

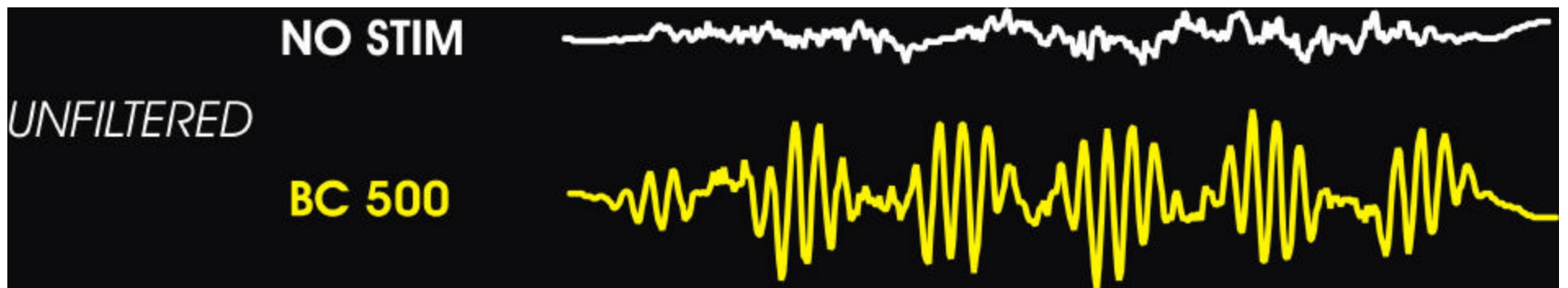
ARTIFACTUAL RESPONSES WHEN RECORDING AUDITORY STEADY-STATE RESPONSES

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STIMULUS ARTIFACT IN THE EEG: FILTER EFFECTS



ALIASING

Alias freq = absolute value (closest integer multiple of sampling freq – input freq)

Assuming the A/D converter sees energy originating from stimulus artifact above the Nyquist freq, aliasing is expected for the following carrier frequencies:

	<u>500 Hz</u>	<u>1000 Hz</u>	<u>2000 Hz</u>	<u>4000 Hz</u>
500-Hz A/D:	✓	✓	✓	✓
1000-Hz A/D:	X	✓	✓	✓
1250-Hz A/D:	X	X	X	X

**STIMULUS ARTIFACT
CANCELLATION:
“ALTERNATED STIMULUS POLARITY”**

ASSRs to inverted and non-inverted stimuli were averaged offline to obtain “alternated stimulus polarity”

STUDY CONDITIONS

MODE	Bone- (BC) air- (AC) conduction
INTENSITY	BC: 40, 50, 60 dBHL AC: 118-120 dBHL
CARRIER	BC: 500, 1000, 2000, 4000 Hz
FREQUENCY	AC: 500, 1000 Hz
MODULATION	BC: 77, 85, 93, 101 Hz
RATE	AC: 77,85 Hz
STIMULUS	
POLARITY	non-inverted, inverted, alternated
A/D RATE	500-, 1000-, 1250-Hz A/D
SAMPLE SIZE	BC: 3-9 subjects (7-9 @ 50 dBHL) AC: 4-6 subjects

PRESENCE OF ARTIFACT

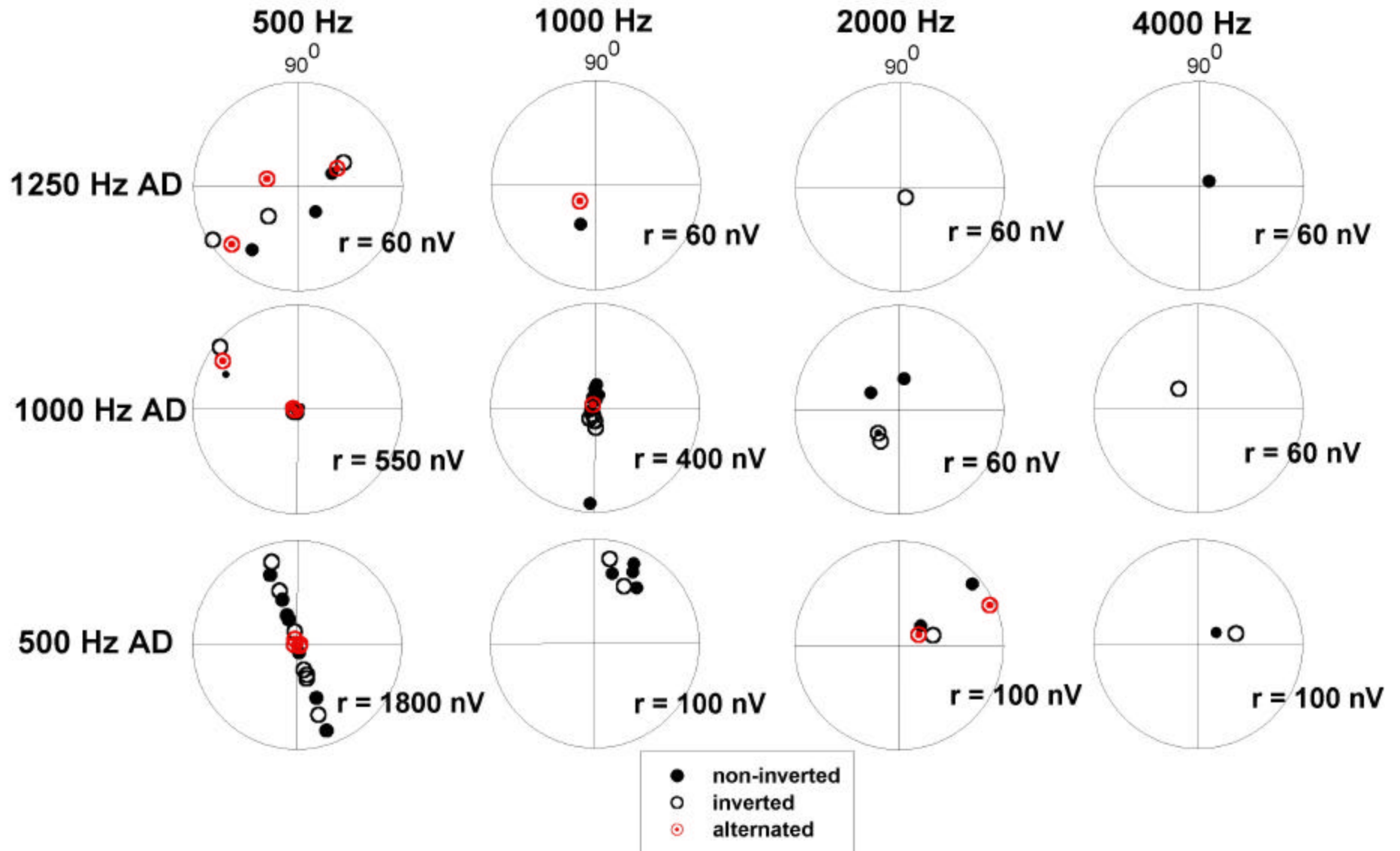
ASSR is considered to be present if $p < .05$

If the number of responses present are significantly greater than the 5% expected by chance, the response is deemed to be *artifactual* for that condition.

RESULTS

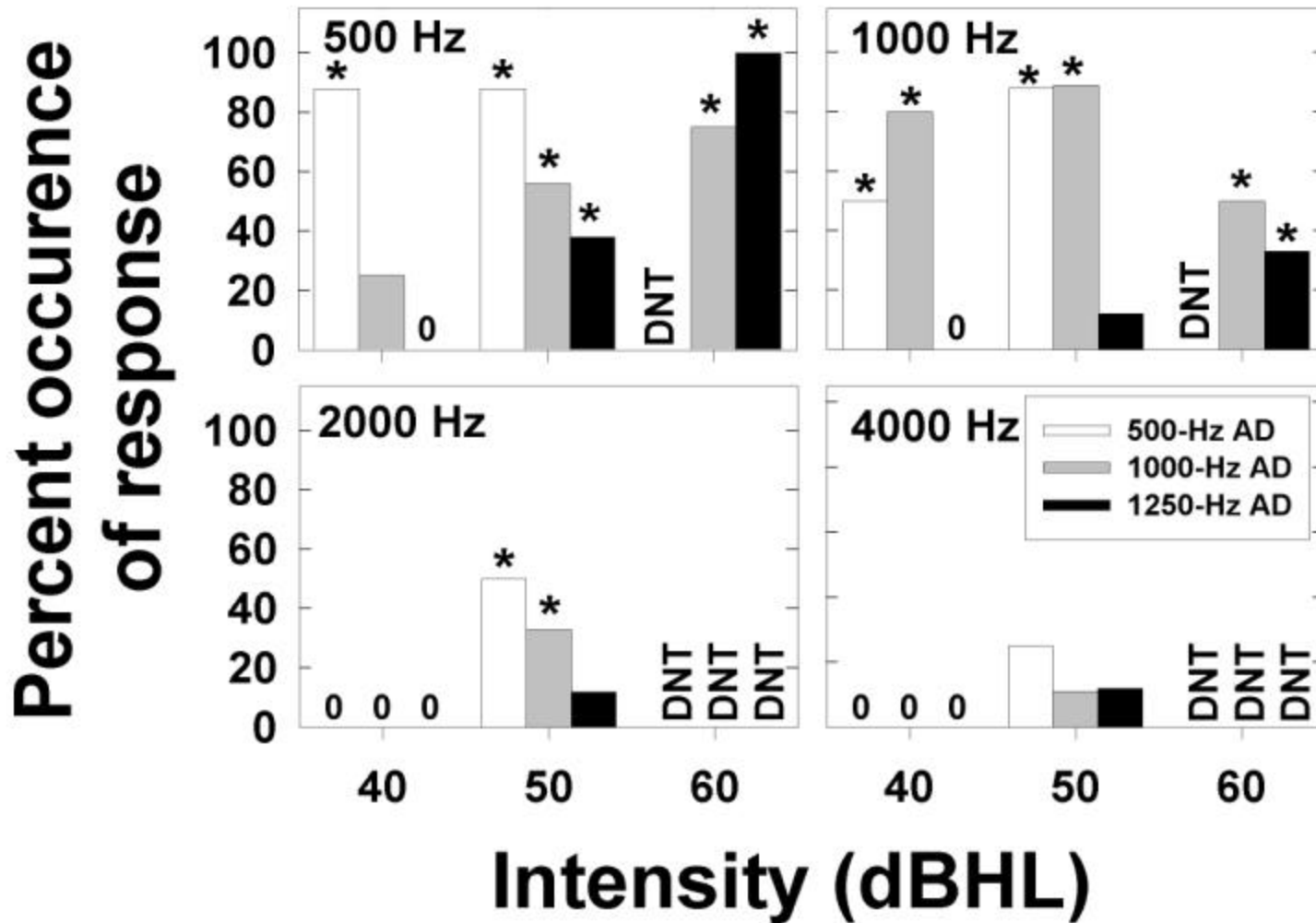
BONE CONDUCTION @ 50 dBHL

Severe-to-profound hearing loss



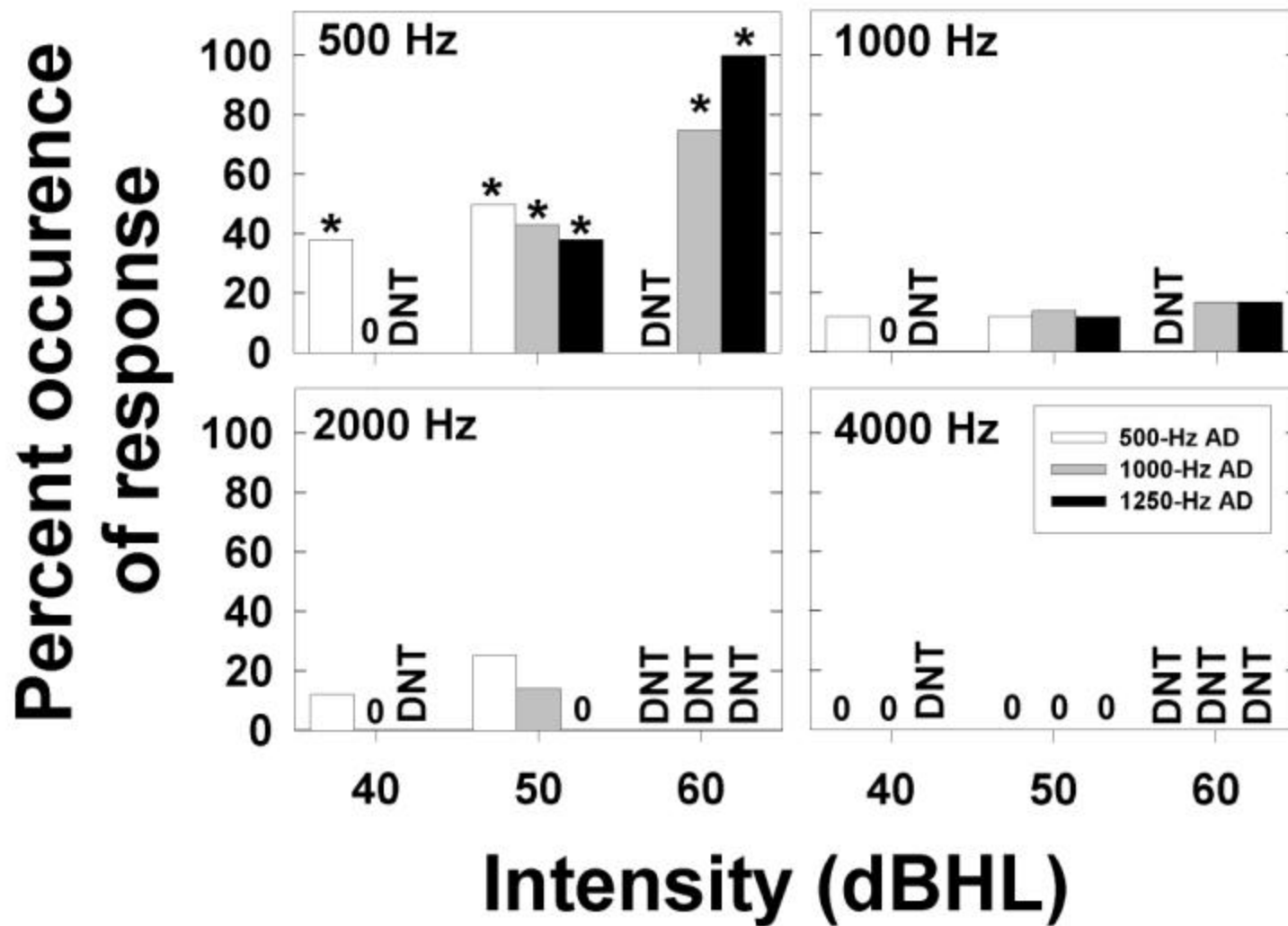
BONE CONDUCTION

Single stimulus polarity



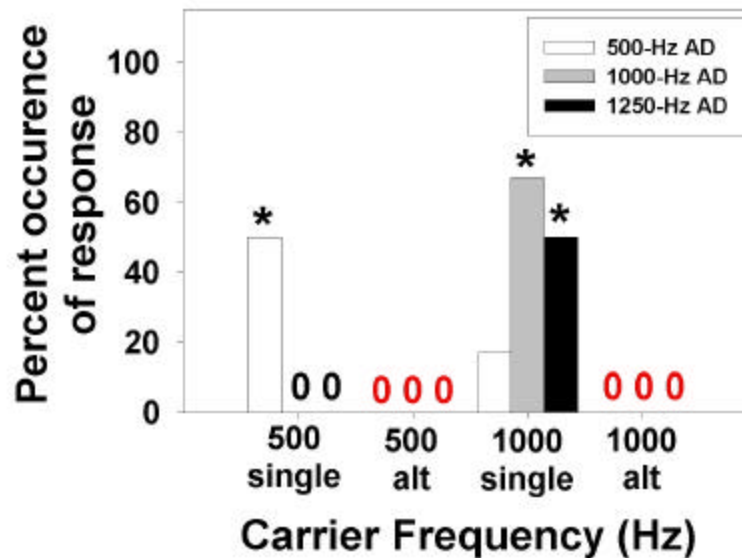
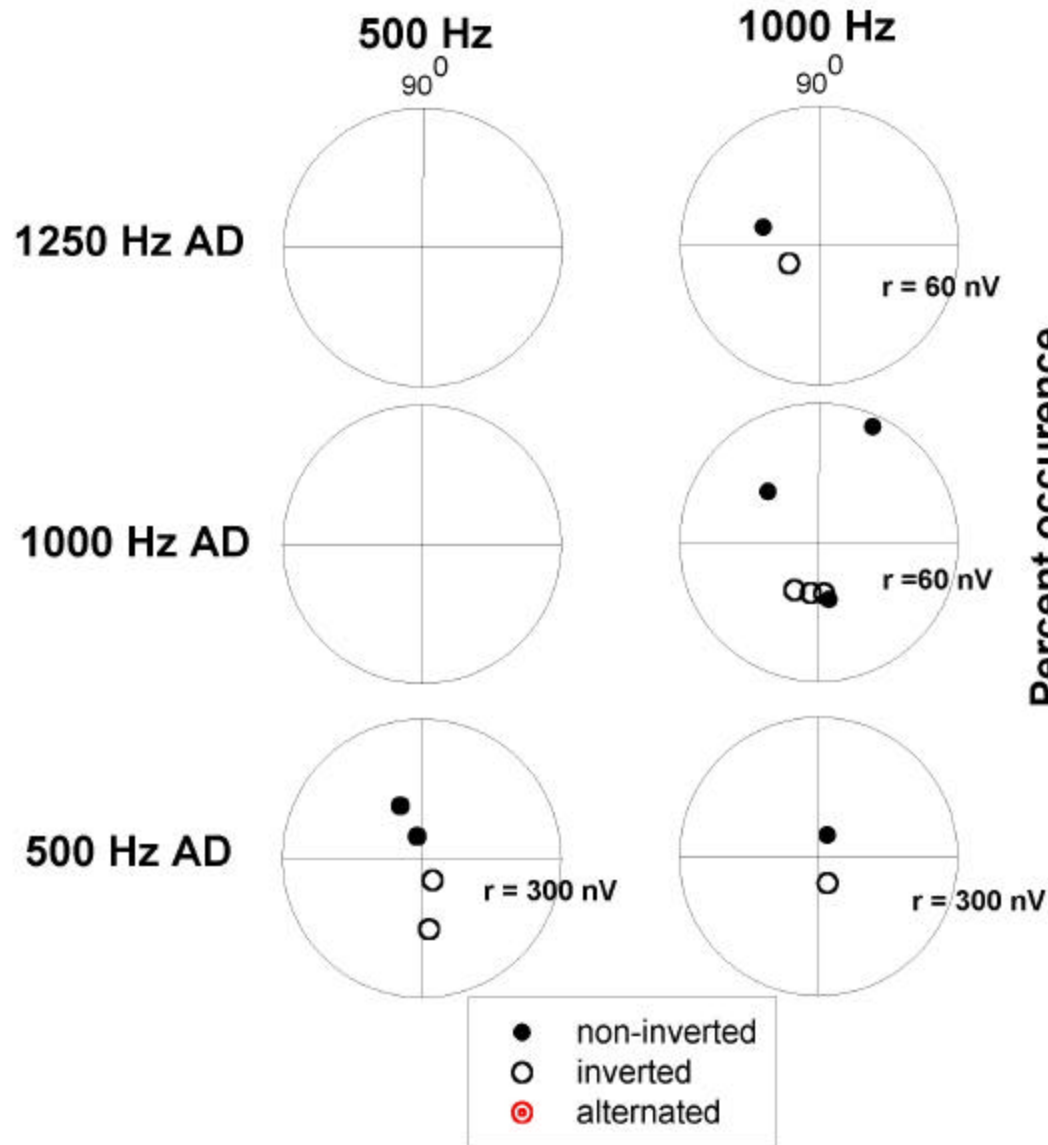
BONE CONDUCTION

Alternated stimulus polarity



AIR CONDUCTION @ 118-120 dBHL

Severe-to-profound hearing loss



CONCLUSIONS

- High intensity bone- and air-conduction stimuli can produce spurious steady-state “responses” to 500- and 1000-Hz carrier frequencies.
- High-amplitude stimulus artifact can result in energy that is aliased at exactly the modulation rate.
- Alternating stimulus polarity helps reduce spurious responses related to stimulus artifact.
- Artifactual responses, due to causes other than aliasing, may occur for bone-conduction stimuli ≥ 50 dBHL (and possibly for air-conduction)
- Some artifactual responses may be physiologic, perhaps vestibular, in origin.