A Concise Vocabulary of Audiology and allied topics

Part 1: Vocabulary

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This on-line version contains some additional material not in the original printed version

The Preface to the original version is reprinted below

Term		Definition
acoustic admittance		Reciprocal of acoustic impedance.
acoustic coupler		A cavity of specified shape and volume which is used for the calibration of an earphone in conjunction with a calibrated microphone to measure the sound pressure developed within the cavity. Compared to an artificial ear, a coupler embodies only a rough approximation to the acoustic properties of the human ear but has the advantage of simple design and construction.
acoustic feedback		In hearing aids, the condition in which the amplified acoustic signal leaks from the ear canal, is picked up by the microphone and then re-amplified, resulting in a howling or whistling sound. The term is also applied to the feedback sound itself.
acoustic gain		As applied to the testing of a hearing aid, the difference between the output sound pressure level developed in the acoustic coupler or occluded-ear simulator and that measured at the position of the hearing aid microphone. The particular conditions of test have to be specified. Sometimes called transmission gain.
acoustic impedance		Quotient of a sound pressure by the volume velocity produced by it.
acoustic nerve		Alternative term for the cochlear nerve.
acoustic neuroma		Common term for a non-malignant tumour on the VIIIth cranial nerve which, by invading the intracranial spaces, becomes life-threatening. It causes ataxia and neural hearing loss. Also termed vestibular schwannoma or acoustic neurinoma.
acoustic reflex		Contraction of the middle-ear muscles, stapedius and/or tensor tympani, as a normally bilateral response to an acoustic or other eliciting stimulus (which is not necessarily bilateral). The amount of contraction and subsequent acoustic reflex decay (ARD) are measured

		by immittance audiometry. The reflex is commonly described as ipsilateral or contralateral, depending on which side the response is observed relative to the stimulus.
acoustic reflex threshold	**ART**	Of an ear and for a specified type of sound, the lowest level of that sound which elicits the acoustic reflex. The reflex is recognized by a change in aural immittance as an increasing stimulus level reaches and surpasses the acoustic reflex threshold. The ART is conventionally expressed in terms of hearing level but use of sensation level is an aid to diagnosis.
acoustic trauma		Instantaneous injury to, or destruction of, a component or components of the auditory system resulting from exposure to a very high transient sound pressure, e.g. from explosion or weapons fire. The term is not to be confused with noise-induced hearing loss from chronic exposure or with barotrauma.
action level		One of three levels of noise specified in the now superseded Noise at Work Regulations 1989. First action level: a daily personal noise exposure of 85 dB(A); second action level: a daily personal noise exposure of 90 dB(A); peak action level: a peak sound pressure of 140 dB(C). These levels define various actions to be taken by employer and employee.
action value		One of three values of noise specified in the current Control of Noise at Work Regulations 2005. Lower exposure action value (LEAV): a daily or weekly personal noise exposure of 80 dB(A) or a peak sound level of 135 dB(C); upper exposure action value (UEAV): a daily or weekly personal noise exposure of 85 dB(A) or a peak sound level of 137 dB(C); exposure limit value (ELV): a daily or weekly exposure of 87 dB(A) or a peak sound pressure of 140 dB(C). These levels define various actions to be taken by employer and employee.
admittance		See immittance.
afferent		Pertaining to that portion of a neural pathway carrying sensory information to the brain.
ageing loss		Loss of hearing sensitivity due exclusively to biological ageing. Practical values of threshold shift as a function of age and sex are standardized internationally for otologically normal persons.
age-associated hearing loss	**AAHL**	Hearing loss consisting primarily of ageing loss and accumulated nosoacusis. In practice, the term is often used loosely when additional time-related components are present, e.g. socioacusis. Sometimes called age-related hearing loss (ARHL). Contrast with presbyacusis.
air-bone gap	**ABG**	Of an ear, hearing threshold level by air conduction minus that by bone conduction.
air conduction	**a-c**	The transmission of sound through the external and middle ear to the cochlea.

alternate binaural loudness balance	**ABLB**	See loudness balance.
alternating force level		Alternative term for vibratory force level
ampulla		The enlarged section of each semicircular canal which accommodates the sensory organs of dynamic balance.
anacusis		Total deafness, unilateral or bilateral.
anechoic		Descriptive of a space which is characterized by total (or near-total) absence of acoustic reflections.
antihelix		The ridge of cartilage of the pinna roughly parallel to the helix.
antitragus		Within the pinna, the indistinct cartilaginous ridge which could be considered to form the inferior termination of the antihelix. It is separated from the tragus by the intertragal (or intertragic) notch.
apical turn		The final turn in the spiral of the cochlea furthest from the oval and round windows. It contains that part of the organ of Corti which responds to low frequencies.
apportionment		In the context of hearing disability assessment, the division of one or more measures of malfunction of the auditory system, or their effects, into components attributable to various causes according to their relative contributions (known, inferred or estimated). In its quantitative connotation, the term is applied to percentage disability or, for some purposes, to threshold shifts in decibels.
articulation		Term deriving from telephony and speech science, sometimes mistakenly used to signify intelligibility in speech audiometry.
articulation index	**AI**	An index of the intelligibility of speech, calculated from the amounts by which the sound pressure levels of the speech in a number of specified frequency bands exceed those of the background noise in the respective bands. In its original form, calculation of the articulation index required 20 frequency bands of irregular bandwidths; practical versions also exist, e.g. one based on one-third octave bands. The index ranges between 0 and 1; intermediate values relate to the percentage of speech elements (open or closed sets of words or sentences) likely to be correctly recognized in communication between typical talkers and listeners. The AI has now been superseded by the Speech Intelligibility Index, SII.
artificial ear		A device for the calibration of an earphone which presents to the earphone an acoustic impedance equivalent to that presented by the average human ear. It is equipped with a calibrated microphone for the measurement of the sound pressure developed

		by the earphone. Artificial ear should not be confused with acoustic coupler. See also ear simulator.
artificial mastoid		A device, incorporating a mechanoelectrical transducer, for loading a bone vibrator dynamically and statically, enabling the bone vibrator to be calibrated. The mechanical impedance of the device is designed to simulate that presented to a vibrator when placed on the average human mastoid. The practical version of this device is termed mechanical coupler.
assumed protection		Of a personal hearing protector, at a specified frequency. In British practice, the mean attenuation minus the standard deviation for typical wearers, as determined by a standard procedure.
ataxia		Loss of the ability to govern movement, although the power necessary to make the movements is still present.
atrium		See tympanic cavity.
attack time		Of a system with automatic gain control, the time interval between the moment when the input signal level is increased abruptly by a stated number of decibels and the moment when the output signal level stabilizes at the elevated steady-state level within a certain tolerance. For hearing aids, this tolerance is ±2 dB.
attenuation		Reduction of transmitted power in decibels (dB). Also applied to field quantities, e.g. sound pressure.
attic		See tympanic cavity.
audio frequency		Any frequency or band of frequencies within the range of human hearing. This is variously understood to mean 16 or 20 Hz to 16 or 20 kHz, according to the application.
audiogram		Pure-tone audiogram: a chart or table of a person's hearing threshold levels for pure tones at different frequencies. See also speech audiogram.
audiometer		An electroacoustical instrument, equipped (for air conduction) with earphones and headband, which provides pure tones at specified frequencies and known sound pressure levels, used to determine hearing threshold levels, one ear at a time. For bone conduction, the audiometer is also equipped with a bone vibrator. For clinical use, both air and bone facilities are required, as well as means of generating calibrated masking noise. An input port is also usually provided for connection to an external signal source, e.g. speech when using the equipment for speech audiometry. There are three main subdivisions as follows: (a) Manual audiometer: one in which the signal presentations, the selection of frequency and hearing level, as well as the noting of the subject's responses, are performed manually.

		(b) Automatic-recording audiometer (also called self-recording audiometer): one in which the signal presentations and the changes of hearing level and frequency are implemented automatically at set rates; only the direction of hearing level change is under the subject's control. Recording of the subject's responses is also done automatically. An automatic-recording audiometer may have facilities for presenting fixed frequencies or a continuously-variable (sweep) frequency, or both; it may also provide continuous as well as pulsed tone outputs. See Bekesy audiometry. (c) Computer-controlled audiometer: one in which the test procedure is controlled by a computer or microprocessor. Often, the hearing threshold levels are calculated by pre-set program, for display or print-out.
audiometric frequencies		The series of frequencies conventionally employed in pure-tone audiometry. It consists of the preferred frequencies at one-octave intervals from 125 to 8 000 Hz supplemented by 750, 1 500, 3 000 and 6 000 Hz; 750 and 1 500 Hz may be omitted. Reference equivalent threshold sound pressure levels (RETSPLs) are also standardized for the preferred frequencies at one-third octave intervals, but these are rarely used.
audiometric zero		For pure-tone air-conduction audiometry: a set of sound pressure levels of pure tones at audiometric frequencies, intended to typify the threshold of hearing of young otologically normal persons. For each frequency, the value is expressed by the sound pressure level measured in an acoustic coupler or artificial ear when the earphone, driven by a specific electrical signal, is placed on it. This value is known as the reference equivalent threshold sound pressure level (RETSPL) for the frequency in question. The specific electrical signal is such that the sound pressure level it generates under the earphone when placed on the average human ear corresponds to the mode (or modal value) of the thresholds of hearing of a group of young otologically normal persons of both sexes within a specified age range. For pure-tone bone-conduction audiometry: the audiometric reference zero is defined analogously as a reference equivalent threshold (vibratory) force level (RETFL) when the bone vibrator is loaded by a specified mechanical coupler. Note: Prior to 1987, the audiometric zero for bone-conduction audiometry was specified in terms of acceleration level; this usage is now obsolete. The values of RETSPL for commonly-used earphones and the RETFL for bone vibrators are given in BSI and ISO documents. The term audiometric zero is also taken to mean the 0 dB HL line on audiogram charts.

audiometry		Measurement of auditory function. See automatic-recording audiometry; Bekesy audiometry; electric response audiometry; immittance audiometry; monitoring audiometry; pure-tone audiometry; screening test; sound field audiometry; speech audiometry.
auditory brainstem response	**ABR**	See electric response audiometry.
auditory critical band		One of a number of contiguous bands of frequency into which the audiofrequency range may be notionally divided and which reflect certain aspects of auditory perception related to the frequency domain. The associated bandwidth may differ according to the aspect tested and also with the conceptual model of the cochlear mechanism involved (see examples below). Critical band for loudness (also known as frequenzgruppe): of sound having a finite bandwidth, the widest such band for which the loudness is independent of the bandwidth provided that the sound pressure level is held constant. The critical bandwidth for loudness can be determined by comparing the loudness of band-limited segments of white noise for which the sound pressure spectral density is progressively decreased whilst the bandwidth is correspondingly increased so as to maintain constant sound pressure level; the point beyond which the loudness is no longer constant defines the critical bandwidth. Critical bands for loudness enter into certain standardized procedures for calculating the loudness of sounds, where they are approximated by one-third octaves centred from 315 Hz upwards and by larger fractions for the lower frequencies. Critical band for masking: in the context of the masking of a pure tone at a specified frequency by noise having a continuously-distributed spectrum over a band centred on that frequency, the widest such band for which the masking effectiveness is independent of its bandwidth provided that its sound pressure level is held constant. If the bandwidth of the masker is increased beyond this point, a previously just-masked tone becomes audible; alternatively the sound pressure level of the masker has to be increased to maintain the tone at the threshold of audibility. The term critical band is also sometimes used with a related but different meaning; see critical ratio.
auditory filter		One of a set of notional elements of the auditory system by which the ear analyses the frequency content of an input sound in a manner analogous to a bank of electrical bandpass filters. The bandwidth of each element is related to that of the auditory critical band and of the tuning curve.
auditory tube		See Eustachian tube. This term is not to be confused with external ear canal.

aural harmonic		In response to a pure-tone acoustic input to an ear, an additional component generated by nonlinearity in the auditory pathway.
auricle		Alternative term for the pinna.
automatic gain control	**AGC**	A means by which the gain of a system is automatically controlled as a function of the magnitude of the envelope of the input signal or other signal parameter.
automatic-recording audiometry		Method of determining hearing thresholds for pure tones, mainly used in hearing conservation, as described under audiometer (b).
automatic volume control	**AVC**	General term for any means of limiting the maximum output level of a system. It embraces linear means automatic gain control) and nonlinear means such as dynamic range compression and peak clipping of the signal waveform.
A-weighted sound pressure level		The sound pressure level of a signal which has been passed through an A-filter whereby both low- and high-frequency components are attenuated without affecting the components near 1000 Hz; symbol L_A. The unit is the decibel, but it is usual to distinguish between this and other uses of the decibel by writing the unit as dB(A). See frequency weighting.
background noise		See noise (1).
backward masking		The perceptual process whereby a segment of one sound is masked by another which seemingly has not yet started; the masking effect appears to occur before the masker is actually present. In experimental paradigms, the masker is usually a noise and the maskee a brief tone burst.
band-pass filter		A filter designed to transmit that portion of the spectrum of an input signal in a given frequency band whilst attenuating other parts of the spectrum. The pass band may be specified in hertz (Hz), or in multiples or fractions of an octave band, or as a percentage of the centre frequency.
band-stop filter		A filter designed to transmit the spectrum of an input signal except for that portion of the spectrum in a specified frequency band. Also known as a band-rejection filter.
bandwidth		The difference between the upper and lower limits of a frequency band. Bandwidth may be expressed in hertz (Hz), as a fraction of an octave band, or as a percentage of the geometric centre frequency.
Barany box **Bárány box**		Clockwork noise generator used when necessary as a masker in tuning fork or clinical speech tests.
bark		Unit in a distorted frequency scale defined by dividing the audio frequency range into contiguous auditory critical bands for loudness, each with a width of 1 bark. The audio frequency range conventionally embraces 24

		of these critical bands. In order to relate values in the two scales, the preferred frequency 1 000 Hz is identified with the centre of the ninth band, which ranges from 920 to 1 080 Hz, that is, from 8 to 9 barks. See critical-band rate.
barotrauma		An injury to the ear due to rapid changes in the ambient atmospheric pressure, e.g. decompression at high altitude. Most commonly, the middle ear is affected, resulting in a conductive hearing loss. Rarely, the inner ear is involved with consequent sensory hearing loss and disturbance of balance. Barotrauma is distinct from acoustic trauma.
basal turn		The first turn of the spiral of the cochlea; the turn which contains the oval and round windows. It contains that part of the organ of Corti which responds to high frequencies.
baseline audiogram		In the context of monitoring audiometry for hearing conservation purposes, the first audiogram in a regular series. The term has alternative interpretations: it may refer to the state of hearing before any significant occupational noise exposure, or to each pre-exposure audiogram with successive employers.
basilar membrane		The membrane separating the *scala media* from the *scala tympani*, running the whole length of the cochlea. The basilar membrane supports the organ of Corti.
Bekesy audiometry **Békésy audiometry**		A form of automatic-recording pure-tone audiometry employing a continuous frequency sweep (glide tone). Use of the eponymous term should be confined to its original meaning to distinguish Bekesy audiometry from fixed-frequency automatic-recording audiometry, sometimes called self-recording audiometry. Among its clinical uses is the demonstration of threshold tone decay by making use of the difference between thresholds obtained with pulsed- and continuous-tone presentations.
benign paroxysmal positional vertigo	**BPPV**	Episodes of rotary vertigo, usually lasting less than a minute, provoked by certain bodily movements or taking up certain postures. The sensation fatigues on repeat provocation. Sometimes abridged to benign positional vertigo (BPV).
bilateral		Pertaining to or occurring on both sides, for example of the head.
binaural		Pertaining to listening with both ears.
binaural masking level difference	**BMLD**	The reduction, in decibels, of masking when a complex sound containing a maskee component and a masker is presented first diotically and then with the polarity (phase) of the maskee reversed in one ear. In audiology, the maskee is usually a tone.

binaural squelch		The effective increase in signal-to-noise ratio conferred by binaural hearing when the signal source and noise source lie in different directions with respect to a listener. The binaural squelch effect arises out of cues available from differences in sound pressure level and time-of-arrival of the signal at the two ears.
Bing test		A tuning-fork test which detects small conductive hearing losses, based on a monaural loudness comparison between open and occluded external ear canal conditions when the fork is applied to the ipsilateral mastoid. One method of occlusion is by pressing on the tragus. The patient with a conductive loss will not perceive a difference between the open and occluded conditions. See occlusion effect.
bone conduction	**b-c**	The transmission of sound to the cochlea mediated by mechanical vibration of the skull.
bone vibrator		An electromechanical transducer designed to excite the sensation of hearing by vibrating the skull.
bony labyrinth		Tortuous series of interconnected passages hollowed out from the temporal bone, partly occupied by the membranous labyrinth with the remaining space being filled with perilymph. Functionally the labyrinth comprises two sections: in front, the cochlea, concerned with hearing; behind, the utricle, saccule and semicircular canals, concerned with balance. Also known as the osseous labyrinth.
brainstem evoked response	**BER**	See electric response audiometry.
broadband noise		See noise (2).
BS		Designating prefix for a Standard issued by the British Standards Institution. BS EN indicates that the Standard is derived from and is identical to the EN (European) Standard with the same number. Likewise, BS ISO indicates that the Standard is identical to the International Standard with the same number.
caloric testing		Procedure for evoking a response from the left and right vestibular organs (in particular the horizontal semicircular canals) individ-ually without movement of the head. This is achieved by irrigating the external ear canal with water or air at temperatures first above and then below body temperature. The technique permits the detection and quantification of unequal function of the left and right vestibular organs. Caloric testing exploits the principle that a hot stimulus applied to one side produces nystagmus in the same direction as a cold stimulus applied to the other. By measuring the nystagmus caused by applying both stimuli to both sides in succession, quantitative estimates may be derived for directional preponderance and for the severity of a canal paresis.

canal caps		Type of hearing protector comprising a pair of stoppers held in place at the entrance to the ear canals by a lightly-sprung band.
canal paresis	**CP**	Dysfunction of one or more semicircular canals resulting in an abnormal neural response. If the condition is unilateral, or bilateral but asymmetrical, its presence can be revealed by caloric testing.
Carhart effect		A phenomenon observed in hearing by bone conduction in the presence of a conductive lesion in the middle ear; it is most often seen in cases of otosclerosis. The effect is observed as a depression (worsening) in the bone-conduction audiogram, maximally around 15 dB at 2 kHz; this audiometric configuration is known as the Carhart notch. The Carhart effect is due to the fact that a middle-ear lesion not only attenuates signals in the normal air-conduction pathway but also affects the transmission of bone-conducted signals to the cochlea. The result is that the observed air-bone gap in such cases underestimates the true attenuation in the air-conduction pathway.
carrier phrase		In speech audiometry, a constant group of words used to precede or surround each target item in the speech material.
central auditory dysfunction	**CAD**	A disorder of the auditory nervous system, the site of which is generally understood to be at or above the level of the brainstem. Also known as central auditory processing disorder.
cholesteatoma		A mass of desquamated epithelium (keratin) usually originating in a retraction pocket in the outer surface of the eardrum in chronic otitis media. Once it invades the middle ear ("skin in the wrong place"), it lays down concentric layers of keratin and, despite a putty-like consistency, is capable of eroding bone and exposing neighbouring structures. When secondary infection supervenes, intracranial complications such as meningitis, brain abscess or facial palsy may follow.
circumaural earphone		An earphone designed to enclose the entire pinna.
cochlea		The spiral-shaped organ of the ear wherein the motion of the ossicles is transduced into electrical nerve impulses by the action of the hair cells.
cochlear duct		Alternative term for *scala media*.
cochlear implant		A form of hearing prosthesis for severely or profoundly hearing-impaired persons. It consists of an external microphone, signal processor and transmitter, and an implanted receiver. The receiver sends signals to an array of electrodes, placed surgically within the cochlea, in order to stimulate various portions of the cochlear nerve as if by sound, albeit with distortion of the original acoustic input. Sometimes referred to informally as a "bionic ear".

cochlear nerve		The branch of the VIIIth cranial nerve serving the cochlea, running from the hair cells of the organ of Corti via the internal auditory meatus to the cochlear nucleus in the brainstem.
cochlear partition		Omnibus term for the structures of the cochlea which separate scala tympani from scala vestibuli.
comodulation masking release	**CMR**	Release from masking of a signal (e.g. a pure tone) by a noise, having a temporally-modulated envelope and applied to the same ear, when a second noise, not necessarily the same as the first but having the same modulated envelope, is applied to the contralateral ear.
comparison method		In the context of electroacoustic instrument calibration, a method of measurement in which the test instrument and a reference transducer (standard microphone) employed to measure the free-field sound pressure are placed simultaneously at two acoustically equivalent points in the sound field.
complex tone		A signal consisting of a number of simultaneously occurring pure tones. See also frequency spectrum.
compliance		See immittance.
compression		See dynamic range compression.
concha		Deep depression in the pinna leading directly to the ear canal. The larger (lower) part is known as the *cavum concha*; the smaller part is the *cavum cymba*.
conductive hearing loss	**CHL**	Hearing loss caused by blockage of the external ear or by derangement of the middle ear, resulting in a reduction of sound energy reaching the cochlea (or inner ear).
contralateral		On, referring to, or applied to the opposite side (of the head).
contralateral routeing of signals	**CROS**	Sytem used in some hearing aids, especially in cases of severe unilateral hearing loss. The microphone is located on the side of the worse ear and the signal from it is fed to the better ear. The better ear also receives direct (unamplified) sound through a vented earmould. Derivatives of the CROS system include BICROS (in which the better ear receives an additional signal from a second microphone placed on the better-hearing side) and CRIS-CROS (which consists of a pair of CROS aids).
cortical electric response audiometry	**CERA**	See electric response audiometry.
coupler		See acoustic coupler mechanical coupler.
crista		A sensory organ of the balance system. There is a *crista* within the *ampulla* of each semicircular duct, functionally analogous to the organ of Corti in the cochlea. Hair cells line the crest of the *crista* and each

		hair cell has a *kinocilium* and multiple *stereocilia*. The *cristae* respond to angular acceleration. See *cupula*.
critical band		See auditory critical band.
critical-band rate		Scale of frequency the unit of which is the bark. The word *rate* in this term may be understood in the sense that frequency itself is a rate of occurrence, *viz*. cycles per second.
critical ratio		A quantity having the dimension of frequency, defined as follows. Given a broadband random noise of approximately uniform spectral density, and a pure tone which is just audible in the presence of that noise, the ratio of the square of the tone sound pressure (Pa^2) to the sound pressure spectral density of the noise (Pa^2/Hz) in the neighbourhood of the tone frequency. The critical ratio is related to the width of the corresponding auditory critical band, normally being about 40% of the latter.
cross hearing		In audiological testing, hearing by the non-test ear, usually unintentional. See transcranial transmission loss.
cupula		A gelatinous structure within each of the three semicircular ducts. The *cupulae* have a functional relation to the crista which is analogous to that of the tectorial membrane to the hair cells in the cochlea.
curve walking		A procedure for retrospectively charting the probable time course of noise-induced permanent threshold shift (NIPTS) from a knowledge of a person's daily noise exposure over a succession of known time periods. The hearing threshold level at the end point of each exposure period determines the starting hearing threshold level for the next period, subject to the proviso that hearing threshold level never decreases over the whole period.
daily personal noise exposure	$L_{EP,d}$	See noise exposure level.
damage-risk criterion		Term used to describe a physical measure of exposure to noise specifying a notional boundary between harmful and harmless to human hearing. In practice, the term is to be avoided as it implies an unrealistically sharp dividing line.
data base		In the audiometric context, an ensemble of values representing, for a specified population of each sex and for each audiometric frequency, the statistical distribution of air-conduction thresholds as a function of age. Data base A refers to otologically normal persons; the thresholds are expressed in decibels relative to the median value at 18 years. Data base B refers to general populations (not restricted to otologically normal persons); unlike data base A, the values are not unique, but population-dependent.

datum level of masking noise		In the context of bone-conduction audiometry, the level, expressed as hearing level, of a one-third octave band of noise delivered by air conduction in the presence of which a pure tone at the centre frequency of the noise band and at a hearing level of 35 dB is just audible, on the basis of 50% detection in repeated trials by an otologically normal person having zero hearing threshold level by air conduction for that pure tone. Note: The value of 35 dB was adopted arbitrarily. It corresponds to the condition specified in the International Standard for the audiometric zero by bone conduction. However, this specification does not imply the adoption of 35 dB of masking noise for clinical practice.
deafness		The term has at least two meanings: (a) the state of total or near-total extinction of hearing function in one or both ears; (b) less specifically, a hearing loss of any degree, sometimes qualified by a preceding adjective e.g. mild, moderate, severe, profound.
decibel	**dB**	The unit for measuring the relative magnitude of a quantity based on a logarithmic scale; symbol dB. See sound pressure level; A-weighted sound pressure level; hearing level; hearing threshold level.
dichotic		Describes the listening condition in which different signals are applied to the two ears. Contrast with diotic.
difference limen		The just-noticeable difference (jnd) of a perceived attribute of sound, expressed in terms of the corresponding physical quantity. For example, the jnd of pitch is expressed as a frequency increment in Hz; for loudness, the jnd is expressed as a decibel increment in sound pressure level.
diffuse (sound) field		A sound field of uniform energy density for which the directions of propagation of waves are random from point to point. See reverberant field.
diotic		Describes the listening condition in which the same signal is applied to both ears. Contrast with dichotic.
diplacusis		The sensation of unequal pitch in the two ears when presented with a sound of the same frequency (binaural diplacusis). The term monaural diplacusis refers to the condition in which a pure tone is perceived as distorted, noisy or buzzing.
direct field		Of a source of sound, that part of the sound field wherein the effects of any boundaries or enclosure can be neglected.
directional preponderance	**DP**	Nystagmus which exhibits a systematic tendency to be greater in one direction than in the other. The preponderance may be symptomatic of a mismatch between the function of left and right vestibular organs. The underlying condition may be investigated by means of caloric testing.

disability		In the general context of health experience, any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being (WHO definition). See handicap.
disablement		In the context of statutory compensation for industrial injury, an administrative measure of loss of bodily faculty.
discrete tone		A prominent component within a broadband noise signal which, together with its harmonics or overtones if any, is identifiable either by instrument or by ear and possesses a tonal quality.
discrimination score		Obsolete term for speech recognition score.
dosemeter (dosimeter)		See sound exposure meter.
ductus reuniens		The narrow section of the membranous labyrinth connecting the *scala media* of the cochlea to the vestibular saccule.
dynamic range		At a given point in a transmission system, the ratio of the maximum to the minimum signal which a system can handle, expressed in decibels. In the context of hearing, the term may be used in two senses. Qualitatively, it covers the perceptual range from just audible to painfully loud. Quantitatively, the dynamic range of the ear conventionally refers to the decibel interval between the threshold of hearing and the threshold of pain.
dynamic range compression		Reduction of the dynamic range of a system by imposing a nonlinear relationship between input and output signal amplitudes. Such compression may be applied in hearing aids. Other transmission systems may also incorporate a corresponding expansion to restore the original dynamic range.
ear canal		The air-filled duct between the concha and the eardrum, through which sound enters the middle ear. It is more formally called the external ear canal or external auditory meatus to distinguish it from the internal auditory meatus.
ear caps		See canal caps.
ear defender		Alternative term for earmuff.
eardrum		Common term for the tympanic membrane or tympanum.
ear insert		A device used to provide the acoustic coupling between a sound source and the external ear canal, for example, an earmould with or without a connecting tube.
ear-insert simulator		In the electroacoustical testing of hearing aids, a substitute for an earmould to provide the acoustic

		coupling between a hearing aid sound tube and the occluded-ear simulator.
earmould		In hearing aids, a device moulded to fit the concha and part of the ear canal, to hold the sound tube from the aid at a fixed position in the wearer's ear canal. The mould may be closed, vented or open (extreme vent), or contain specific acoustic elements, to adjust the frequency response of the aid. Vents also serve to aerate the inner portion of the canal. In hearing conservation, an earmould (without a sound tube or vent) constructed of flexible material can be used as a hearing protector.
earmuff		A hearing protector designed to enclose the pinna.
earphone		An electroacoustic transducer operating from an electrical system to an acoustical system and designed to be applied to the ear, usually without leakage.
earphone coupler		In American usage, a hearing aid test coupler of volume 2 cm^3. The various configurations for mating insert earphones to the coupler are referred to as "HA-1", "HA-2", etc.
earplug		A hearing protector which is inserted into the external ear canal.
ear protection zone		An area within a workplace marked for the obligatory use of hearing protectors by anyone entering the zone. The extent of the zone is defined in terms of daily personal noise exposure at or exceeding the second action level.
ear protector		See hearing protector.
ear simulator		Synonymous with artificial ear, but now the preferred term in IEC Standards.
effective masking level		The level of a specified masking noise in decibels, numerically equal to that hearing level of a given test sound to which the threshold of audibility of the notional normally-hearing young person would be raised by the presence of that masker. Effective masking level is thus analogous to hearing level; it is a measure of sound on a physical scale, independent of a particular ear under test. An analogous definition applies in the case of speech audiometry. See hearing level of speech; speech recognition threshold level; reference speech recognition threshold level.
efferent		Pertaining to a neural pathway conveying information from a higher to a lower level.
electric response audiometry	**ERA**	Measurement of auditory function by means of externally recorded electrical potentials evoked by acoustic stimuli applied to the ear. Techniques are distinguished according to the site of origin of the potential.

		Cortical ERA (CERA) records potentials from the auditory cortex; this is also known as slow vertex response (SVR). The auditory brainstem response (ABR) records potentials from the brainstem; this is also known as brainstem evoked response (BER). Electrocochleography (ECochG) records the potentials existing in and around the cochlea, using an electrode placed either externally or transtympanically. Other forms of ERA include recording of the postauricular myogenic response (PAM) and event-related potentials such as those used in deriving mismatch negativity.
electrocochleography	**ECochG**	See electric response audiometry.
electronystagmography	**ENG**	Measurement of nystagmus by means of externally recorded electric potentials. Also known as electro-oculography (EOG).
electrophonic effect		Sensation of hearing caused by electromagnetic radiation acting on the head. Sometimes understood to refer to a sensation of sound when an electric current is passed through the body.
EN		Designating prefix for a Standard ("Euronorm") issued by the European Committee for Standardization (CEN) and the European Committee for Electrical Standardization (CENELEC). EN ISO or EN IEC indicates that the Standard is derived from and is identical to the ISO or IEC Standard with a related number.
endolymph		The fluid contained within the membranous labyrinth. Its chemical composition differs from that of perilymph, resulting in a difference of electric potential (endocochlear potential) of about +80 mV between *scala media* and the perilymph of *scalae vestibuli* and *tympani*. The endocochlear potential is reduced to some +50 mV between the endolymph and perilymph in the semicircular canals.
endolymphatic hydrops		Distension of the membranous labyrinth due to excess endolymphatic pressure, resulting in malfunction of hearing and/or balance. See Meniere's disease.
epitympanum		See tympanic cavity.
equivalent air volume		Term used in immittance audiometry to represent the acoustic compliance of the tympanic membrane and its attached structures, usually expressed in cm^3. That volume of air which, when driven acoustically at a specified frequency, corresponds to a given value of the modulus (absolute value) of acoustic admittance or impedance. A conventional frequency for measurements is 226 Hz; at this frequency, an equivalent air volume of 1 cm^3 corresponds to an acoustic impedance of 10^8 $Pa.s/m^3$.

equivalent continuous sound pressure level	**$L_{eq,T}$. may be $L_{Aeq,T}$**	Of a sound which varies in level over a period of time, T, the sound pressure level of a notional unvarying sound which, for the same duration, would have the same energy as the varying sound; symbol $L_{eq,T}$. When this measure employs the A-weighting, it is also known as equivalent continuous sound level (symbol $L_{Aeq,T}$) or as time-average sound level (symbol $L_{A,T}$). See noise exposure level; sound exposure level.
equivalent threshold force level	**ETFL**	In the context of bone-conduction hearing by a given ear, the vibratory force level delivered by a bone vibrator to a specified mechanical coupler when the vibrator is activated by the same electrical signal as that which elicits the bone-conduction threshold of hearing of the given ear using the same vibrator under specified conditions. For an ensemble of such values from different listeners, the derived value (currently the mean) is termed the reference equivalent threshold force level; see audiometric zero.
equivalent threshold sound pressure level	**ETSPL**	For a given ear, the sound pressure level delivered by an earphone in a specified ear simulator or acoustic coupler when the earphone is activated by the same electrical signal as that which elicits the monaural threshold of hearing in the given ear using the same earphone. For an ensemble of such values from different listeners, a specified measure of central tendency (usually the modal value) is termed the reference equivalent threshold sound pressure level; see audiometric zero.
Eustachian tube		On each side, the narrow duct connecting the tympanic cavity to the nasopharynx. It is closed at rest but is opened naturally by the act of swallowing. This serves to equalize the air pressure on both sides of the eardrum. It may be opened deliberately by the Valsalva manoeuvre. The Eustachian tube is sometimes referred to as the auditory tube.
external ear		The first part of the auditory transmission chain, comprising the pinna and ear canal, and terminating at the eardrum.
feedback		See acoustic feedback.
fenestra cochleae		Alternative term for the round window of the cochlea.
fenestra vestibuli		Alternative term for the oval window of the cochlea.
filter		A device which modifies the frequency spectrum of a signal, usually while it is in electrical form.
force level		Alternative term for vibratory force level.
formant		Of a sound having a broadband frequency spectrum, a frequency band surrounding a local peak in the spectrum. The term is usually applied to the vowel sounds of speech, the formants corresponding to vocal tract resonances. The fundamental vibration of the vocal

		cords is denoted by the frequency F0; higher speech formants are numbered F1, F2, etc. in ascending order of frequency.
forward masking		The perceptual process whereby a segment of one sound is masked by another which has already ceased. The masking effect appears to carry over, or cast a shadow, in time. In experimental paradigms, the masker is usually a noise and the maskee a brief tone burst.
free (sound) field		A sound field within a given volume of space wherein the effects of any boundaries are negligible throughout the volume. These conditions are met in the central region of an anechoic chamber.
frequency	***f***	The rate of oscillation of an acoustic or vibratory signal, symbol *f*. The unit is the hertz (Hz), one complete oscillation per second. High frequencies can conveniently be expressed in kilohertz (kHz).
		Measurements in acoustics and audiometry are normally carried out using standardized sets of preferred frequencies and audiometric frequencies respectively.
frequency band		A frequency interval which includes all the frequencies in the range between a lower and an upper limit. See bandwidth.
frequency response		The output amplitude of a system as a function of frequency, for a constant input amplitude. In relation to the performance of hearing aids, the sound pressure level developed in a coupler or ear simulator, under specified test conditions, expressed as a function of frequency for a sound of constant input level.
frequency selectivity		That faculty of the auditory system whereby components of a compound acoustic signal can be individually distinguished in the frequency domain. The selectivity is related to sharpness of the tuning curves of the listener.
frequency spectrum		The distribution of the power in a signal as a function of frequency. A signal having a continuous spectrum (for example, white noise) contains energy in every interval of frequency, no matter how narrow, within the overall bandwidth of the signal. The spectrum of a pure tone consists of a single component at one frequency; that of a complex tone consists of a finite number of components at different frequencies. Note that a pure tone has zero bandwidth but an infinite spectral density. The combined spectrum of noise and tone can therefore only be depicted graphically in the discontinuous form of band sound pressure levels of selected bandwidth.
frequency weighting		Modification of the frequency spectrum of a signal by means of a filter having one of the standardized response characteristics known as A, B, C, etc. The weighting is usually embodied in the electronic circuitry

		of sound level meters, the A-weighting being the most commonly used.
fusion frequency		The repetition rate above which a succession of brief sounds are no longer heard as separate events.
genuine hearing threshold level	**GHTL**	In the context of hearing disability assessment, a hearing threshold level which is known, or has been confirmed, to be a true measure within normally-accepted uncertainty limits.
glue ear		A pathological condition of the tympanic cavity in which a highly viscid exudate is unable to escape down the Eustachian tube by natural means. It occurs almost exclusively in children, usually following *otitis media*. Often referred to as *otitis media* with effusion (OME).
HA-1, HA-2, HA-3		See earphone coupler.
hair cell		A specialized type of nerve cell, found in the organ of Corti and in the *cristae* and *maculae* of the organs of balance.
half optimum speech recognition threshold level	**HOSRTL**	For a given listener with a maximum speech recognition score of less than 100%, for a specified speech material and a specified manner of signal presentation, the lowest hearing level of speech at which half of the maximum speech recognition score is obtained. In the case where the maximum speech recognition score is 100%, the unqualified term speech recognition threshold level applies.
half-peak level elevation	**HPLE**	Obsolete term for half optimum speech recognition threshold level.
Hallpike manoeuvre		Clinical test for benign paroxysmal positional vertigo associated with neck position. The patient's head is turned to one side, and the patient is moved from the seated to the supine position with the head overhanging the end of the table. Nystagmus and report of vertigo are noted. Also known as the Dix-Hallpike manoeuvre.
handicap		In the general context of health experience, a disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfilment of a role that is normal (depending on age, sex, and social and cultural factors) for that individual (WHO definition). Note: Usage differs in North America, where the term handicap corresponds more closely to the WHO definition of disability.
head-and-torso simulator	**HATS**	A device simulating the geometry of the average human head, including the external ears, and the upper torso. It is equipped with microphones at the positions corresponding to the eardrums. One form of HATS is standardized internationally. The generic term manikin is also used for head-and-torso simulators.

headphones		An assembly comprising two supra-aural earphones and a headband or equivalent device to hold these in place with a specified force.
head shadow		The frequency-dependent effect of acoustic diffraction around the head, observed as the difference of sound pressure level between the ears when one ear faces a source of sound and the other is shielded from it. The term is not to be confused with shadow hearing, cross hearing or transcranial transmission loss.
hearing acuity		Term used to describe the overall status of a person's hearing capability (hearing thresholds, frequency discrimination and selectivity, temporal resolution, etc). Contrast with hearing sensitivity which refers only to the person's thresholds of hearing.
hearing aid		A prosthetic device to aid the perception of sound. The output signal may be presented acoustically, by bone vibration, or by direct electrical stimulation (see cochlear implant). The term is also applied to devices taking advantage of other sensory modalities, e.g. vibrotactile aids.
hearing level	**HL**	Of a pure tone generated by a specified type of transducer for a specified frequency and manner of application, the sound pressure level (or the vibratory force level) of the tone, produced by the transducer in a specified artificial ear or acoustic coupler (or mechanical coupler) minus the appropriate reference equivalent threshold sound pressure level (or reference equivalent threshold force level). Thus, dial settings in hearing level of a correctly calibrated audiometer indicate decibels relative to audiometric zero. See hearing threshold level.
hearing level of speech	**HLS**	For a specified speech material and manner of signal presentation, the speech level minus the appropriate reference speech recognition threshold level.
hearing loss		The amount in decibels by which an individual's hearing threshold level changes for the worse, commonly understood to refer to the combined loss from all causes. The term may also be applied to that part of the overall loss which is attributable to a known influence (for example, noise-induced hearing loss) or a combination of contributing causes (for example, age-associated hearing loss). The related term threshold shift implies before-and-after comparison whereas hearing loss commonly assumes a notional starting point such as audiometric zero. In a qualitative sense, hearing loss is used loosely to mean a symptom of hearing disorder, and is often modified by descriptors, e.g. conductive, sensorineural, etc.

		The term is sometimes incorrectly used as a synonym for hearing threshold level (HTL) which, by itself, does not describe a threshold shift.
hearing protector		A generic term embracing earmuff, earplug and helmet (or other noise-excluding device) worn on the head or in the ear canal.
hearing sensitivity		Term used to describe the status of a person's hearing with respect to the audibility of sounds.
hearing threshold level	**HTL**	Of a given ear, for a pure tone of specified frequency, the threshold of hearing at that frequency, expressed as hearing level. Note that hearing threshold level is a property of the ear under test whereas hearing level refers only to the sound (or vibration) generated by an audiometer. Note: In the case of speech, the analogous term is not hearing threshold level for speech, but speech recognition threshold level.
helicotrema		A small opening between the *scala vestibuli* and *scala tympani* at the apex of the cochlea.
helix		The posterior and superior margin of the pinna in the form of a rolled edge; it extends forwards and downwards to the tragus.
hertz	**Hz**	The unit of frequency; one cycle per second; symbol Hz.
high-frequency audiometry		Conventionally, the term applied to pure-tone audiometry at frequencies of 8 kHz and above.
high-pass filter		A filter designed to transmit that portion of the spectrum of an input signal above a given frequency (cut-off frequency) whilst attenuating the low-frequency portion.
homograph		As applied to the construction of word lists for speech audiometry, a word having the same spelling as another word but different received pronunciation and meaning, for example, *lead* (metal) and *lead* (precede).
homonym		As applied to the construction of word lists for speech audiometry, a word having the same spelling and pronunciation as another word but different meaning, for example, *bear* (animal) and *bear* (tolerate).
homophone		As applied to the construction of word lists for speech audiometry, a word having the same received pronunciation as another but a different spelling and meaning, for example, *sole* and *soul*.
hypoacusis		Alternative term for a hearing deficit.
hypotympanum		See tympanic cavity.
iatrogenic		Arising from medical intervention.
idiopathic		Of a disease, impairment, etc., having no known cause.

immittance (aural)		A generic term embracing various quantities determined by immittance audiometry, *viz*. acoustic impedance, acoustic admittance, acoustic compliance, equivalent air volume and acoustic reflex threshold.
immittance audiometry		Determination of the aural acoustic immittance of the middle ear. See tympanometry.
impairment		In the general context of health experience, any loss or abnormality of psychological, physiological, or anatomical structure or function (WHO definition).
impedance		See immittance.
incidence		Of a disease or condition, within a given population, the number of new cases that occur during a specified time period, usually expressed as an incidence rate by dividing the new cases by total number of subjects at risk of acquiring the disease or condition during that period. Contrast with prevalence.
incus		See ossicles.
induction loop		An installation for use with hearing aids, in a room or auditorium, by which the signal is transmitted from a wire loop, usually at audiofrequencies, by electromagnetic induction to a pick-up coil in each aid.
industrial audiometry		Monitoring audiometry conducted for hearing conservation purposes, usually employing the automatic-recording technique.
infrasound		Sound with an infrasonic frequency spectrum, that is, below the audiofrequency range.
inner ear		Alternative term for cochlea. Sometimes understood to embrace the cochlear and vestibular labyrinth.
insert earphone		An earphone designed to deliver its acoustic output directly into the external ear canal. Sometimes called an intra-aural earphone.
insertion gain		Of a component of a transmission system, the gain in level at a point in the system, downstream of that component, when that component is inserted in the transmission chain. As applied to the testing of hearing aids, the specific term is simulated insertion gain.
insertion loss		The negative of insertion gain. Usually applied to passive elements or devices, for example, hearing protectors.
in-situ gain		See simulated *in-situ* gain.
integrating-averaging sound level meter		A development of the sound level meter. In its "averaging" mode, the instrument provides a direct reading of the sample equivalent continuous sound pressure level. In its "integrating" mode, where this is provided, it reads sound exposure level directly.

intensity		Term used loosely (but incorrectly) as a measure of the strength of an acoustic signal, e.g. sound pressure or sound power. See sound intensity.
interaural attenuation		Term sometimes used to mean transcranial transmission loss.
internal auditory meatus		The passage within the temporal bone which accommodates the cochlear and vestibular nerves and the blood supply to the cochlea and balance organs. It also contains the facial nerve.
internal ear		Alternative term for the inner ear.
intra-aural		Adjective indicating in-the-ear, more specifically in the external ear canal, e.g. intra-aural hearing aid.
ipsilateral		On, referring to, or applied to the same side (of the head).
isophonemic		Of a speech material, the property of individual lists when these have the same distribution of phonemes. This distribution may not necessarily preserve phonetic balance.
just-noticeable difference	**jnd**	The minimum perceptible change in a subjective continuum, e.g. loudness, pitch, etc. See difference limen.
King-Kopetsky syndrome		See obscure auditory dysfunction.
kinocilium		Among the hairs found in the *cristae* of the semicircular ducts and the *maculae* of the *saccule* and *utricle*, a single (longer) hair differentiated from the *stereocilia*.
labyrinth		See bony labyrinth and membranous labyrinth.
laddergram		A diagrammatic display of results from the alternate binaural loudness balance (ABLB) recruitment test. Points of equal loudness between the normal and the recruiting ears are shown as "rungs" of a ladder between two vertical scales of hearing level. Where recruitment exists, the rungs are not horizontal.
Lombard effect		The unconscious tendency of a person to raise the voice when in a noisy environment. A related but opposite phenomenon occurs when the speaker, wearing hearing protection, lowers the voice. The underlying principle is the maintenance of the normally-expected loudness of one's own voice (vocal sidetone).
loudness		1. In general, an observer's auditory impression of the strength of a sound.
		2. A standardized measure with the unit sone, used to quantify loudness, based on the ratio of the perceived strength relative to that of a reference sound. See also loudness level.
loudness balance		Technique used to verify the existence of, and quantify the extent of, loudness recruitment. The listener is

		required to equalize the loudness of a signal (usually a pure tone) heard alternately in the good ear and the impaired ear (alternate binaural loudness balance). The test is performed over a range of levels to demonstrate unequal growth of loudness in the two ears. In case of one "dead" ear, loudness balancing may be carried out in the other (impaired) ear between different frequencies (monaural loudness balance). Binaural loudness balancing is also used for the subjective calibration of an earphone, by comparing the loudness of the sounds that it emits against a reference sound presented to the opposite ear.
loudness discomfort level	**LDL**	Alternative term for uncomfortable loudness level (ULL).
loudness level		For a given sound, the loudness level in phons is numerically equal to the sound pressure level of a reference sound that is judged by the average observer to be equal in loudness to that of the given sound. The reference sound is a pure tone of frequency 1 kHz in the form of a plane wave arriving from directly in front of the observer. There is a standardized relationship between the scale of loudness level in phons and the scale of loudness in sones.
low-pass filter		A filter designed to transmit that portion of the spectrum of an input signal below a given frequency (cut-off frequency) whilst attenuating the high-frequency portion.
macula		A sensory organ of the balance system. The two maculae are found in the utricle *(macula utriculi)* and the saccule *(macula sacculi)*, oriented roughly at right angles to each other. Each contains hair cells with a *kinocilium* and multiple *stereocilia*, and is analogous to the organ of Corti in the cochlea. The *maculae* respond primarily to linear acceleration and to head position relative to gravity. See otoconia.
malleus		See ossicles.
manikin		See head-and-torso simulator.
manubrium		Handle of the *malleus*. See ossicles.
masked threshold		Threshold of audibility (usually of a tone) measured in the presence of a masking noise. In audiometric equipment, the masker noise is usually derived by band-pass filtering of broadband noise.
maskee, masker		See masking.
masking		The process by which the threshold of hearing of one sound (the *maskee*) is raised due to the presence of another sound (the *masker*). The term is also used to express the amount of threshold shift in decibels relative to the threshold of hearing in quiet. The term also has psychoacoustic connotations; see suppression.

		In audiological testing, the masker is usually a band of noise and the maskee is usually a pure tone or speech. Various conditions apply, as follows. Ipsilateral masking refers to the case where masker and maskee are both delivered to the test ear. Contralateral masking refers to the case where the test sound might be audible in the non-test ear (through transcranial conduction) but is deliberately obliterated by applying a masker to the non-test ear. Cross masking occurs when a masker, delivered to the non-test ear, crosses the head and is audible in the test ear, so unintentionally masking the desired test sound. Sometimes termed over-masking. Central masking refers to the case where a masker causes a threshold elevation in the absence of, or additional to, any ipsilateral, contralateral or cross-masking effect; it is due to interactions within the central nervous system between the separate neural inputs derived from masker and test sound. Separation of masker and maskee in frequency is termed remote masking; separation in time is called temporal masking. See backward masking, forward masking.
masking noise		See *masker* under masking.
mastoid		General term for that portion of the temporal bone behind the pinna. Also loosely used as the site of placement for bone vibrators for hearing aids and audiometric purposes.
maximum sound pressure level		Of an acoustic signal with a time-varying envelope, the highest value of sound pressure level during the course of the signal as measured with an instrument having a specified time weighting. Maximum sound pressure level should not be confused with peak sound pressure level.
maximum speech recognition score	**MSRS**	The speech recognition score corresponding to the peak of a given speech recognition curve. The peak score may be one of the values actually recorded or a value interpolated by smoothing.
mechanical coupler		A practical device based on the concept of the artificial mastoid. It is designed to present a specified mechanical impedance to the bone vibrator of a hearing aid or audiometer. The vibrator has to be applied to the spherical surface of the coupler with a specified static force. The vibratory force level at the surface of contact is measured by a piezoelectric transducer under the surface.
mechanical impedance		Quotient of a vibratory force by the vibratory velocity that it produces.
median		Of a statistical distribution ranked in magnitude, that value, true or notional, which divides the total number of observations in half. In cases where the data are few in

		number or are coarsely grouped along a continuous scale, the median is best defined as the 50% point on a smoothed cumulative distribution. The median acknowledges the existence of outliers but is uninfluenced by their numerical values. See mode.
membranous labyrinth		A tubular structure filled with endolymph and lying within, and extending along the whole length of, the bony labyrinth. It contains the sensory organs for hearing and balance, together with their supporting structures. The labyrinth, although continuous, is in several distinct sections. Within a semicircular canal, it is known as a semicircular duct. These ducts open into the vestibule containing the utricle and saccule, with a side-branch to the endolymphatic sac, and thence into the *ductus reuniens* leading to the cochlear section (*scala media*).
Meniere's disease **Ménière's disease**		A condition associated with excess fluid pressure within the membranous labyrinth, and characterized by episodic vertigo, fluctuating sensorineural hearing loss (usually at low frequencies) and tinnitus, possibly with the sensation of fullness in the ear(s).
mesotympanum		See tympanic cavity.
middle ear		Functionally, the portion of the auditory transmission chain between the eardrum and the oval window; it includes the three ossicles, and the *stapedius* and the *tensor tympani* muscles. Anatomically, the tympanic cavity and its component structures.
minimum audible field	**MAF**	The normal threshold of hearing under conditions of binaural listening to a frontally-incident plane sound wave, expressed as sound pressure level in the unobstructed sound field, that is, with the listener absent.
minimum audible pressure	**MAP**	The normal threshold of hearing under conditions of monaural listening by earphone, expressed as sound pressure level at a defined point within the external ear.
mismatch negativity	**MMN**	A component of the auditory event-related potential obtained by presenting a block of several hundred identical stimuli (standards) punctuated occasionally and randomly by acoustically different stimuli (deviants). Mismatch negativity is derived by subtracting the averaged response to the standards from that of the deviants, the difference having peaks at latencies between 100 and 200 ms after stimulus onset. It reflects a change-discrimination process considered to reside primarily in the auditory cortex.
mode (modal value)		Of a statistical distribution, that band of its histographic representation which contains the greatest number of observations. In almost all practical cases, determination of the mode entails smoothing of the histogram to estimate the underlying probability density function, the mode then being the value of the variate at the peak of the density function. The mode is unaffected by the "tails" of the distribution, including any outliers. The modal value is the measure of choice for typifying by a

		single value some characteristic of a population, e.g. audiometric zero. See median.
modiolus		The central pillar of the cochlea, accommodating afferents and efferents of the cochlear nerve. The *modiolus* has the spiral lamina winding round it in the manner of a screw thread. Connections to the cochlear nerve are distributed over the whole length of the spiral.
monaural		Pertaining to listening with one ear.
Mondini deformity		A term encompassing a variety of congenital malformations of the cochlea. Also called Mondini dysplasia.
monitoring audiometry		Pure-tone audiometry carried out on a recurrent basis, usually in conjunction with a hearing conservation programme. The monitoring function is to facilitate warning or referral procedures in cases where a hearing loss is found or suspected, or for statistical purposes. The process entails the measurement and recording of hearing threshold levels and their subsequent analysis; it is also known as serial audiometry or surveillance audiometry and is not to be confused with audiometry performed as a screening test.
narrow-band noise	**NBN**	See noise (2).
noise		1. In common parlance, any sound which is undesired by the recipient. In a more specific sense, there is a fine distinction between background noise and all-encompassing (ambient) sound; background refers to the undesired component(s) of the total acoustic environment. In the context of assessing hearing damage, no distinction should be made between the background and other sounds. 2. A class of sound, derived from an electrical signal and used for specific test purposes e.g. in audiology, characterized by having a continuous spectrum over a defined frequency band. Various types are recognized, as itemized below. See also speech-weighted noise Wideband noise (WBN) contains of a wide range of frequencies, i.e. upwards of several octaves. Narrow-band noise (NBN) e.g., one-third-octave noise, contains all frequencies within the band and negligible power outside the band. White noise has constant spectral density (equal power per unit bandwidth) over a wide frequency range. Pink noise has a spectral density that falls at the rate of 3 dB per octave over the audiofrequency range. The sound pressure level in any octave (or given fraction of an octave) is therefore constant across the frequency range.

		Random noise is a broadband signal whose instantaneous magnitude varies randomly with time according to a particular probability density distribution. Note: White, pink, etc. refer to spectral character whereas the term random refers to signal amplitude. These terms are not equivalent or interchangeable.
noise dose meter		See sound exposure meter.
noise-excluding headset		Headphone assembly in which each earphone is surrounded by a circumaural earcup to provide attenuation of external noise, additional to that provided by the earphones themselves.
noise exposure level	L_{EX}	Within a given period of 24 h, the A-weighted sound exposure expressed in dB relative to 1.15×10^{-5} $Pa^2.s$. In the case of a constant noise that lasts for 8 h, it is numerically equal to the A-weighted sound pressure level. Other terms have been used to define the same quantity, namely: equivalent continuous sound level normalized to 8 hours (HSE, 1972); daily acoustic immission (HSE, 1981); daily personal noise exposure, $L_{EP,d}$ (EC *Council Directive 86/188/EEC* and the UK *Noise at Work Regulations 1989*).
noise immission level	**NIL**	The total quantity of sound impinging on the ear over a long period, expressed in decibels. It is calculated as the sum of the noise exposure level and 10 times the decimal logarithm of the number of years of repeated daily exposure to noise (assuming 5 days per week, 50 weeks per year), or the energy equivalent thereof if the daily exposure is not constant.
noise-induced hearing loss	**NIHL**	Cumulative hearing loss associated with repeated exposure to noise, principally due to irreversible changes in the organ of Corti. The typical audiometric pattern is a maximum hearing loss (sometimes a notch) in the region 3-6 kHz which is roughly the same in both ears. Loss implies a comparison of the affected person's hearing threshold with that of an appropriate control. Such a control (or notional person) is taken to be one differing from the affected person only in respect of the noise exposure. The term normally excludes sudden damage and the associated hearing loss, e.g. from an explosion acoustic trauma) or rapid change of barometric pressure barotrauma).
noise-induced permanent threshold shift	**NIPTS**	That component of a person's overall threshold shift that is solely due to noise exposure, and that does not recover. The definition implies a before-and-after comparison of thresholds for the same person.
non-organic hearing loss	**NOHL**	An apparent hearing loss for which there is no biological or organic cause associated with the hearing system (from the pinna up to the auditory cortex). NOHL may be

		unintentional or psychological (hysterical deafness), or it may be feigned (malingering). Sometimes called functional hearing loss (FHL) or pseudohypoacusis.
normalized equivalent continuous sound level		See noise exposure level (1).
nosoacusis		Accumulation of sub-clinical hearing impairments resulting from deficiencies of general health and the aftermath of disease.
notch		Of a pure-tone audiogram, a colloquial term for a sharply elevated (worse) threshold level over a narrow frequency range, flanked by lower (better) thresholds. A notch is often associated with noise-induced hearing loss.
notched noise		Broadband noise after transmission through a band-stop filter. Signals of this type are used for tests of frequency selectivity.
not-masked threshold		Threshold of hearing determined without the use of a contralateral masking noise. This term is used in preference to "unmasked" threshold to avoid possible confusion with the unrelated term unmasking.
nystagmography		Recording of the amplitude, time dependence etc. of nystagmus. See electronystagmography.
nystagmus		Involuntary movement of the eyeballs, normally bilateral in the same direction, comprising a series of slow displacements (horizontal, vertical or rotary), each followed by a rapid fly-back due to centrally-mediated correction. Nystagmus may be spontaneous (SN), in which case it is a sign of central dysfunction e.g. brain stem or cerebellar lesion; this is in contrast to nystagmus originating in the vestibular (peripheral) organs. For vestibular diagnostic purposes, nystagmus may be elicited by a variety of stimuli. Caloric nystagmus results from raising or lowering the temperature in the external ear canal, thereby providing a unilateral vestibular stimulus. Optokinetic (OKN), positional (PN), neck positional (NPN), etc. refer to nystagmus caused by the eye-tracking of moving objects, position or displacements of the head, and position or rotation of the neck, respectively.
obscure auditory dysfunction	**OAD**	A condition in which a patient (particularly a young person) has pure-tone thresholds within the normal range but seeks help for difficulty in understanding speech in noise. Sometimes known as King-Kopetsky syndrome.
occluded-ear simulator		A device used in the testing of hearing aids and the calibration of insert earphones. It simulates the acoustic properties of the innermost portion of the human ear canal, terminated by the tympanic membrane and its attached structures.
occlusion effect		The perceived increase of a bone-conducted signal reaching the cochlea when the external ear canal is

		closed, covered or plugged, e.g. by an earphone, thereby forming an enclosed air volume in the canal. The effect is greatest at low frequencies.
octave		A frequency ratio of 2 to 1.
octave band		A band of frequencies spanning an octave. In audiological and acoustical practice, octave bands are usually referred to by their geometric centre frequencies, e.g. 0.5, 1, 2 kHz (see preferred frequencies). The lower and upper band limits are respectively $1/\sqrt{2}$ and $\sqrt{2}$ times the centre frequency. Certain fractional octave bands are commonly used, for example, one-third octave bands. The ratio of the upper to the lower frequency limit in a one-third octave band is 1.259 (cube root of 2).
optic fixation index	**OFI**	Ratio of the slow-phase eye speed of caloric nystagmus with visual fixation to that without it.
optimum discrimination score	**ODS**	Obsolete term for maximum speech recognition score.
optimum speech level		For a given listener, a specified speech material and a specified manner of signal presentation, the lowest speech level at which maximum speech recognition score occurs.
optokinetic test		A means of inducing and recording the nystagmus caused by eye-tracking the markings on a drum or frieze (or their optical equivalents), rotating first in one direction and then in the other.
organ of Corti		The sensory organ of hearing in which mechanical vibrations are transduced into neural discharges. It rests upon the basilar membrane and consists principally of one row of inner hair cells and three (or occasionally four) rows of outer hair cells, extending the whole length of the cochlear spiral. The free ends of the hair cells are organized in a regular tightly-coupled formation known as the reticular lamina, above which the *stereocilia* protrude, coming into close proximity with or touching the overhanging tectorial membrane. The 20 000 or so hair cells are arranged in a tonotopic manner, with high sound frequencies being associated with the basal turn, and low frequencies with the apical turn, of the cochlea. See also hair cell, *stereocilia*. The inner hair cells are primarily responsible for converting mechanical motion into nerve impulses in the afferent auditory pathway. In contrast, the outer hair cells respond by producing mechanical forces which amplify the vibration of the basilar membrane. Discharges of the hair cells are initiated by the relative motion between the stereocilia and the tectorial membrane.
osseous labyrinth		Alternative term for the bony labyrinth.

ossicles		Chain of tiny articulated bones in the tympanic cavity: *malleus, incus* and *stapes* ("hammer", "anvil" and "stirrup" respectively). They connect the tympanic membrane to the oval window of the cochlea, and serve to transmit sound vibrations in the air to the perilymph of the scala vestibuli in an efficient manner. Embedded in the inner surface of the eardrum is the handle (*manubrium*) of the *malleus*. The articular facet of the malleus is connected to the incus, which in turn articulates with the head of the *stapes*. The footplate of the *stapes* acts in the oval window with either a pumping or rocking motion.
otalgia		Earache.
otitis media		Infection of the middle ear, either acute or chronic. See glue ear.
otoacoustic emission	**OAE**	Vibrational energy originating in the cochlea which is observable as sound in the external ear canal. Such emissions, associated with motile behaviour of the outer hair cells, may be spontaneous (SOAE) or evoked by an externally applied acoustic stimulus. Otoacoustic emissions evoked by a transient acoustic stimulus (e.g. a click) occur with a time delay of a few milliseconds and are termed transient-evoked otoacoustic emissions (TEOAE) or informally as cochlear echoes. Distortion-product otoacoustic emissions (DPOAE) occur under continuous acoustic stimulation; a sensitive indication of these emissions is obtained by observing components at combination frequencies using two-tone stimulation.
otoconia		Granules of calcium carbonate within the sensory apparatus of the utricle and saccule, the gravitational or inertial drag of which leads to excitation of the hair cells of the *maculae* by deformation of an intervening gelatinous layer.
otolith		General term for that part of the balance system concerned with static balance and head position relative to gravity. The more specific term otolith organs refers to the saccule and utricle, each with its sensory apparatus.
otological normality		An ideal definition of otological normality would be the notional state of complete freedom from derangement, both of form and function, of the auditory system. Natural biological variability and ageing are not exclusions. In practice, normality is based upon a specified set of exclusion criteria, applied with greater or lesser rigour, to a total population; for an example of such criteria, see otologically normal person.
otologically normal person		In the principal audiological Standards, an otologically normal person is defined as: A person in a normal state of health, who is free from all signs or symptoms of ear disease and from obstructing

		wax in the ear canals, and who has no history of undue exposure to noise. For the purpose of specifying audiometric zero, the otologically normal population is restricted to the age range 18-30 years. Recent extensions of the Standards (e.g. to higher frequencies and to speech audiometry) have introduced a narrower age range (18-25 years) and additional exclusion criteria, viz. history of familial hearing loss and known exposure to potentially ototoxic drugs.
otorrhoea		Discharge from the ear.
otosclerosis		Disease of the bony labyrinth and stapes involving the deposition of material which gradually reduces the mobility of the *stapes*. This produces a progressive conductive hearing loss, usually beginning in the second or third decade of life. The focus may ultimately invade the cochlea, to produce a secondary sensorineural hearing loss.
ototoxic		Of a drug or other chemical or physical agent, having the potential to damage the sensory organs of hearing or balance. The agent may be cochleotoxic or vestibulotoxic or both.
outer ear		Alternative term for external ear.
oval window		The aperture in the wall of the bony labyrinth, into which the footplate of the *stapes* is inserted to communicate its vibration to the perilymph in the *scala vestibuli.*
paracusis		In conductive hearing loss, enhanced speech perception in noise
pars flaccida, pars tensa		See tympanic membrane.
peak clipping		Truncation of a signal waveform to a limiting amplitude. In its extreme form, the peak-clipped signal resembles a square wave. In hearing aids, peak clipping may be considered a crude form of dynamic range compression.
peak sound pressure level		The highest instantaneous value of sound pressure, positive or negative, expressed as a level, usually of a transient acoustic signal. For example, the Action Level 200 Pa specified in the *Noise at Work Regulations 1989* is sometimes referred to as a peak sound pressure level of 140 dB re 20 µPa. Peak sound pressure level should not be confused with maximum sound pressure level; nor is it the same as peak-to-peak equivalent sound pressure level.
peak-to-peak equivalent sound pressure level	**pe SPL**	As applied to audiometry, a measure of the magnitude of a short-duration acoustic signal, defined as the level in decibels re 20 µPa of a continuous sinusoidal sound having a peak-to-peak amplitude which is the same as that of the signal. For impulses, the peak-to-peak amplitude is reckoned without reference to polarity or symmetry of the waveform. The term is sometimes abbreviated to peak equivalent sound pressure level.

perilymph		Fluid of the bony labyrinth surrounding the membranous labyrinth. The perilymph communicates with the cerebrospinal fluid. Contrast with endolymph.
permanent threshold shift	**PTS**	The component of threshold shift which shows no recovery with the passage of time when the apparent cause has been removed. Noise-induced permanent threshold shift is the component of PTS specifically attributable to noise exposure. The PTS may also include ageing loss, a pathological component, or both.
persistent threshold shift		See temporary threshold shift.
phon		The unit of loudness level. Under reference listening conditions, the loudness level of a 1 kHz pure tone is numerically equal to its sound pressure level; this relation does not apply to other frequencies.
phoneme		The smallest element of speech out of which words are constructed.
phonetic balance		Of a speech material , the property of possessing a distribution of phonemes which is representative of that in the parent language. Compare isophonemic.
pink noise		See noise (2).
pinna		The portion of the external ear that projects from the head and acts as a sound collector. Alternatively known as the auricle.
pitch		The attribute of auditory sensation related primarily to frequency.
postauricular myogenic response	**PAM**	See electric response audiometry.
posturography		A technique for detecting functional balance deficits by inducing and recording body sway. The subject stands upon a platform by which postural changes are detected. For static tests, the subject endeavours to maintain a constant posture under a variety of contrasting conditions (e.g. eyes open or closed). For dynamic tests, either the platform or the visual field is manipulated to confuse the proprioceptive and visual senses.
preferred frequencies		The series of frequencies standardized for general application in acoustical measurement. Within the decade of frequency from 100 to 1 000 Hz, they are defined as integer values close to those at the exact one-sixth octave intervals. For most applications, only the alternate values at the nominal one-third octave intervals are used, thus: 100, 125, 160, 200, 250, 315, 400, 500, 630, 800 and 1 000. These are multiplied or divided by appropriate powers of ten to cover other decades, e.g. 10 to 100 Hz.
presbyacusis		Medical term for hearing disorder which accompanies ageing in the absence of other identifiable causes, of such magnitude as to cause an older person to complain

		of hearing difficulties. This term should not be confused with ageing loss.
prevalence		Of a disease or condition, within a given population at risk, the number of individuals with that disease or condition at a given point in time, usually expressed as prevalence rate by dividing the prevalence by the total number at risk. Contrast with incidence.
primary neuron		In the auditory pathway, the first nerve cell in the chain from hair cell to brain.
probe tone		An acoustic signal employed to investigate various aspects of hearing. Probe tones may be used for experimental purposes or incorporated into audiological instruments which measure the acoustic properties of the peripheral auditory system.
prognosis allowance		In the context of hearing disability, projection of the increase in percentage disability from the time of assessment to a specified later age.
pulsed tone		In automatic-recording audiometry, a regularly interrupted tone with standardized repetition rate (2-2.5 Hz), on- and off-durations, and rise-and-fall characteristics.
pure tone		A sound whose instantaneous sound pressure varies sinusoidally with time and which is characterized by a single frequency. See also frequency spectrum.
pure-tone audiometry	**PTA**	A technique for determining a person's hearing threshold levels for pure tones by behavioural means, usually understood to employ a manual technique as described under audiometer (a). Sound may be applied monaurally by means of an earphone (termed air-conduction audiometry), or vibrations may be applied to the skull by a bone vibrator (termed bone-conduction audiometry). Note that the terms air-conduction and bone-conduction audiometry indicate the type of transducer employed rather than the exclusive pathway of sound transmission to the cochlea.
random noise		See noise (2).
recovery time		Of a system with automatic gain control, the time interval between the moment when the input signal level is reduced abruptly by a stated number of decibels and the moment when the output signal level stabilizes at the lower steady-state level within a certain tolerance. For hearing aids, this tolerance is ±2 dB. Also sometimes referred to as release time.
recruitment (of loudness)		A manifestation of auditory dysfunction which is characterized by a raised threshold and by a more rapid growth of loudness with sensation level than for a normal ear, that is, a reduced decibel span of the dynamic range. Recruitment is pathognomonic of a cochlear lesion, and has the effect on a sufferer that sounds are perceived as either too soft or excessively loud.

reference equivalent threshold force level	**RETFL**	See audiometric zero for pure-tone bone-conduction audiometry.
reference equivalent threshold sound pressure level	**RETSPL**	See audiometric zero for pure-tone air-conduction audiometry.
reference level for narrow-band masking noise		For a specified type of earphone and a specified ear simulator (or acoustic coupler), the decibel value to be added to the appropriate reference equivalent threshold sound pressure level of a pure tone at the geometric centre frequency of the noise band to obtain the sound pressure level of the narrow-band masking noise corresponding to the effective masking level of 0 dB.
reference sound pressure		For sound in air, the reference sound pressure (zero on the scale of sound pressure level) is 20 micropascals; this may also be written as 20 μPa or 20 x 10^{-6} Pa.
reference speech recognition curve		For a specified speech material and a specified manner of presentation, a curve that describes the median speech recognition score as a function of speech level for a sufficiently large number of otologically normal test persons of both sexes, aged between 18 and 25 years inclusive and for whom the test material is appropriate.
reference speech recognition threshold level	**RSRTL**	For a specified speech material and a specified manner of presentation, the median value of the speech levels at which a sufficiently large number of otologically normal test persons of both sexes, aged between 18 and 25 years inclusive (and for whom the test material is appropriate) correctly identify 50% of the test items. The zero point on the scale of speech recognition threshold level.
reference vibratory force		In audiology, the reference force is 1 micronewton; this may also be written as 1 μN or 10^{-6} N.
Reissner's membrane		The membrane of the cochlea separating scala vestibuli from scala media. It runs the whole length of the cochlea up to the helicotrema and is attached at its inner and outer margins to the spiral lamina and stria vascularis respectively.
release time		See recovery time.
remote masking		See masking.
retrocochlear		Of a disease or pathology in the auditory pathway, having its focus medial to the cochlea (higher than the cochlea)
reverberant (sound) field		A sound field resulting from the superposition of many sound waves due to repeated reflections at the boundaries of an enclosure. The reverberant field in a large hard-walled enclosure may be a practical approximation to a diffuse field.
reverberation time		Of an enclosure for a sound of a given frequency or covering a specified bandwidth, the time taken for the

		sound pressure level in the enclosure to fall by 60 dB, after the sound has been stopped.
Rinne test		A tuning fork test in which hearing by air conduction is compared with that by bone conduction in each ear separately. The fork is held near the entrance to the ear canal for air conduction and then transferred for bone conduction to the ipsilateral mastoid. The person with normal hearing perceives the tone as louder by air conduction than by bone, as does the person with a sensorineural hearing loss (in which hearing by both bone and air conduction are reduced by the same amount). This is recorded as Rinne positive. By contrast, the person with a significant conductive hearing loss hears better by bone conduction. This is known as Rinne negative. In some cases, the bone-conducted sound is heard on the opposite (non-test) side louder than the air-conducted signal on the test side; this is reported as Rinne false negative.
root mean square	**rms**	Effective value of a varying quantity. The square root of the mean value of the squares of the instantaneous values of the quantity. The term may be applied to sound pressure or particle velocity of an acoustical signal and to alternating force or velocity of a vibration. The signal power in each case is proportional to the square of the rms value.
round window		The aperture, closed by a membrane, in the wall of the bony labyrinth between the scala tympani and the tympanic cavity. The round window acts as a pressure release termination for vibrations set up in the perilymph by the motion of the stapes.
saccule		A recess within the vestibular section of the labyrinth containing one of the sensory otolith organs (*macula sacculi*).
scala media		The cochlear portion of the membranous labyrinth, filled with endolymph and containing the organ of Corti. The *scala media* is of roughly triangular cross-section, bounded by Reissner's membrane, the basilar membrane, and the part of the wall of the bony labyrinth covered by the *stria vascularis.*
scala tympani		The passage of the cochlea leading from the *helicotrema* to a blind end at the round window. It is filled with perilymph and runs parallel to the *scala vestibuli*, but in the opposite direction. The two *scala*e are essentially a single duct folded back on itself at the *helicotrema*. See bony labyrinth.
scala vestibuli		The perilymph-filled passage of the cochlea, leading from the oval window to the *helicotrema*. See *scala tympani*.
screening test		Simple test for the presence or absence of a given characteristic. As applied to pure-tone audiometry, a screening test consists of presenting tones of different

		frequencies at a set hearing level. Failure to respond to any of the stimuli is taken as a crude sign of hearing impairment.
self-recording audiometry		Synonymous with automatic-recording audiometry.
semicircular canal	**SCC**	Component of the balance system which is sensitive to rotary motion. Specifically, there are three canals in the form of tunnels in the temporal bone, each shaped roughly as two-thirds of a toroid and lying in a plane at right angles to the other two. Each canal has an elliptical cross-section, with a membrane dividing the canal into two parts. The greater part contains perilymph in communication with that of the cochlea. The smaller part is known as the semicircular duct and contains the *crista*, the sensory organ. The canals lead out from the utricular section of the vestibule. The lateral (horizontal) canal leads, through the lateral *ampulla*, back to the utricle; the superior and posterior canals both lead, through their respective *ampullae*, from the utricle but are joined at the other end *(crus commune)* and return along a common path to the utricle.
semicircular duct		The duct within each semicircular canal which contains endolymph and which forms part of the membranous labyrinth.
sensation level	**SL**	For a sound, usually a pure tone, applied to a given ear, the level of that sound expressed in decibels above the hearing threshold level for the same sound.
sensitivity		Of a screening test applied to a sample population, a known subset of which possesses the characteristic that the test is intended to identify, the number of cases correctly identified (true positives) divided by the number of individuals in the subset (usually expressed as a percentage). If the sensitivity is less than 100%, the shortfall indicates cases incorrectly rejected (false negatives). Contrast with specificity. In a more general sense, the most sensitive test is that which, for a given difference in the severity of a disorder, yields the highest probability of ordering the test scores consistently with the degree of severity of the disorder.
sensorineural hearing loss	**SNHL**	Hearing loss due to a lesion or disorder of the inner ear (sensory hearing loss) or of the auditory nervous system (neural hearing loss). Formerly called perceptive loss or nerve loss; both terms are now obsolete.
shadow		As applied to threshold audiometry in cases where the two ears differ appreciably in hearing sensitivity. When testing the worse ear, the resulting threshold value is falsely attributed to that ear when, in fact, the signal is perceived, albeit at a reduced level, in the opposite ear due to transcranial sound transmission (shadow hearing or cross hearing). Elimination of this artefact requires the

		application of appropriate masking to the non-test (better) ear. See transcranial transmission loss.
sign		A visible or tangible finding indicative of a pathology. Contrast with symptom.
signal-to-noise ratio	**SNR or S/N**	The difference, in decibels, between the level of a desired or target signal and that of an interfering noise (accidental or intentional). (Note: the abbreviation SNR is also used for the Single Number Rating of hearing protection. S/N avoids this potential confusion.)
simulated insertion gain		The increase of sound pressure level from a sound source, measured by the transducer of a head-and-torso simulator, when a hearing aid is placed appropriately on the simulator ("aided-ear" level minus "open-ear" level).
simulated in-situ gain	**SISG**	In the context of hearing aid testing, the difference between the sound pressure level produced in the ear simulator and the free-field sound pressure level at the test point in the absence of the head and torso simulator.
ski slope		In audiology, a colloquial term applied to an audiometric configuration exhibiting a marked worsening of hearing threshold over a narrow interval of ascending frequency.
slow vertex response	**SVR**	See electric response audiometry.
socioacusis		Component of overall hearing loss attributable to significant non-occupational noise exposure.
sone		The unit of loudness. A reference sound of frequency 1 kHz and 40 dB sound pressure level presented to the observer as a plane wave arriving from directly in front has, by definition, a loudness level of 40 phons, and is assigned the value 1 sone. The loudness of any other sound that is judged by the listener to be n times that of the reference sound is n sones. An increment of 10 phons corresponds roughly to a two-fold increase of loudness in sones.
sonotubometry		A procedure for assessing Eustachian tube function by means of sound administered through the nose and detected by a probe microphone in the external ear canal.
sound		Mechanical disturbance, propagated in an elastic medium, of such character as to be capable of exciting the sensation of hearing. The propagation of a sound wave is usually expressed in terms of the fluctuations in pressure with which it is associated. See sound pressure.
sound exposure	**E, EA**	The quantity of sound impinging on the ear over an interval of time; the A-weighting is understood unless otherwise specified. It is directly proportional to the product of the mean square sound pressure and the duration of the sound. The SI unit is the $Pa^2.s$, and the practical unit for the standardized sound exposure meter is the $Pa^2.h$. For a given duration, each increase

		of 10 dB in sound pressure level corresponds to a 10-fold increase in E. Note: A noise of 85 dB(A) lasting for 8 h, that is, the first action level from the *Noise at Work Regulations 1989*, corresponds nearly to 1 Pa^2.h of sound exposure.
sound exposure level	**L_E may be L_{AE}**	A measure of sound exposure in decibels. In this scale, 0 dB corresponds to the reference sound pressure persisting for a reference time of 1 s; the A-weighting is understood unless otherwise specified. Note that A-weighted sound exposure level and noise exposure level are similar quantities, differing only by a constant (44.6 dB). Sound exposure level can be applied to single events of any duration as well as to a specified segment (e.g. 1 hour, 1 day) of noise of a continuing character. For an event lasting less than 1 second, the sound energy is "smeared out" to fill the reference time; conversely, long duration sounds are "squashed" into 1 second. Note: This term, with the symbol L_{AX}, was first defined to describe the overflight noise exposure from individual aircraft.
sound exposure meter		An instrument worn on the person which provides a measure of the accumulated sound exposure received by the wearer while moving about during the work day. The instrument is calibrated in Pa^2.h (pascals squared hours). If the meter is worn for only a representative part of the working day, the reading must be grossed up appropriately. Noise dose meter is a more general term for instruments having a similar purpose but not necessarily measuring the quantity *E* (sound exposure) or being calibrated in the same units; many dose meters are calibrated in percentage of maximum permitted daily exposure and therefore can vary from country to country.
sound field audiometry		Determination of a person's hearing threshold levels when listening in a sound field (as opposed to the conventional use of earphones). The ideal sound field would be in the form of a free progressive wave at a specified angle of incidence with respect to the listener. In practice, test conditions are usually semi-diffuse rather than strictly anechoic.
sound intensity	***I***	The sound power transmitted through unit area in the direction normal to the wavefront in a sound field.
sound level meter		An instrument designed to measure a frequency- and time-weighted value of sound pressure level. It consists of a microphone, amplifier, square-law rectifier, averaging circuits, and an indicating meter or visual display. It has a specified performance in respect of directivity, frequency response, and rectification characteristic. The instrument is normally equipped with the time weightings F and S, and possibly also with the time weighting I, as an aid to measuring rapidly fluctuating sounds. With suitable analogue or digital

		processing, it can also perform frequency analyses, usually into one-octave or one-third octave bands. See frequency weighting time weighting.
sound power	***P, P*$_a$**	Of a source, the total sound energy radiated by a source in a specified frequency band over a certain time interval, divided by that interval.
sound power level	**SWL**	Sound power expressed in decibels relative to the reference value of 1 picowatt; this may also be written as 1 pW or 10^{-12} watt.
sound pressure	***p, p*$_a$**	Instantaneous sound pressure: at a point in a medium, the difference between the pressure existing at the instant considered and the ambient atmospheric pressure. Sound pressure is measured in pascals (Pa); 1 Pa = 1 newton per square metre. Unless otherwise specified, sound pressure is understood to mean the root mean square value of the instantaneous sound pressures over a given time interval. Peak sound pressure: the greatest instantaneous sound pressure (positive or negative) that occurs during a given time interval.
sound pressure level	**SPL**	The sound pressure level of a sound, in decibels, is equal to 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure.
specificity		Of a screening test applied to a sample population, a known subset of which does not possess the characteristic which the test is intended to identify, the number of cases correctly rejected (true negatives) divided by the number of individuals in the subset (usually expressed as a percentage). If the specificity is less than 100%, the shortfall indicates cases mis-identified (false positives). Contrast with sensitivity.
spectral density		Of a steady-state signal having a continuous spectrum, the limiting value of the signal power in a frequency band divided by the width of the band as the bandwidth is reduced towards zero. The result is a function of frequency, whose integral over the whole frequency band is equal to the total signal power. In acoustics, the term power spectral density (PSD) may be applied to sound power, the units being W/Hz; spectral density may also apply to the square of sound pressure, the units in this case being Pa^2/Hz.
spectrum		See frequency spectrum.
spectrum pressure level		The spectral density of a broadband sound defined, at a given frequency, in terms of the sound pressure in an infinitely narrow band divided by the square root of the bandwidth, and expressed in decibels. The reference level is 20 micropascals per hertz to the half power (20 $\mu Pa/Hz^{1/2}$). Values of spectrum pressure level are

		often quoted, conveniently but erroneously, in decibels per hertz.
speech audiogram		A chart or graph, depicting a person's speech recognition curve and speech recognition threshold level.
speech audiometry		The presentation of speech material (usually word lists) to determine the percentage of material correctly detected or correctly identified. In the simplest form, recorded material is presented monaurally by earphone in quiet listening conditions. Variations include live-voice presentation, sound-field binaural listening, added noise, etc. Results are displayed on a speech audiogram.
speech detection threshold level	**SDTL**	For a given listener, a specified speech material and a specified manner of presentation, the speech level of the test material at which it is detected (but not necessarily understood) in a specified percentage of the trials, usually 50%. Sometimes called speech awareness threshold.
speech interference level	**SIL**	A simple measure of the potential for degradation of speech communication in a given noise. It is defined as the arithmetic average of the band sound pressure levels of the noise in the octave bands centred at 0.5, 1, 2 and 4 kHz. Note: Earlier versions of SIL were based upon only three octave bands with non-preferred centre frequencies.
Speech intelligibility index	**SII**	An index of the intelligibility of speech, calculated from the amounts by which the sound pressure levels of the speech in a number of specified frequency bands exceed those of the background noise in the respective bands.
speech level		The sound pressure level (or vibratory force level) of a speech material as measured in an appropriate acoustic coupler, artificial ear or sound field (or on a mechanical coupler) with specified frequency weighting and time weighting. Speech level may be expressed as the equivalent continuous sound pressure (or vibratory force) level by averaging over the duration of the speech signal with frequency weighting C, and excluding any carrier phrase or the silent intervals between individual test items. For lists of single test items, the speech level may be estimated by subtracting 5 dB from the average of the maximum measured sound pressure levels (or vibratory force levels) using frequency weighting C and time weighting I.
speech material		An omnibus term for the ensemble of test items employed in speech audiometry e.g. words scored as units or phonemes, words embedded in a carrier phrase, etc.
speech recognition curve		For a given listener, a specified speech material and a specified manner of signal presentation, a curve which

		describes that person's speech recognition score as a function of signal level. The term should be reserved for the case where signal level is plotted as hearing level of speech. Note: Usage differs with respect to the measure of signal level: some authorities specify that the score be plotted as a function of speech level.
speech recognition score		For a given listener, a specified speech material and specified manner of presentation, and at a specified signal level, the percentage of test items correctly identified. The method of scoring will influence the result and therefore also has to be specified.
speech recognition threshold level	**SRTL**	For a given listener, a specified speech material and a specified manner of signal presentation, the hearing level of speech at which 50% of the test items can be correctly identified by that person. See also half optimum speech recognition threshold level.
speech-weighted noise	**SWN**	Noise having a frequency spectrum corresponding to that of long-term average speech. For masking purposes in speech audiometry, speech-weighted noise is defined as having a spectrum pressure level in free sound field conditions which is constant from 0.125 to 1 kHz and falls at 12 dB/octave in the range 1 to 6 kHz.
spiral ganglion		The collection of cell bodies of the cochlear primary neurons. These cell bodies are distributed within the core of the cochlea, where their axons amass in the *modiolus* to form the cochlear nerve.
spiral lamina		See *modiolus*.
spiral ligament		The attachment of the outer edge of the basilar membrane to the wall of the bony labyrinth.
spurious hearing threshold level	**SHTL**	In the context of hearing disability assessment, a measured hearing threshold level which is false, either deliberately (malingering) or otherwise. The degree of error in an SHTL may be determined by means of specialized tests, for example, Stenger test, speech audiometry, cortical electric response audiometry.
stapedius		The muscle attached to the neck of the *stapes*. When activated by the acoustic reflex, the *stapedius* acts, in conjunction with the *tensor tympani*, to alter the linkage of the ossicular chain and thereby attenuate the transmission of vibration to the cochlea.
stapes		See ossicles.
Stenger test		An audiometric test to confirm, or otherwise, an apparent unilateral or asymmetrical hearing loss. The principle of the test is to present pure tones to both ears, first separately and then simultaneously, the levels of the presentations being determined by set rules from the monaural thresholds just obtained. On the simultaneous (binaural) presentation, a genuine unilateral hearing loss

		will elicit a response different from that given by a malingerer feigning a hearing loss.
stereocilia		The fine hair-like projections at the free end of a hair cell in the cochlea or vestibular organs. In the case of the organ of Corti, the *stereocilia* pass through the reticular lamina and terminate near to or in the tectorial membrane. They are inter-connected near their tips and it is believed that the relative displacement of this complex structure, under the influence of basilar membrane vibrations, opens channels for ion flow into the hair cell body. It is the endolymphatic potential that is responsible for the ion flow. On reaching a critical potential, the cell discharges. In the vestibular organs, deflection of the *stereocilia* in one direction produces a response opposite to that from deflection in the opposite direction.
stria vascularis		Band of tissue, richly supplied with blood vessels, responsible for the electric potential found in the endolymph. The *stria* forms one of the three bounding surfaces of the *scala media*.
substitution method		In the context of electroacoustic instrument calibration or the determination of hearing aid performance, a method of measurement in which the device to be tested and a reference transducer (standard microphone) employed to measure the free-field sound pressure are placed alternately at the same point in the sound field.
suppression		The reduction of auditory response to a given stimulus when supplemented by an additional acoustic signal. In the context of click-evoked otoacoustic emissions, a reduction of amplitude of the emission from the stimulated ear. Contralateral suppression refers to the reduction brought about by applying sound to the opposite ear whilst ipsilateral suppression refers to the reduction of emission amplitude brought about by a large increase in the click rate (without stimulation of the opposite ear). In psychoacoustical applications, such as loudness, suppression is sometimes referred to as partial masking.
supra-aural earphone		An earphone designed to be applied to the pinna with or without an intervening ear cushion. See headphones.
sweep frequency		See audiometer, Bekesy audiometry.
symptom		Sensation or feeling arising from a pathological condition. Contrast with sign.
tectorial membrane		A gelatinous structure within the *scala media* which arises from the spiral lamina and covers the *stereocilia* of the hair cells of the organ of Corti.
temporal integration		The signal processing property of the auditory system whereby a stimulus excites a neural response giving rise to a sensation of loudness which, up to a critical

		duration, increases progressively with the duration of the stimulus. As a corollary, the shorter the sound the higher the amplitude necessary to reach the threshold of hearing or to reach a given loudness.
temporal resolution		That faculty of the auditory system whereby changes in the envelope of the waveform of an acoustic signal are detected, e.g. brief silence (in the order of milliseconds) interrupting an otherwise continuous sound ("gap detection").
temporary threshold shift	**TTS**	The component of threshold shift which shows a recovery with the passage of time after the apparent cause has been removed. Recovery usually occurs within a period ranging from seconds to hours. Above a certain level of TTS, the recovery process is retarded and may take days; this case has sometimes been referred to as persistent threshold shift.
tensor tympani		The muscle attached to the handle of the *malleus*. See acoustic reflex , *stapedius*.
threshold of audibility		Alternative term for threshold of hearing, usually confined to listening conditions other than in quiet.
threshold of hearing		The minimum level of a sound which is just audible in given conditions on a specified fraction of trials (conventionally 50%). The term is often understood to imply quiet listening conditions, that is, it represents the irreducible, absolute threshold. In the presence of a masking sound or noise, the term masked threshold is appropriate.
threshold shift		The difference, in decibels, between the hearing threshold levels of a person measured on two separate occasions, for instance with and without a masking noise, after a lapse of years, or after exposure to noise. If the threshold shift progressively diminishes with passage of time, it is referred to as temporary threshold shift (TTS), otherwise as permanent threshold shift (PTS).
threshold tone decay	**TTD**	Failure of an individual to maintain the perception of a steady sound, presented initially at a just-audible level, under prolonged stimulation. TTD is measured by the increase in sound level required to maintain the sound at a just-audible level for a specified period of time, e.g. 30 or 60 s.
time weighting		The characteristic of the averaging process which is applied to the square-law rectified electrical signal in a sound level meter. Three such weighting have been standardized. The time weightings S and F provide smoothing over periods of the order 2 s and 250 ms (time constants of 1 s and 125 ms) respectively, and yield the same result for steady sounds, but not for time-varying sounds e.g., vehicle noise or speech. The I weighting, characterized

		by a fast rise time (35 ms) and slow decay time constant (1.5 s), is sometimes used to measure impulsive sound.
tinnitus		Subjective tinnitus is a sensation of sound which does not have an identifiable mechanical or acoustical origin. The symptom can be perceived in one ear, both ears or in the head. It can occur on a variety of time scales, ranging from a single "ping" decaying in seconds, all the way to continuously audible. Continuous tinnitus can have a character ranging from tonal to noise-like. Some forms are maskable by externally applied sound; others are not. As a symptom of auditory pathology, tinnitus usually accompanies elevated thresholds of hearing (as with occupational hearing loss); it can, however, occur in persons having no obvious auditory dysfunction. Tinnitus is occasionally associated with an externally detectable sound radiated from the ear; this rare occurrence is called objective tinnitus.
tinnitus masker		Miniature noise generator, usually resembling a head-worn hearing aid, intended to alleviate or suppress the sensation of tinnitus.
tone decay		See threshold tone decay.
tonotopic		Term describing the organization of cells in an organ or nerve when their positions in space are directly mapped on to their response in the frequency domain.
tragion		Anthropometric term for the base of the notch just above the tragus. The distance between the tragion of the left and right ears is known as the bitragion diameter.
tragus		Cartilaginous flap forming the anterior margin of the *concha*, directly over the entrance to the ear canal.
transcranial transmission loss		In general, for a pure tone signal applied to one ear under an earphone but measured in the contralateral ear, the difference in sound pressure level. The attenuation depends upon the acoustic loading of the contralateral ear and the existence of different pathways, principally air-borne sound heard on the other side and direct bone conduction. In clinical audiometry, the magnitude of the transmission loss sets a limit to the difference between the apparent monaural air-conduction thresholds of the two ears. The value ranges typically between 40 and 60 dB. If the difference for the person under test at a given frequency exceeds that value, the true threshold of the worse ear has to be determined using appropriate masking of the better ear.
transmission gain		See acoustic gain.
Tullio phenomenon		Vestibular disturbance induced by a concurrent acoustic stimulus.
tuning curve		A plot against frequency of the response of an element of the auditory system defining the shape of an auditory

		filter. This shape may be determined from the electrophysiological response of single cochlear neurons to pure tones. A psychoacoustical tuning curve (PTC) is a related plot obtained by measuring the level of a narrow-band noise that just masks a tone of fixed frequency, as a function of the centre frequency of the noise; the level of the tone is fixed at a low sensation level (5 to 15 dB).
tympanic cavity		That air-filled space in the temporal bone which contains the ossicles and their attachments to the middle ear muscles (*stapedius and tensor tympani*) and which is vented by the Eustachian tube. The three parts of the cavity are designated as follows: *mesotympanu*m (that part of the cavity behind the *pars tensa* of the tympanic membrane); *hypotympanum*, or atrium (below the *mesotympanum*); and *epitympanum*, or attic (behind the *pars flaccida* and the bone above it, and containing the head of the *malleus*).
tympanic membrane		The membrane terminating the external ear canal at its inner end. It vibrates in response to incident sound and transmits its vibration to the *malleus.* The membrane forms an eccentric inward-pointing flattened cone, the apex of which is known as the *umbo*. The major area is stretched tightly (*pars tensa*); a small part of the upper margin is flaccid (*pars flaccida*). Commonly referred to as eardrum and sometimes as *tympanum*.
tympanic membrane displacement	**TMD**	A technique for measuring very small (nanolitre) dynamic volume displacements of the tympanic membrane, such as those caused by respiration, cardiovascular activity, opening of the Eustachian tube, or activation of the acoustic reflex. One commercially available measurement device incorporates a servo loop controlled by computer, and employs ensemble averaging to improve signal-to-noise ratio.
tympanometry		Determination of aural immittance as a function of the difference between air pressure applied to the external ear canal and ambient atmospheric pressure. The result is displayed graphically as a tympanogram.
tympanosclerosis		A type of healing response following suppurative *otitis media.* The process may produce deposits, so-called "chalk patches", in the tympanic membrane. Similar deposits can occur as nodules in the middle ear, restricting the movement of the ossicles, especially the *stapes*.
ultrasound		Sound with an ultrasonic frequency spectrum, that is, above the audiofrequency range.
umbo		See tympanic membrane.
uncomfortable loudness level	**ULL**	The lowest signal level, applied monaurally, which is judged to be uncomfortably loud. The measurement is

		usually done with pure tones at audiometric frequencies but may be performed using speech-weighted noise; the signal level has to be expressed relative to a reference value, e.g. as hearing level.
unilateral		Pertaining to or occurring on one side, for example of the head.
unmasking		In psychoacoustics, a release from masking when an additional sound is presented. It can be demonstrated, for example, in forward-masking experiments by presenting an extra tone synchronously with the masker, thereby reducing its effectiveness due to suppression of the masker by the tone.
utricle		A recess within the vestibular section of the labyrinth containing one of the sensory otolith organs (*macula utriculi*).
Valsalva manoeuvre		A method of voluntarily opening the Eustachian tube by increasing the pressure in the nasopharynx. This forces air into the tympanic cavity.
vertigo		In a technical sense, the illusion of movement of oneself or of the environment, such as a sense of spinning or rotation. In the colloquial sense, the term may be applied to a fear of heights or feelings of giddiness, faintness or unsteadiness.
vestibular nerve		The nerve bundle within the internal auditory meatus serving the organs of balance; it is a branch of the VIIIth cranial nerve.
vestibular schwannoma		See acoustic neuroma.
vestibule		The central portion of the labyrinth containing the organs of static balance (otoliths), connecting at one end with the organ of hearing (cochlea) and at the opposite end with the organs of dynamic balance in the semicircular canals.
vestibulometry		Measurement of vestibular function. See caloric testing, canal paresis, directional preponderance, nystagmography.
vestibulo-ocular reflex	**VOR**	Rotation of the eyeball within the orbit in response to excitation of the organs of balance; the excitation may either result from body motion or be artificially induced (as in caloric testing). See nystagmus.
vibratory force level		Of a vibration, the level in decibels defined as 20 times the logarithm to the base 10 of the ratio of the rms value of the force transmitting the vibration to the reference vibratory force 1 μN. Also termed force level or alternating force level.
warble tone		A sound whose frequency varies periodically about a mean value (carrier frequency). Four characteristics have to be specified, viz. the carrier frequency, the waveform and repetition rate of the modulating signal,

		and the maximum frequency deviation around the carrier frequency. For sound-field audiometry, the carrier frequencies used are the same as in conventional pure-tone audiometry, the modulation may be sinusoidal or symmetrical-triangular, the repetition rate is in the range 4 to 20 Hz and the maximum frequency deviation is between ± 2.5% and ± 12.5% of the carrier frequency.
wavelength		The distance between successive wavefronts of a wave propagating in a medium, measured normal to the wavefront. Symbol l.
Weber test		A tuning-fork test used to differentiate between conductive and sensorineural hearing loss in cases of unilateral or asymmetrical hearing deficit. The fork is held on the midline of the skull (commonly the vertex or forehead). If the loss is conductive, the sound will be heard better in the affected ear. If, by contrast, the loss is sensorineural, the sound is referred to the unaffected side. The Weber test can also be used to differentiate between a sensorineural loss on one side and a conductive loss on the other, by applying the Rinne test to the referred side.
white noise		See noise (2); frequency spectrum.
wideband noise	**WBN**	See noise (2).

Preface to the original printed version

This book owes its origin to a brief Glossary of 32 terms, first added in 1983 to the notes distributed to people attending the annual ISVR short course on Industrial Audiology and Hearing Conservation. With the passage of time, terms were added piecemeal until it had grown to four or five times its original size and was included in notes of other courses, on Clinical Audiology, Technical Audiology and Industrial Deafness. Eventually it became apparent that a radical overhaul would be needed to meet the needs of advanced students and to cover major developments in the art and practice of audiology. Once embarked on this revision, the authors also felt that the product might be of interest to a wider readership and the question of its scope had to be addressed.

It is tempting to define the word audiology on etymological grounds simply as the "science of hearing", but this would encompass far too broad a range to appeal to many specialists and professionals, clinical and otherwise, who are already comfortable with the word. Topics such as psychoacoustics, the theory of hearing, and perceptual aspects of sounds and speech, for instance, are certainly part of the science of hearing, but feature at best as ancillary to the repertoire of audiology as commonly understood. This is not to say that the term has a unique meaning, and certainly not one that transcends national frontiers – there is a marked divide between American and European usage, for example. The term is perhaps best characterized by saying that you know what it is when you meet up with it, even though you cannot precisely define it by "inclusion". A definition by "exclusion", although perhaps rather stark, gives a better sense of its scope: audiology is not exclusively a branch of medicine, nor is it a branch of physics, psychology, phonology or physiology, although there are obvious connections in each case. We opine that different people use, and will continue to use, the term variously to mean what they want it to mean. In compiling this volume, therefore, we set out to cover only the terms that we personally associate with the field of audiology. We have admitted terms from contiguous areas only to the extent that they might be useful to the likely readership.

After scope came the question of depth. We set ourselves a dual practical objective: firstly to afford the reader an entrée to the meaning of technical terms but without the elaboration that might be

expected in an encyclopaedia or textbook, and secondly to provide a work of reference for practitioners in search of accurate terminology. Thus we have aimed in this Vocabulary to provide definitions more informative than one associates with the style of a dictionary. Laconic formal definitions may be sufficient to provide the already knowledgeable reader with standard usage and to give a watertight meaning to jargon terms. However, this would be rather unhelpful to the student hoping to gain insight. In some cases, explanation has been added to formal definition where we deemed it useful to do so. Expanded description applies particularly to some of the more recondite terms and to those where usage is not uniform or where there are even discrepancies between "authoritative" sources, such as International Standards. There is also a category of terms, notably those used in the field of speech audiometry, where conscious efforts have recently been made in standardizing circles to rationalize the terminology, but where ultimate acceptance has not yet been reached. In these cases, the authors have adopted their own preference and interpretation. The reader will notice an inverse relationship between the apparent simplicity of a concept being explained and the length of the explanation itself.

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