Establishing immediate fitting goals

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Abstract:

Immediate fitting goals refer to what happens in the initial hearing aid fitting appointment. Although there are many articles in the audiological literature regarding the therapeutic goals of hearing devices, most commonly hearing aids, there are few, if any, published guidelines on the immediate goals of the fitting process. There is a variety of prescription formulae which have been published, each of which has their own enthusiastic adherents. However, the common experience is that no particular formula universally meets the aid wearer's needs, requiring a retuning process. Each audiologist is on their own in this retuning stage of the process because of the lack of agreed-upon immediate fitting goals. Surveys of user satisfaction with their hearing aids routinely reveal short-comings. This paper presents a general immediate goal, with theoretical underpinnings, together with problem-solving approaches. The purpose of this paper is to initiate discussion of the process to better facilitate this part of the therapeutic process

Text:

Once we, with our patient, have arrived at the point of deciding that we are going to proceed with hearing aids, how do we proceed? We have already established that hearing aids are appropriate, identifying amplification targets and deciding either with the patient that the magnitude of their hearing difficulties are sufficient to warrant the use of hearing aids, a macro-audiological view-point also advocated by Gatehouse, or through a more evangelical approach such as that advocated by Dillon that improved audibility will be in the patient's best interests. We have discussed and decided upon the model and technology level appropriate for the patient's needs.

What do we do next?

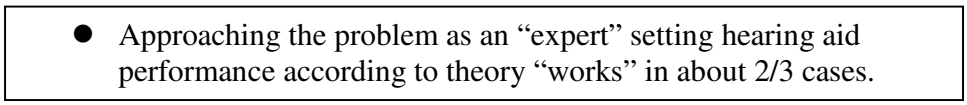

Figure 1. Expert/patient interaction

The traditional method that I was first exposed to, was to proceed through the mechanics of the process in a step-by-step manner – taking the impressions, getting the earmoulds/hearing aids, fitting the hearing aids, modifying the earmoulds/shells to enable them to fit in the ear, setting the parameters of the hearing aids, instructing the patient in the hearing aids' operation and care, and sending them out the door. In those early days, follow-up appointments were not encouraged, and follow-up visits for hearing aid patients meant only one thing – trouble.

- Approaching the problem as an "expert" setting hearing aid performance according to theory "works" in about 2/3 cases.
- Or does it?
  - Own voice
  - Noise annoyance
  - Poorer hearing performance in competing noise

Figure 2. Problems with expert approach

Gradually, it became apparent that there were some problems with this approach. Some patients (our favourites) were happy with the outcome, a lot of them (the trouble-makers) complained about some aspect of the hearing aids, while a significant proportion gave up and did not continue using their hearing aids. This latter outcome caused us to shake our heads sadly and to ponder on the short-comings of our fellow men.

As hearing aids became more expensive, however, patients had a great investment in the process, and fewer of them were content to abandon the process. More trouble! Although the audiological literature from the 1970s on gradually came to espouse a prescriptive approach to hearing aid performance, based on rational testable theories, these too showed some problems in patient acceptance. Even with the advent of advanced technologies, such as real-ear measurements of hearing aid performance, the baffling and frustrating problem of acceptance remained.

One response to this problem is to retreat into the ivory tower. We know from our literature that we can optimise speech intelligibility if we apply amplification according to certain rules derived from the chosen prescriptive method. Therefore, it would appear to be a logical stance to demonstrate to the patient that we have indeed achieved a theoretical level of performance with their hearing aids and that what they are experiencing is what is best for them.

This approach, however, goes down like a lead balloon with most adult patients. It has some validity when we are fitting hearing aids to deaf infants, and shaping their auditory experience, but with patients with established auditory experience a significant number of problems arise.

Macro-audiology approaches the problem from a quite different angle. It advocates that what we are trying to achieve is to change the patient's behaviour from a non-hearing aid user to a hearing aid user. The problem then becomes how to achieve this. How can we persuade our patient to keep this piece of plastic in their ear?

- In order to increase our success rate, we have to re-examine:
  - What we are doing
  - How we are doing it
  - Why we are doing it
- We want to change behaviour of our patient/client from "non-hearing aid user" to "hearing aid user"

Figure 3. Starting to re-examine the process

Macro-audiology recognises a natural behavioural economy which determines how we behave. In general, it states, we will continue to do things that have a positive outcome for us, where the benefit derived from the action outweighs the cost, in behavioural terms, of the action. So, we will seek audiological help when the cost of not doing so starts to become excessive. We will want to use hearing aids when our hearing problems start to limit our social activities, for instance. We will happily wear our hearing aids when they improve our hearing.

Getting hearing aids to change our hearing is easy, but getting them to improve our hearing is much more difficult. At this stage, there does not appear to be a single solution to the problem; although the concept of a prescriptive approach to amplification has intuitive appeal, audiology does not yet have sufficient understanding of hearing to be able to achieve this.

- In order for this to happen, the *benefits* of using hearing aids must outweigh the *costs* (not $$$)
- Hearing aids are a "pain in the neck" ("Finally, a hearing aid that people want to use").
- But if hearing aids are an inherent "pain in the neck", what needs to happen to allow the balance to shift?

Figure 4. Further considerations

In order to change our patients' behaviour, it is necessary for us to engage in a process with them. The process is characterised by important input from both parties, but the goal of the process needs to be clearly established from the outset. The audiologist defines the process and describes to the patient what is going to happen. The macro-audiology model suggests that hearing works most effectively and efficiently when it conforms to its natural state.

- Before we can begin the process itself we need to have a clear overview
- I believe that the best way to obtain the desired outcome is by a co-operative process
- This can only happen if both parties "buy-in" to the process
- This paper presents some theoretical underpinnings for this process; actual problem-solving steps in the process are another very important topic for discussion

Figure 5. A new perspective

In order for the patient to be able to contribute effectively to the process, they need to be oriented correctly in terms that are meaningful to them. Although most humans are unsophisticated in terms of hearing, and so find it virtually impossible to describe whether a sound is "natural", most adults are familiar with concepts such as "comfort" and "forgettable". In this approach, the patient's task is to critique the process so that the end result is "comfortable and forgettable".

- "First, do no harm"
    - Eliminate (as a starting goal) negative hearing aid experiences
        - Own voice
            - Passive own voice (POV) effects
                - Occlusion
                - TMJ
            - Active own voice (AOV) effects
                - Tuning errors

Figure 6. First principles

In this approach, the patient acts a guide for the audiologist to approach the goal. Their critical participation is vital if it is to succeed. The challenge for the audiologist is to guide this criticism in a way that allows the audiologist to meaningfully utilise the comments they receive from the patient. It is also necessary to clearly distinguish between "forgettable" and "tolerable".

- Second, return toward normality".
    - Most adult hearing aid candidates, with acquired deafness, once enjoyed "normal hearing"
    - What happened to that experience; is it just a fond memory?

Figure 7. A basic question

Most audiologists would have little quarrel with the concept of a comfortable hearing aid, the concept of forgettability may be more contentious. Apart from the humanitarian aspect of a comfortable hearing aid, are there other reasons that might support this approach?

- Macro-audiology is a patient/client-centred model of human hearing based on a "black-box" approach.
- It is concerned not so much with known physiological processes, but with their behavioural consequences.
- By examining the behavioural consequences of abnormal auditory function, we can hypothesise possible normal auditory processes.

Figure 8. Introducing some macroaudiological principles

If we consider the normal case for a moment, it is apparent that the hearing process is something of which we are largely unaware.

- Auditory system responds to sound

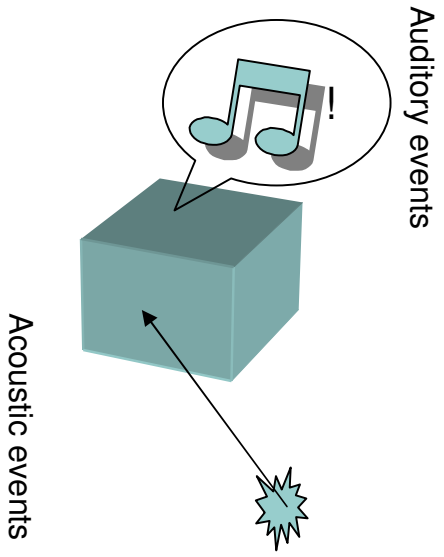

Figure 9. The basic black-box concept

The results of the hearing process pop into our consciousness from time to time, but we are usually unaware of any conscious participation in the process.

- Auditory system responds to sound
- But the soundscape is usually alive with a myriad of sounds
- The majority of these do not register a significant auditory experience.
- How does this work?

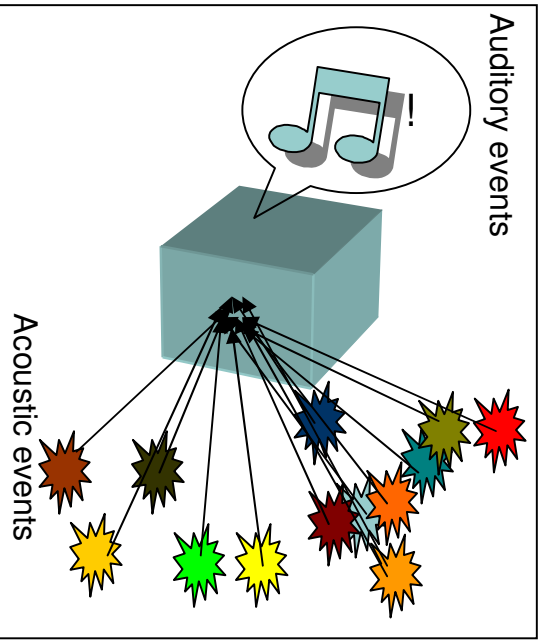

Figure 10. The real-life black box

In the soundscape, there are myriad sounds that do not reach our consciousness, even though they activate the peripheral apparatus. How does this happen?

The Doors of Perception…

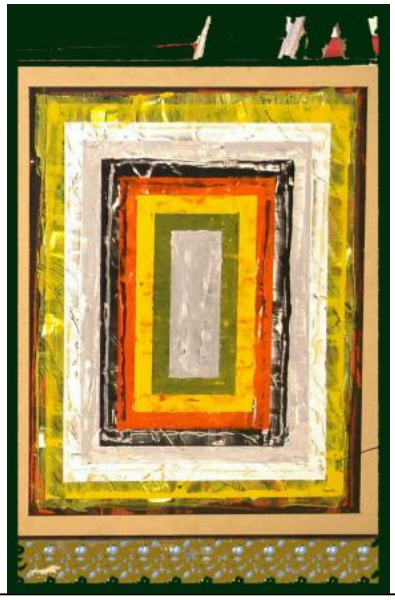

Figure 11. The doors of perception ...

The macro-audiology model posits a "gatekeeper" function in the auditory process that decides which sounds are admitted to our consciousness and which are discarded.

- If the doors of perception were cleansed, everything would appear to man as it is, infinite….

W. Blake

Figure 12. When the doors are opened ...

Sounds which are situation-appropriate and of low information content tend to be discarded from our consciousness, while those which are of high information content, such as speech or music, or which are situation-inappropriate are admitted.

- The auditory system has a sophisticated pre-conscious “doorkeeper” (habituation) process that:
    - Diverts low-information-content sounds from the listener’s conscious experience.
        - Situation-appropriate sounds
    - Admits high-information-content sounds to the listener’s conscious experience.
        - Situation-appropriate that have been assigned a high value by the listener
        - Situation-inappropriate sounds

Figure 13. The doorkeeper concept.

Thus, to use an example with which you are probably aware, when we turn the pages of the newspaper we take no notice of the sound of the paper turning. Conversely, the sound of someone starting to speak when we are doing something else will engage our attention, even if the person is not speaking specifically to us. The gatekeeper has the job of identifying every incoming sound and making the appropriate decision whether to discard or not.

How well it does its job depends on whether it can recognise the sound; its default response is to pass sound on to our consciousness if it does not recognise it as being situation-appropriate. In this way, we are alerted when sabre-tooth tigers are sneaking up on us.

- The doorkeeper compares incoming neural activity with learned templates to determine its response.
- With gradual loss of peripheral sensitivity there is a corresponding reduction of activation of original templates (reduced internal redundancy).

Figure 14. The doorkeeper's role

The gatekeeper is affected by internal redundancy, a facility whose development is determined by our auditory experience.

- New templates slowly come into being as the normal input reduces, but the old templates are not lost.

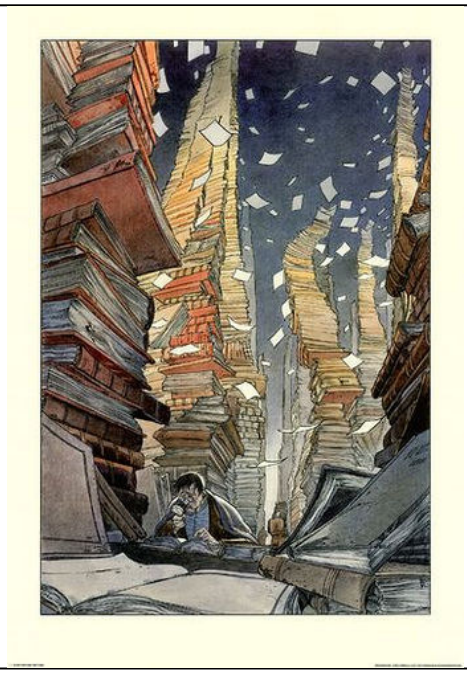

Figure 15. Changing templates

If there are changes introduced to the sensory input into this process, the result is that recognition may no longer be automatic and we may fail to respond appropriately. Thus we might miss the start of what someone says to us because our attention was not alerted. Environmental sounds often become too weak to activate the system if there is any loss of sensitivity to weak sounds, or conversely, environmental sounds may become more intrusive if there is no sensitivity loss, leading to hyperacusis.

- When we do something to increase the input to the system, the immediate result to the doorkeeper is loss of selectivity
- The default response is activated – everything is passed on to conscious perception

Figure 16. The effects of changing the input

When we use hearing instruments to adjust the audibility of sound, we change the input to the auditory system and necessarily affect the input to the gatekeeper. Even with correctly-tuned hearing aids, the initial experience will be an increase in awareness of sound; everything will sound different.

Figure 17. The effect of misaligned input to the doorkeeper

If the tuning is incorrect, this initial increase of awareness of sound will persist. The patient will experience unwanted sounds as intrusive, often describing the hearing aids as "making everything too loud", and will have difficulty attending exclusively to desired sounds when competing noise is present.

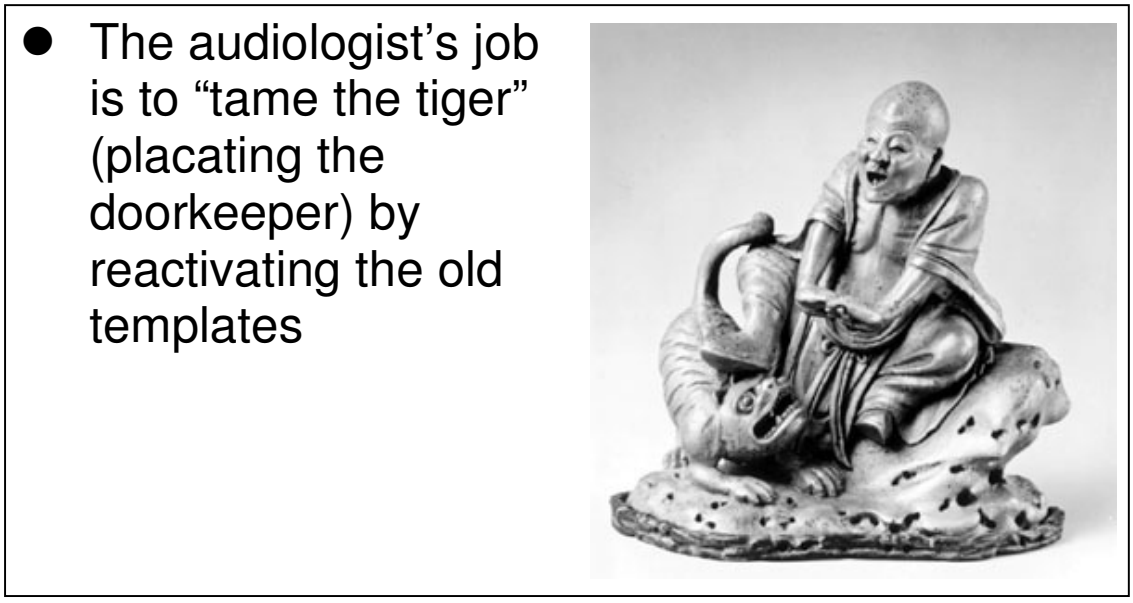

Figure 18. Taming the tiger

How do we resolve this type of problem? Can it be resolved, or is it an inevitable consequence of hearing aids? Macroaudiology theory states that it can, and must, be resolved if the hearing instrument intervention is to be successful.

Conundrum:-

- Only the hearing aid wearer knows when the aids are properly tuned.
- But…

Figure 19. The conundrum

What is required is an expert to guide us. Fortunately, we have an expert on hand. Only the patient listening with the hearing instruments can experience their effect; the experience is unavailable to any other person. However, the gatekeeper, with its stores of original templates, is on hand and can help to guide us.

- Conundrum:-
  - Only the hearing aid wearer knows when the aids are properly tuned.
  - But…
  - The hearing aid wearer will almost never know how to identify when the hearing aids are properly tuned.
  - How…

Figure 20. The conundrum expanded.

Somewhat inconveniently, however, the patient cannot consciously access the gatekeeper's expertise, working as it does at a pre-conscious level. How then can we access this expertise?

- Audiologist and patient/client enter a cooperative exploratory process.
- Audiologist sets the parameters, outlines expectations, and explains the need for active participation
- Audiologist gets "buy-in" from patient/client
- Patient/client provides critical feedback

Figure 21. The conundrum disentangled

We know that the gatekeeper adapts to new situations through the process of habituation, and that habituation takes time. This same process occurs with "getting used to" hearing aids, but if we are to be successful, we must approach this process a little differently.

We can optimise the process by setting appropriate expectations of the process with our patients.

- Audiologist sets the parameters:
  - Comfort
  - Forgettability
  - Encourages patient/client's critical participation
  - Outlines optimal outcome:
    - Natural sound quality
    - Reduced listening effort
    - Strong noises no louder than without hearing aids
    - Should be able to hear in competing noise at least as well with hearing aids as without

Figure 22. Setting the parameters

"Everything will sound different with the hearing aids. That is the goal. What we want to achieve is for everything to sound more natural with the hearing aids, and this is a difficult task. If we do our job properly, your increased awareness of sound will gradually diminish as you go through the repertoire of everyday sounds in your environment. After 2 or 3 days, it should be possible for you to forget that you are wearing hearing aids."

Process Expectations:

- If the audiologist manages to hit the target on the first fitting session (it happens sometimes!), the patient/client can expect:
  - Everything to sound different
  - To take more notice of all environmental sounds
  - That environmental sounds will fade from their awareness over a 2 – 3 day span, by which time they should be able to forget they are wearing hearing aids
  - Some confusion if they wear their hearing aids in a demanding environment during these first 3 days.
  - That they may notice reduced listening effort

Figure 23. Setting realistic expectations

In this process, the audiologist acts as a facilitator, reuniting the patient with as natural an auditory experience as can be achieved. The audiologist's success in this process will depend on their commitment to the process, their training and understanding of the process, and their experience and armamentarium, as well as their ability to listen openly to their patient's reports.

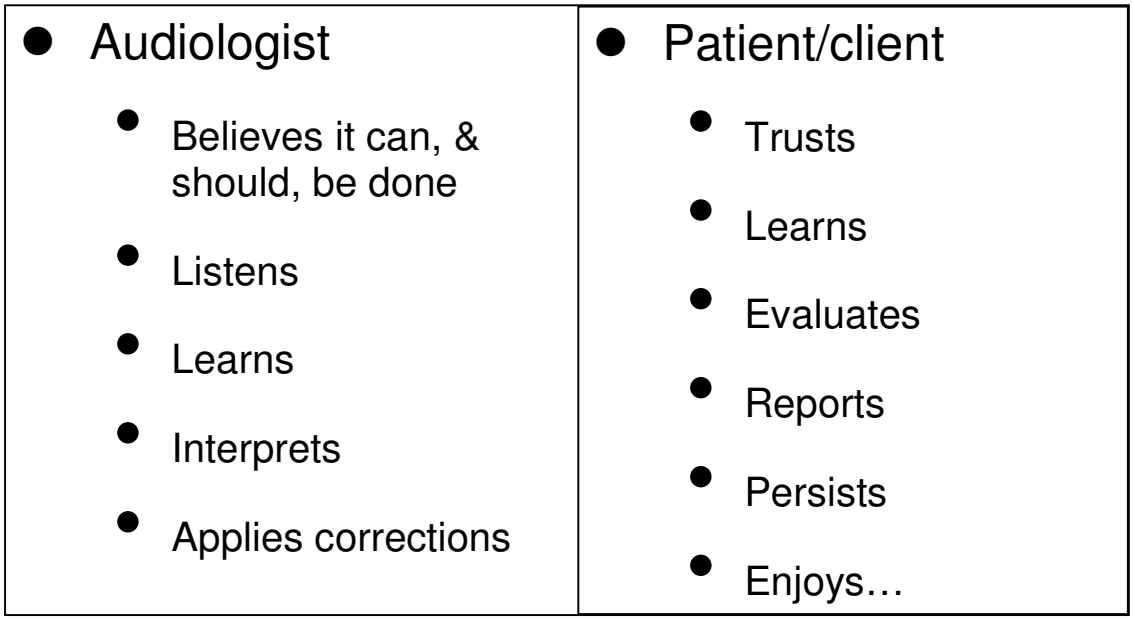

Figure 24. The process ...

The fine-tuning process continues until the patient decides that the goal has been reached. This must necessarily take a number of follow-up visits (sometimes only 1); because the habituation process cannot be hurried. The situation in the audiologist's clinic is highly artificial for a number of reasons, not the least being that the patient is listening actively, an activity that in the real world occurs relatively infrequently.

- Both audiologist and patient/client decide when the goal has been reached
- If the optimal outcome cannot be reached, both parties understand the limits.
- This is ***not*** the same as "You'll get used to it", or "This is what the computer says"

Figure 25. Completing the process

The process is not without its challenges. The audiologist must be confident in the process to be able to listen non-defensively to their patients' reports, even if these are highly emotional.

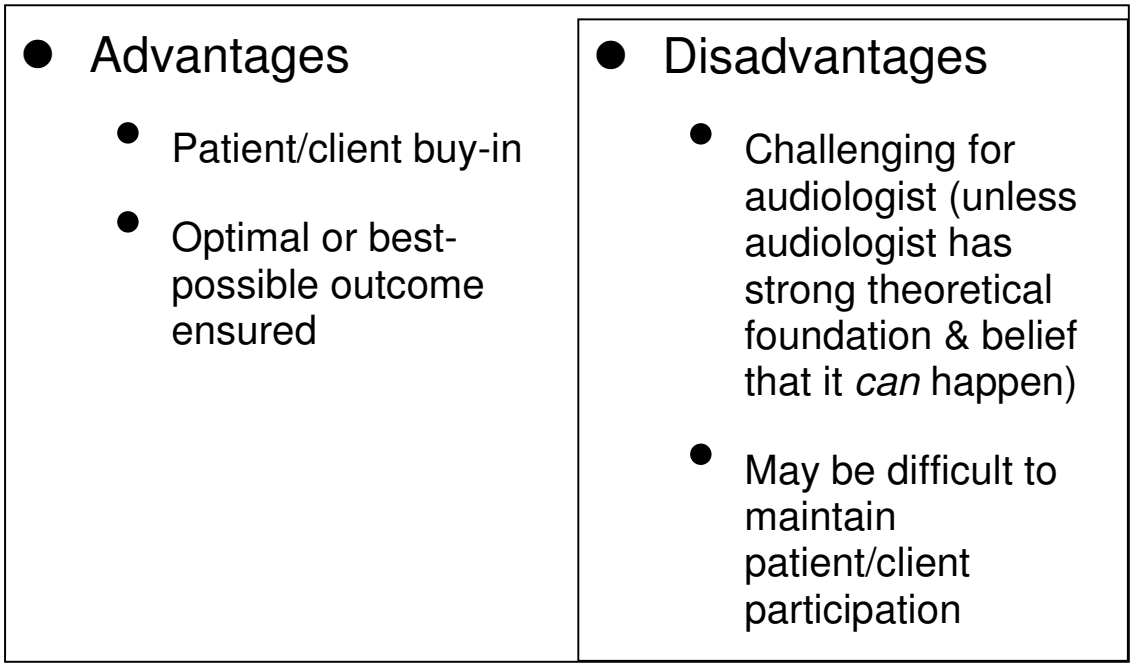

Figure 26. Advantages and disadvantages

The audiologist's position can be strengthened through education and experience. It is vital that clinic managers understand that the process takes its own time-course, and that there should be no pressure placed on the audiologist or patient to shorten it.

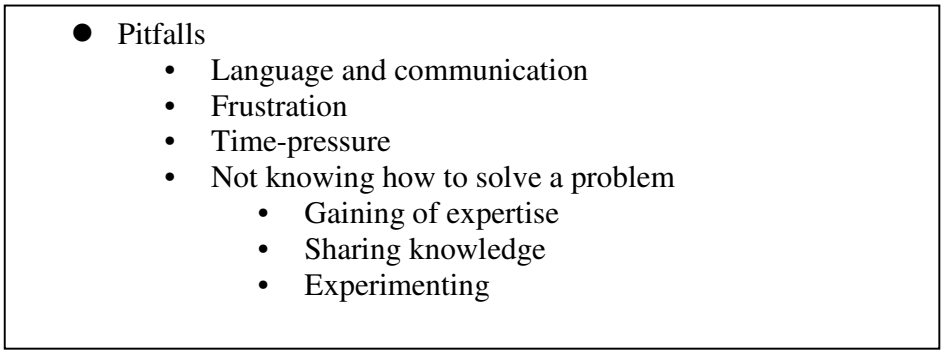

Figure 27. Pitfalls

The outcome of the process will be a patient who feels they have been valued and listened to, involved in the process, and who understands the strengths and limitations of their hearing instruments.

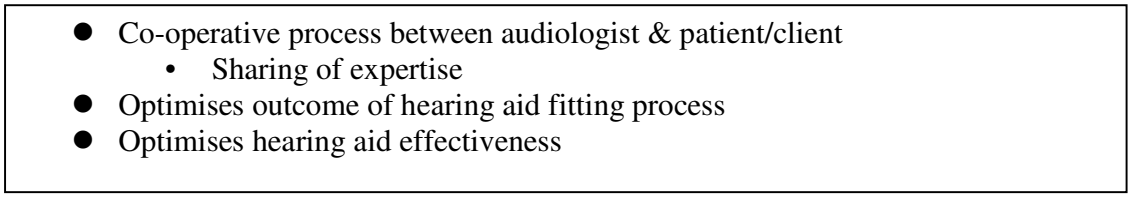

Figure 28. Creating a shared process

For the profession, this approach can form a testable process for the successful provision of hearing instrument intervention in clinical audiological practice. If this approach is adopted, it could contribute to the hearing aid research base by standardising patient's experience, not through the application of an arbitrary amplification rule, or through some unspecified fine-tuning process, but by reaching the goals of comfort and forgettability.

- Can allow development of "Standard Of Care" for provision of amplification
- Provides clearly understood statement of process for all parties
- Adoption of standard by academic hearing aid researchers would remove major source of uncontrolled variability in the hearing aid literature

Figure 29. Wider benefits of the approach

For the most important person, the patient, the process will lead to a more satisfactory outcome. And for the second-most important person, the audiologist, the outcome will be a fruitful and satisfactory relationship with their patient.