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The importance of precise reproduction of time-domain information in Loudspeaker Systems

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Sounds and music contain both information in the time domain and information in the frequency domain. Traditional loudspeakers seem to concentrate mainly on performance in the frequency domain and often the precise reproduction of time domain information, also known as aperiodic sound or transients, gets less attention. A first consequence of this is that percussive musical sounds and sonic events like objects hitting or falling are not reproduced very realistically. But more important is that the way the human auditive system perceives space, is based largely on time-domain information.

As a result, the general lack of precision in reproduction of time information in loudspeakers has consequences well beyond the realism of percussive sounds and extends into other areas like for example the wide acceptance of inadequate compression algorithms, the proliferation of channels in immersive reproduction systems, and possibly the otherwise unexplained popularity of spaced microphone recording techniques.

The author participates in a team led by John Watkinson that develops new types of loudspeaker systems, based on study of human hearing, and with attention for precise reproduction and appropriate dispersion for both time information and frequency information. Prototype loudspeakers will be demonstrated shortly.