 1 (see bars 10-13, Figure 3), the function of the perfect cadence may be seen as a prolonged cadential memory device which serves to maintain a sense of unity in a work that otherwise might be heard as a series of fragmentary and isolated melodic curves. The dominant chord of the cadence is placed under the highest point of the melodic curve on the first beat of bar 10, and it does not resolve onto the tonic, A*b* major, until the first beat of bar 13. This, alongside the added energy of the accacciatura in the base, contributes stability to the pacing of the retardation, pushing the music up and forward to the top of the melodic curve like the car on the roller coaster. The positioning of the tonic chord A*b* on the first beat of bar 13 enhances the sense of closure as the car descends to the end of the melodic curve.

At level 2 (see Figure 3), the *cadences irregulières* are identifiable by the harmonic progression using the subdominant with an added sixth, which then resolves onto the tonic. These may be seen first between the third beat of bar 8 and the first beat of bar 9 (see Figure 3) and similarly between bars 12 and 13. In both instances, their function is to support the pacing of a subtle retard toward the end of the descent of the melodic curve.

Conclusion

The similarity of the melodic curves in *Bruyères* with the roller coaster's track and the degree of slope and corresponding retardation and acceleration with its "coefficient of friction at all points along the way" (Epstein 1995, p.27), which in this case is supported by two different types of cadences, is clear to see. If the performer plans and controls this recurring accumulation and release of tension, which together affect the pacing of the retardation and acceleration during the ascent and descent of the melodic curve, this will, as Epstein points out "lead the car to its designated end, its motion controlled throughout" (1995, p. 27). If not, the pacing of the ascent and descent of the melodic curve, like the car of the roller coaster, may be spent too soon and the intended musical effect, which is to control a graduated pacing of the ascent and descent of the melodic curve from the predetermined tempo of approximately 66 to the quarter note, to the same related tempo at the downward end of curve may be dissipated.

IMPLICATIONS

Future research may consider associating the graduated pacing of retards and accelerandos in piano performance with the kinetics of body movements. For example, bodily movements may be organized to reduce any angular movements in performance by planning ideal trajectories of bodily motion that take into account the demands of the musical score.

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