Sharp as a Tack, Bright as a Button: Timbral Metamorphoses in Saariaho’s *Sept Papillons*

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**Abstract**

In this paper, I argue that the acoustical information captured by the audio descriptor known as “sharpness” provides a musically insightful window into the timbral structures of Kaija Saariaho’s *Sept Papillons* for solo cello. In Papillon I, I utilize Saariaho’s concept of a “sound/noise axis” as a means of interpreting both the succession of timbral states at the surface as well as the distribution of sharpness energy over time. I also investigate timbre’s narrative role in binding together distinct and seemingly opposing thematic gestures into a symbiotic relationship in Papillons IV and VII. The analyses as a whole demonstrate that audio descriptors provide a useful representation of timbral structures. By interpreting these representations through appropriate analytical lenses, analysts can begin to engage in more detailed inquiries into timbre’s crucial role in many contemporary musical languages.

**Sharpness**

**Acum:** “The reference sound producing 1 acum is a narrow-band noise one critical-band wide at a center frequency of 1 kHz having a level of 60 dB” (Zwicker and Fastl, 239).

**Total Loudness:** $N = \int_{z=0}^{24} N' dz$

Where $z$ is the critical band rate and $N' dz$ is the specific loudness of each band.

**Sharpness:** $S = 0.11 \int_{z=0}^{24} \frac{N'g'(z)z dz}{N}$

Where

\[
\begin{align*}
&z < 14, \rightarrow g'(z) = 1 \\
&z \geq 14, \rightarrow g'(z) = 0.00012z^4 - 0.0056z^3 + 0.1z^2 - 0.81z + 3.51
\end{align*}
\]

**Figures**

![Figure 1a. Papillon I: Pitch analysis.](image-url)
Figure 1b. Papillon I: Sharpness (Alexis Descharmes, Cello).

Figure 1c. Papillon I: Sharpness (annotated).

Figure 1d. Papillon I: Sharpness quartile analysis.
Figure 2a. Papillon IV: Associative set definition.

Figure 2b. Papillon IV: Sharpness graph with aligned bar graph schematic.

Figure 2c. Papillon IV: Annotated sharpness detail of A1 and B1/A5.
Figure 2d. Papillon IV: Pitch analysis.

Figure 3a. Papillon VII: Associative set definition.

Figure 3b. Papillon VII: Annotated sharpness graph with aligned bar graph schematic.
Figure 4. Three sharpness examples: A.) Cello range from C2 to E6 (Daron Kirsch, Cello); B.) Messiaen, Quatuor pour la fin du temps, iii., "Abîme des oiseaux," m. 13 (Guy Deplus, Clarinet); C.) Saariaho, Papillon I, mm. 1-2.
Bibliography


