CHAPTER 2

PSEUDOHYPACUSIS AND APPROPRIATE STRATEGIES TO DETECT AND QUANTIFY THE CONDITION

AIM

To define and describe the phenomenon of pseudohypacusis and to analyse and evaluate the audiological strategies currently available to audiologists to detect this phenomenon.

2.1 INTRODUCTION

In Chapter 1, the high incidence of exaggerated hearing test results in the South African mining industry, as well as the negative impact this exaggeration potentially has in terms of cost and the effectiveness of audiological centres, was described. This sets the scene for this study which attempts to evaluate one possible way to address deliberate exaggeration of hearing loss on the part of noise-exposed mine workers.

Deliberate and potentially deceptive exaggeration of hearing loss is called “pseudohypacusis” (Martin, 1994). The phenomenon of pseudohypacusis is examined in this chapter in terms of its prevalence and causative factors in order to make it possible to evaluate better possible alternatives to present audiological methods used in the assessment of workers who present with this problem. This discussion not only looks at audiological methods able to detect pseudohypacusis, but specifically addresses the techniques employed in determining hearing thresholds. In searching for an audiological solution to pseudohypacusis, the first step is to define the phenomenon of pseudohypacusis.

2.2 DEFINITION OF PSEUDOHYPACUSIS

Hearing loss greater than that which can be explained solely by a disorder within the auditory system has been variously described as non-organic hearing loss, pseudohypacusis/pseudohypocusis, psychogenic hearing loss, feigned hearing loss, malingering, functional hearing loss, conversion deafness and simulated hearing loss (Rintelmann *et al.,* 1991; Martin, 1994, 2000; Roeser *et al.,* 2000b). Rintelmann *et al.* (1991:381) define pseudohypacusis, from the point of view that "the patient exhibits a hearing loss in some fashion but where there is no organic basis readily apparent for the disorder". To summarise: pseudohypacusis refers to false or exaggerated hearing thresholds "measured" due to a lack of co-operation from the patient.

Recent literature suggests that pseudohypacusis is the most widely used term for this phenomenon at the moment. It is also clear that there is very limited new research on this phenomenon. Audiological textbooks (Roeser *et al.,* 2000b; Martin, 2000) summarising research in this field refer mainly to research done in the 1960s and 1970s. More recent literature on pseudohypacusis and especially in the field of noise-induced hearing loss is limited, but authors such as Rickards and De Vidi (1995), Qiu *et al.* (1998) and Rickards *et al*. (1996) deserve to be mentioned as making some contributions.

The phenomenon of pseudohypacusis can be better understood within the framework of the prevalence and etiology of this condition, which are interrelated.

2.3 PREVALENCE AND ETIOLOGICAL FACTORS

The basis of pseudohypacusis, according to Qiu *et al*. (1998), can be conscious (malingering) or unconscious (psychogenic). From a clinical position, it is clear that it is difficult to determine whether a false threshold is the result of a conscious or an unconscious motive and it is thus more appropriate to refer to this phenomenon only in terms of the concept of

false/less than true *(pseudo*) hearing loss *(hypacusis*). It is also important to remember that feigned hearing thresholds can be superimposed on a true organic component (Roeser *et al.,* 2000b). In this regard, researchers have proven that pseudohypacusis is more frequently superimposed on a true organic component than on normal hearing sensitivity (Qiu *et al.,* 1998*).*

A number of factors may encourage a person to feign a hearing loss that does not exist or to exaggerate one that does. The reasons for pseudohypacusis can be classified as two groups, based on the financial and/or the psychological gain a patient wishes to obtain (Roeser *et al*., 2000b). From this, it can be concluded that the prevalence of pseudohypacusis is highly variable, depending on the population examined (Rintelmann *et al.,* 1991). Since the prevalence of pseudohypacusis is so closely linked to potential causative or motivating factors, these two aspects are dealt with concurrently in the discussion below.

Rickards *et al*. (1996) have shown that pseudohypacusis plays a significant role in noise-induced hearing loss claims and in their financial impact on employers. They have reviewed studies that have found that the prevalence of pseudohypacusis varies between nine and 30 per cent of compensation claims, and they add that 18 per cent of noise-induced hearing loss claimants in the Australian state of Victoria are referred for evoked response testing, indicating that true thresholds cannot be established through conventional methods.

Qiu *et al. (*1998) estimate the prevalence of pseudohypacusis in the military to be between 15 and 20 per cent of referrals from the US Veterans' Administration. It is also interesting that, in a review of the literature, it has been found that the prevalence of pseudohypacusis is greatest among adult workers who may qualify for monetary compensation if occupational hearing loss can be demonstrated (Rintelmann *et al*., 1991). It also seems that the phenomenon is increasing. In one study, it was found that service-connected, non-organic hearing loss had increased from ten per cent to nearly 60 per

cent in the ten years following World War II (Johnson, Work & McCoy, 1956). Martin (1994) cites a study that found that 24 per cent of 116 workers applying for compensation were pseudohypacusic. Martin (1994) points to an increase in the number of pseudohypacusic cases since the implementation of laws regulating noise in the workplace in the USA.

The incidence of pseudohypacusis in South Africa has not yet been studied, but audiologists consulting in the mining industry regard it as significant. De Koker (2003) has kept records of 160 cases referred for compensation evaluations during a three-month period in 2002. Of these, 32 per cent were found to have exaggerated their hearing loss An increased prevalence of pseudohypacusis has been noted in South Africa since the implementation of the Workmen's Compensation Commissioner's (1995) Instruction 168. Industry-wide, this could partially account for the dramatic increase in noise-induced hearing loss claims since 1995 (De Koker, 2003). This instruction lowered the "fence" for compensation from a 42 dB average hearing loss to 26 dB. This entitled more workers to compensation, resulting in an escalation of mining industry claims for noise-induced hearing loss from eight per cent of all claims for disease and injury to the current level of 14 per cent (Begley, 2001). It is possible that workers' awareness of the potential for monetary gain from hearing loss has also increased, and that this is apparent from the behaviour of patients during noise-induced hearing loss evaluations.

The foregoing discussion can perhaps lead to a wrong conclusion that all pseudohypacusic cases are associated with monetary gain. Psychological factors also contribute to the prevalence of pseudohypacusis (Martin, 1994; 2000). Some of the most important studies of social and psychological factors associated with this phenomenon are summarised in Table 2.1 (overleaf).

TABLE 2.1: PSYCHOLOGICAL ANOMALIES FOUND IN PSEUDOHYPACUSIC PATIENTS

TYPES OF ANOMALIES	PSYCHOLOGICAL/SOCIAL ANOMALIES	SOURCE
Behavioural anomalies	• Avoidance of undesirable situations	Martin, 2000
	• Emotional disturbances	Trier & Levy, 1965
	• Tendency to hypochondria	Trier & Levy, 1965
	• Diminished confidence in meeting needs of everyday life	Martin, 1994
	• Deviant social behaviour	Gold, Hunsaker & Haseman, 1991
	• High incidence of personality disorders	Gold *et al*., 1991
	• Lack of adjustment to hearing loss	Martin, 1994
Financial status	• Lower socio-economic status	Trier & Levy, 1965
Symptoms impacting on health	• Psychosomatic complaints	Gold *et al*., 1991
Intelligence anomalies	• Lower levels of verbal intelligence	Trier & Levy, 1965
	• Poor academic achievement	Gold *et al*., 1991

One can deduce from the above table that it is possible for pseudohypacusic patients to have deviant emotional/social adaptation and symptoms, but also that they may fall into a lower socio-economic class, which might explain their malingering for financial gain. Lower levels of verbal intelligence could also add to the belief that they will be able to exaggerating a hearing loss.

The question of why a pseudohypacusic patient claims to have a hearing loss and not some other type of disability can be raised. Martin (1994) suggests that a patient may select this disorder in consequence of a previous incident or circumstance that has focused his attention on hearing, for example, an ear infection, physical trauma to the ears, tinnitus or noise exposure. This suggestion is particularly relevant for the mining industry. It is certainly true that a high incidence of noise-induced hearing loss is already present in this population, and this increases the awareness of hearing loss. Most mine workers are also male, and thus carry the burden of being breadwinners. Receiving a settlement amount of thousands of rands for a hearing loss is often their only way of ever accumulating a sizable amount of money (Geyser, J., 10 March 2003: personal communication).

From the above it is clear that there is some disagreement in the literature about whether pseudohypacusis is psychogenic, or deliberately and consciously chosen in the hope of personal gain. Goldstein (1966) suggests that psychogenic (unintentional), cases of exaggerated hearing loss do not exist, and that all pseudohypacusis cases are conscious pretences. The experience of many audiologists in the mining industry suggests that this is often the case where compensation is involved (De Koker, 2003).

2.4 AUDIOLOGICAL ASSESSMENT OF PSEUDOHYPACUSIS

In dealing with pseudohypacusic patients, audiologists face a twofold challenge. The first is the detection of pseudohypacusis, and the second the determination of true hearing thresholds in such patients (Martin, 2000). The audiologists' responsibility goes further, taking into account the need for rehabilitation: "identification of pseudohypacusis is extremely important not only to ensure that the *patient receives appropriate intervention but also to avoid potentially harmful intervention.*" (Roeser *et al*., 2000b:329, own emphasis).

It is thus clear that appropriate, relevant and practical audiological procedures are imperative to ensure correct, relevant and professional management of

pseudohypacusic workers. Current audiological testing methods and existing clinical knowledge do contribute to the detection of pseudohypacusis, but very often fail to establish true hearing thresholds. Some of the audiological indicators used in the detection of pseudohypacusis are discussed below.

2.4.1 REASON FOR REFERRAL

In many cases, the reason for the referral of the patient in itself suggests the possibility of pseudohypacusis, for example, when a patient is referred in order for the audiologist to investigate or evaluate a compensation claim (Qiu *et al*., 1998). Martin (2000) points out that referrals from attorneys and the veterans' administration should alert audiologists to the possibility of pseudohypacusis. In practice, often this problem is suggested when a patient already has an extensive file of previous tests and specialist opinions.

2.4.2 PATIENT BEHAVIOUR

Patient behaviour during the interview and test situation very often aids audiologists in detecting pseudohypacusis.

Information gathered by a skilled clinician in informal observation of the patient before and during the taking of the case history is helpful in the diagnosis of pseudohypacusis (Roeser *et al.*, 2000b). The patient's body language can feign reliance on lip-reading, and he may also ask the interviewer to repeat questions or instructions. This is not common in people with true loss of hearing (Martin, 2000). In the author's experience, pseudohypacusic patients very often claim to suffer from symptoms associated with hearing loss, and tend to exaggerate these symptoms. So for instance, they answer in the affirmative to all symptoms that the clinician inquires about.

The above indicators of pseudohypacusis are not always available to all audiologists in the South African mining industry, since language and communication barriers can arise, especially because foreign workers are

employed. In such cases, the interpreters employed in audiological centres need to be made aware of a possible exaggeration of symptoms, and to receive training in interviewing skills. These interpreters also need a basic knowledge of how hearing loss and particularly different degrees of hearing loss affect communication behaviour.

Discrepancies between audiometric results and a patient's social functioning should also alert clinicians to the possibility of pseudohypacusis. It is impossible for a patient with profound bilateral hearing loss to respond appropriately to questions or instructions presented at a normal conversational level of 50-60 dB, particularly if any attempt to lip-read is subverted (Martin, 1994).

Extremely slow and deliberate responses, according to Martin (1994), are indicative of pseudohypacusis, because most people respond immediately to test signals. The experience of the researcher supports the contention that audiologists should suspect pseudohypacusis where patients responded slowly. Finally, Gold *et al.* (1991) state that exaggerated body movements and facial expressions (for example, sitting on the edge of the chair and grimacing as if to suggest extreme concentration) should be regarded as possible signs of pseudohypacusis.

2.4.3 PURE-TONE AUDIOMETRY

Martin (1994) identifies two types of potential error in the determination of pure-tone thresholds, namely false-negative and false-positive responses. Failure to respond at levels above the true threshold constitutes a false-negative response, which is the most important characteristic of pseudohypacusis.

According to Qiu *et al.* (1998), it is not difficult for an audiologist to detect pseudohypacusis using conventional audiological procedures. This may be true for experienced audiologists but, unfortunately, inexperienced audiolo-

gists often fail to scrutinise patients' behaviour and other indicators of underlying intentions, and hence may not detect the presence of exaggerated hearing loss. Using current methods, considerable time and effort may be needed for the evaluation of pseudohypacusic cases if lack of co-operation is not detected by a clinician. Nevertheless, pure-tone audiometry, as part of the basic audiological assessment battery, plays a very important role in the detection of pseudohypacusis. Pure-tone audiometry is also prescribed in the current South African legislation. Instructions 168 and 171 of the Workmen's Compensation Commissioner specify that a response to 500, 1 000, 2 000, 3 000, 6 000 and 8 000 Hz needs to be tested for compensation purposes (Workmen's Compensation Commissioner, 1995).

Pure-tone audiometry can assist in the detection of pseudohypacusis in the following ways set out below.

2.4.3.1 Inconsistent thresholds

Rintelmann *et al.* (1991) state that the best indicator of pseudohypacusis is inconsistent tests responses. Where two threshold determinations for the same frequency differ by more than 15 dB, the results can be treated as inconclusive. Repeating the test with an intervening time lapse is intended to confound any attempt to consistently exaggerate a hearing loss. The current practice of performing two pure-tone air-conduction tests on the same day but at different sittings for potential compensation cases allows for an identification of possible pseudohypacusis before any further testing is done (Workmen's Compensation Commissioner, 1995). However, it is important to remember that this is not an infallible detection method, since Haughton *et al.* (1979) have found that subjects with normal hearing asked to feign hearing loss during three tests over a two-week period were able to duplicate their feigned loss to within 6 dB, on average. This raises the concern that self-discipline and familiarity with the test procedure could enable workers to feign hearing loss consistently and qualify falsely for compensation or for inflated settlements.

2.4.3.2 Different pure-tone threshold determination methods

Rintelmann *et al.* (1991) recommend a procedure that may well be the most effective and time-efficient method for detecting pseudohypacusis when using pure tone audiometry. They recommend the use of two pure-tone air-conduction tests using different presentation methods. Patients who attempt to simulate hearing loss often try to select a level above their true threshold as a reference for recording consistent above-threshold responses. To counter this tactic, it is recommended that the first test be presented using the ascending method, and that the second test use the descending method (Martin, 1994; Roeser *et al.,* 2000b). When it is applied to pseudohypacusic patients, this procedure generally results in significant discrepancies between the two pure-tone tests, thereby identifying the patient as pseudohypacusic.

2.4.3.3 Audiometric configuration

Another indication of pseudohypacusis using pure-tone audiometry as a method of detection is the shape of the audiometric curve. A flat configuration is very often an indication of pseudohypacusis (Martin, 1994). So, for instance, it may be found that all the thresholds in one or both ears are at the same intensity, therefore presenting a straight line on the audiogram. (This is uncommon in audiology).

2.4.3.4 Lack of interaural attenuation

Roeser *et al.* (2000b) are of the opinion that many pseudohypacusic patients feign unilateral hearing loss.

In the case of a true unilateral hearing loss, a patient reacts to loud sound presented to the poorer ear, due to the fact that the intensity of the sound presented to the poorer ear is sufficient to cross to the other (better) ear. This crossover involves the transmission of sound emanating at the test ear to the cochlea of the non-test ear (Stach, 1998). In the case of a true unilateral hearing loss, the patient stops reacting to the sound with the better ear as soon as the better ear is masked and is thus removed from the test situation.

A naïve pseudohypacusic patient indicates no hearing in one ear and good hearing in the other, which is impossible given the preceding discussion of interaural attenuation (Martin, 1994).

The phenomenon of interaural attenuation is of particular importance with bone-conduction testing, since the lower limit of interaural attenuation is essentially 0 dB across frequencies. Thus, regardless of bone conductor placement, both cochleas will be stimulated equally and simultaneously, and the better cochlea should thus prompt a response (Stach, 1998). A pseudohypacusic patient does not normally respond with the bone conductor placement on the chosen weaker ear.

2.4.3.5 Lack of correlation between air- and bone-conduction tests

A further indication of pseudohypacusis in pure-tone testing is commonly a lack of correlation between bone- and air-conduction results.

It is impossible for bone-conduction results correctly to indicate worse hearing than air-conduction results, since air-conduction results have already given an indication of the status of the whole hearing mechanism. It is therefore impossible for a sub-section of that tested mechanism to be worse than the whole. A second indication of pseudohypacusis is a false air-bone gap (Qiu *et al.,* 1998). When an audiologist is presented with an air-bone gap it usually means that an outer or middle ear problem is impeding the conduction of sound to the cochlea (Dirks, 1973). Pseudohypacusic patients sometimes present with a conductive hearing loss that cannot be verified by an otoscopic examination, medical history or, most importantly, the results of immittance testing (Qiu *et al.,* 1998; De Koker, 2003).

2.4.4 SPEECH TESTING

In the diagnostic audiological battery available to audiologists, pure-tone tests are commonly perceived as the gold standard for evaluating the specific effects of auditory system pathological conditions. However, pure-tone

measurements provide only limited information about the communication difficulties a patient may experience, or the site of the lesion (Roeser *et al.,* 2000b). It is therefore imperative to apply a test battery to cross-check the pure-tone information. In the case of pseudohypacusic patients, clinicians usually rely on the ability of speech audiometry to assess the validity of the pure-tone thresholds.

2.4.4.1 Speech reception thresholds

Discrepancies between the speech reception thresholds (SRT) and the pure-tone average (PTA) can indicate pseudohypacusis. Gold *et al.* (1991) regard a difference of 15 dB between the PTA and SRT (with the PTA as the higher threshold) as an indication of pseudohypacusis. Roeser *et al.* (2000b) regard even an 8 dB difference as significant. In the case of people who respond truthfully, however, the two parameters generally correspond closely. It is therefore realistic to assume that any discrepancy, in the absence of a reasonable explanation for it (for example, the slope of the audiogram or poor word discrimination), is thus indicative of pseudohypacusis (Martin, 1994).

Apart from the above discrepancy between SRT and PTAs, it has also been noted that pseudohypacusic patients often respond to spondee words by repeating only half of the word, for example “dog” for “hotdog” (Gold *et al.,* 1991). Since SRT constitutes a threshold determination test, it could be the first step in a patient’s evaluation, followed by pure-tone testing. This corresponds with the recommendation of Rintelmann *et al*. (1991) to avoid supra-threshold tests at the beginning of audiological procedures. Furthermore, most South African mine workers are very familiar with pure-tone air-conduction procedures as a result of annual screening, but few have had exposure to speech audiometry, and thus discrepancies between PTA and SRT results can be indicators of pseudohypacusis.

2.4.4.2 Word discrimination tests

When considering word discrimination test results, Gold, Hunsaker and Haseman (1991) report pseudohypacusic patients with hundred per cent discrimination scores at levels equalling, or slightly exceeding, admitted pure-tone thresholds. This phenomenon should alert a clinician to the possibility of pseudohypacusis, since hundred per cent discrimination is usually achieved only at a sensation level of 30 to 40 dB (Stach, 1998).

As is the case with pure-tone testing, some indicators of pseudohypacusis can also be found in the behaviour of the patient during the test. Roeser *et al.* (2000b) report a lack of patient co-operation during word discrimination testing, stating that patients tend to get all words right once, and then start missing all words.

2.4.5 SPECIAL TESTS

A review of the literature indicates that several specialised audiometric tests have been developed to identify pseudohypacusis, including:

- the Stenger test (Chaiklin & Ventry, 1965);
- automatic audiometry (Jerger, 1960);
- delayed auditory feedback (Martin, 1994);
- the swinging story test (Martin, 1994);
- pulse-count methods (Ross, 1964) ;
- the yes-no test (Frank, 1976) ;
- the Doerfler-Stewart test (Doerfler & Stewart, 1946);
- the Lombard test (Simonton, 1965);
- the forced choice procedure (Haughton *et al.*, 1979); and
- electrodermal audiometry (Gold *et al.,* 1991).

Roeser *et al. (*2000b) label these tests “historical tests” that are not routinely used in daily audiological practice. The reasons they are not used can be sought in their involving long and complicated procedures, requiring special equipment, and most importantly, them being unable to determine true hearing

thresholds. In a clinical situation, particularly in the mining industry, where large numbers of workers impose large caseloads on audiologists (Franz, 2003), there is little to be gained from tests that confirm the presence of pseudohypacusis without establishing true hearing thresholds. The only one of these tests that is quantitative in nature is the Stenger test, but this is primarily useful in the detection of feigned unilateral hearing loss, which is not common in the mining industry.

Accurate and objective information on hearing thresholds is crucial to the evaluation of compensation claims and to determining workers' fitness (RMA guidelines, 2003). This need, along with the high incidence of pseudohypacusis among noise-exposed workers, has led many audiologists to employ electrophysiological procedures to estimate true hearing thresholds. Roeser *et al.* (2000b) have also focused attention on the fact that electrophysiological tests are quantitative, unlike the qualitative conventional and historical tests described in this chapter.

Roeser *et al*. (2000b) argue that, in cases where true thresholds cannot be obtained, electrophysiological evaluations are indicated. It is thus necessary for audiologists to move beyond the identification of pseudohypacusis to the estimation of true thresholds. All audiological procedures discussed up to this point have aided only in the detection of pseudohypacusis.

2.5 SUMMARY

Pseudohypacusis, where a patient feigns or exaggerates hearing loss, has been examined in terms of the very limited information in the existing literature. Definitions have been offered, and the prevalence and causative/-motivating factors have been discussed. Means of identification of pseudohypacusis by audiologists have also been highlighted.

Most of the available test procedures failed to assist clinicians in objectively determining true hearing thresholds, especially within reasonable limits with regard to time and cost. The researcher is of the opinion that there is little to

be gained from performing an array of specialised and time-consuming tests that fail to provide accurate hearing thresholds.

The test of choice for identifying pseudohypacusis remains the pure-tone audiogram. Hence, the answer in the search for an objective test with which to estimate pure-tone behavioural thresholds appears to lie in the realm of electrophysiological tests, which will be the subject of the next chapter.