

Pietro Mengoli's Theory of Perception of Musical Intervals: Mathematical Approach to the Sense of Hearing in the Scientific Revolution Period

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Pietro Mengoli, an Italian mathematician of the Scientific Revolution period, maintains in his *Speculationi di musica* (1670) that the sense of hearing is the only agent for recognizing musical intervals. This assertion, natural as it seems to us, is epoch-making because most contemporary musical theorists in the *Quadrivium* tradition considered that it is reason or intellect that judges exactly the kind of intervals perceived by the sense.

Mengoli's accounts of hearing are based on mechanics. He considers air as corpuscular matter. The human soul counts each aerial corpuscle transmitted from high and low sounds, abstracts the logarithm of the ratio of these numbers, and finally recognizes the size of the interval. Those numbers of corpuscles are counted not through reason, but through the sense only. However, because the cognitive faculty of the sense is very limited, the size and errors of intervals recognized are also limited. Mengoli then distinguishes errors into three categories according to tolerance the sense of hearing must have for identifying intervals: 1. Errors unrecognizable to the sense, 2. Errors recognizable but acceptable to the sense, 3. Errors recognizable and barely tolerable to the sense.

When the human soul is faced with intervals with errors of the first and a part of the second categories, it tends to accept them as pure intervals that are determined by ratios of the limited integers the sense can count. This theory shows that Mengoli considers interval recognition as an active operation the soul carries out by categorizing intervals.

Mengoli's discourse on music offers us a fresh insight into the rationalistic current of thought about the sense of hearing in early modern Europe.