

# Proceedings of the Institute of Acoustics

## Spatial impression and envelopment in concert halls - M Barron

Thus the major influence on the late level and hence the late lateral level is the total acoustic absorption in the auditorium. We would expect the sense of envelopment to be high in small halls and low in large ones. Does this correspond with subjective experience?

## 8. CONCLUSIONS

Before concluding the discussion, mention must be made of a stimulating recent publication by Griesinger [18], who raises many questions that other authors have tended to gloss over. Traditional objective measurements in auditoria use impulse responses, but of course impulsive sounds are the exception in our normal listening experience. Griesinger considers how our ears extract spatial information from the mostly continuous music or speech we listen to, using rise times, fall times and the gaps between musical notes. He suggests that there are at least three types of spatial impression and that which of these we are hearing depends mainly on the nature of the music involved. Thus spatial experiences with solo, chamber, lightly or thickly scored orchestral music are likely to be different.

Though research into spatial hearing in concert halls goes back several decades, there are still many uncertainties. Morimoto, Iida, Bradley and Soulodre have provided a major advance by clarifying the fact that at least two spatial effects occur, source broadening and listener envelopment. The phenomenon of source broadening has been extensively studied, the design considerations are well understood and there is evidence that it is one of the components of the best acoustics, but not a guarantee of excellence [19]. On the subjective front, we can all as listeners to concerts consider the validity of Kuhl's threshold approach to source broadening.

The situation with envelopment seems less clear. How important is envelopment for the overall concert hall experience? Is the sense of envelopment independent of the level of the early sound, for instance? Is the late lateral level a reliable measure for the subjective effect in practice? If so, is envelopment really lower in large concert halls?

And as if two spatial effects were not enough to separate out, we have the suggestion that the situation is even more complicated. As listeners, there is clearly the opportunity to analyse the details of spatial experience when attending concerts.

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