

# Envelopment: What is it?

## A definition for multichannel audio

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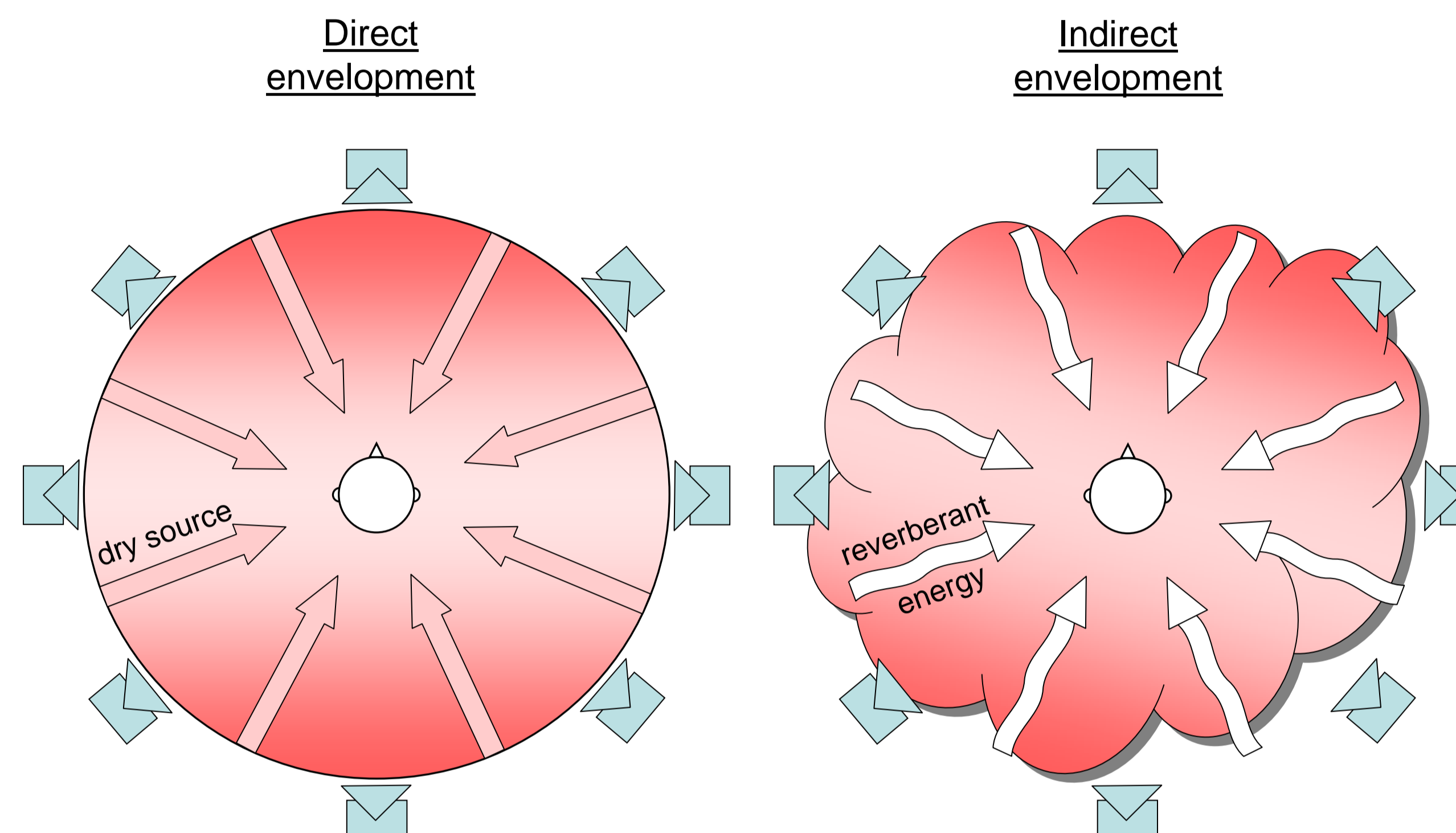
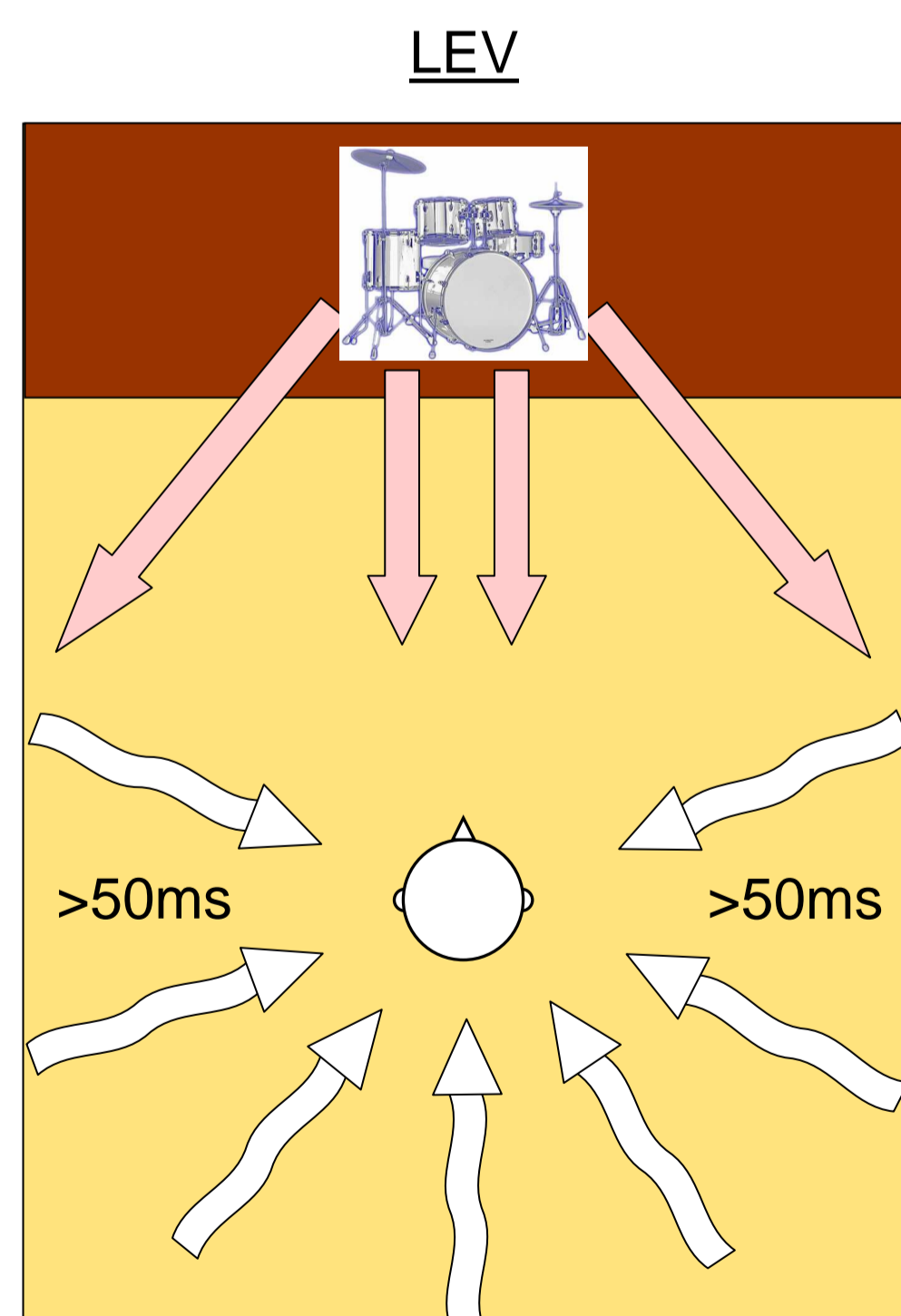
### Envelopment: What is it?

Envelopment [Webster's Dictionary (1913)]: "1. The act of enveloping or wrapping; an enclosing or covering on all sides. 2. That which envelops or surrounds; an envelope."

### Listener Envelopment (LEV)

Envelopment was first considered as a spatial attribute in concert hall acoustics.

In the concert hall LEV is created when a listener is surrounded by late-arriving (at least 50ms after the direct sound [Griesinger, 1996]) laterally reflected sound. Psychoacoustically this sensation is created by fluctuations in ITD and ILD caused by the arrival of de-correlated signals at the ears.



### Envelopment for multichannel audio

With multichannel audio it is possible to reproduce the sensation of LEV, and also an additional different type of envelopment, not considered in concert hall acoustics.

An enveloping sensation can be perceived by listeners when surrounded by (dry) sources [Rumsey, 2001].

This has led to the development of the following definitions:

**Direct envelopment** – the sensation of being surrounded by dry sources.

**Indirect envelopment** – the sensation of being surrounded by reverberant energy or acoustic reflections.

### Experiment: Direct envelopment scaling

The experiment was designed to collect interval level data representing perceived envelopment using a multi-stimulus test paradigm. Panned dry sources were the primary scene elements.

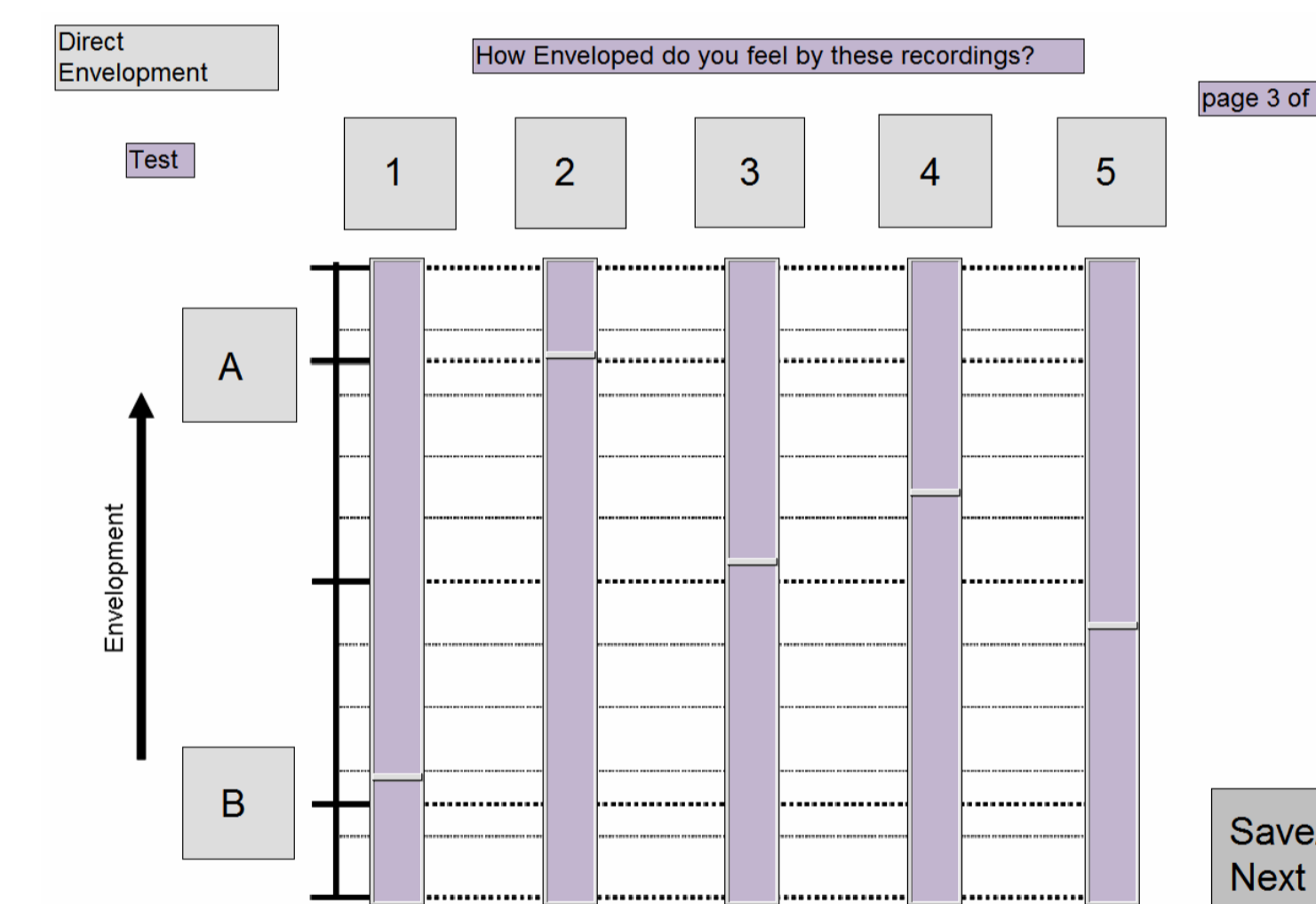
An 8 loudspeaker array was used, incorporating a constant power panning technique.

30 stimuli of varying envelopment; both synthesised and 'real' material.

2 anchors: A = high direct envelopment, B = low direct envelopment.

19 listeners from the IoSR.

Question: How enveloped do you feel by these recordings?



### References

Webster's Dictionary (1913)  
<http://www.bibliomania.com/2/3/257/frameset.html> [Accessed 15 January 2007]

Griesinger, David, (1996). "Spaciousness and envelopment in musical acoustics." AES.

Rumsey, Francis, (2001). "Spatial Audio." Focal Press, GB.