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Maximizing Auditory Training Effectiveness – A Clinical Perspective

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An increasing body of evidence is turning into a testament for the effectiveness of Auditory Training (AT) for Central Auditory Processing Disorder (CAPD). Many studies are reporting improvements on behavioural test outcome measures and neurophysiological measures in children with learning difficulties and language impairments using both formal and informal AT programs. Moreover, not only have we found similar findings in our private practice, but these are also being reinforced by teacher and parent ratings of improvement in communication, academic performance, attention and alertness post-AT (Lau, 2012). While there can be no guarantees on AT outcomes, it is not unusual to secure post-AT test scores within the normal range. Certain considerations and choices, then, can enhance the prognosis of any AT intervention.

The crux of effective CAPD intervention is an effective AT therapy plan. The necessary requisites of successful therapy plans are thoroughly discussed by Musiek, Chermak & Weihing (2013). They remind us that any auditory training program should include a variety of age and language-appropriate, deficit-specific tasks that keep an individual engaged and challenged. There are both informal and formal AT programs, with most formal programs being Computer-Based Auditory Training (CBAT, Thibodeau, 2013).

It has been over a decade since our clinic first began providing CAPD therapy – initially to school-aged children, but now extending to young adults, individuals with head injuries, and seniors. Over the years, our AT outcomes have ranged from spectacular and dramatic, to pleasantly satisfactory, to the less gratifying “it didn’t make much difference”. Each of our clients, whether the outcomes were positive or less than ideal, is taken as a lesson to be reviewed and learned from, and this article presents an accumulation of experiential factors that we believe influence AT outcomes. These factors have had an impact on the embarkation, execution and, ultimately, the effectiveness of our intervention for CAPD.

THERAPY CONSIDERATIONS

Deficit-Specific Intervention

Appropriate treatment choice is always central to the preparation of any AT plan. The identification of specific CAPD deficits is necessary to establish a directed, goal-oriented intervention plan (Chermak & Musiek, 2002). For example, treatment of binaural integration deficits would not benefit significantly from auditory closure exercises, so providing phonemic-based exercises would not be as beneficial as a dichotic listening training program in such cases. Conversely, doing a dichotic training program to treat prosodic or temporal processing deficits

would not be constructive. There are an increasing number of articles and references that endorse appropriate, deficit-specific training for CAPD. A generalized, broad-stroke diagnosis of CAPD is unable to provide sufficient information and direction to design a suitable intervention plan.

Multiple Deficits

In most cases, a single CAPD deficit tends to be more straightforward and require shorter treatment periods to effect change. Often, however, many of our clients have a combination of deficits, either closure combined with integration, or prosodic combined with integration. The most challenging of our clients include individuals who have significant, global CAPD with several deficits. Multiple deficits require longer, more extensive CAPD training to achieve significant improvements in test scores, and long-term skills retention require booster sessions. The sequencing of treatment therapies of multiple deficits should always be considered.

Intervention Sequencing

In cases where there are multiple deficits, it is important to consider which CAPD deficits should be targeted first and which ones should be delayed. To design a therapy plan and ultimately the sequence of therapy goals, we typically ascertain what foundation skills must be present to participate in a given deficit-specific treatment program. For example, if an individual has a prosodic deficit with pitch or durational perception deficits severe enough to impact the ability to differentiate between /sh/and /s/, or between a long /ee/ and short /e/ sound, then work on auditory discrimination and closure skills may not be as fruitful unless the prosodic deficit is addressed first.

Another example is a case in which dichotic listening training is indicated for an integration deficit, but auditory closure scores are also severely impaired such that it would impede the focus of the dichotic training. Here, the individual's auditory effort is expended on dichotic listening while insufficient command of auditory closure will offset the outcomes. Auditory capacity cannot be trained without having some degree of accuracy first.

A third scenario occurs if an individual is indicated for dichotic separation training that requires the repetition of phrases or sentences in the weaker ear. A significant working memory weakness that impedes the ability to remember short sentences will render this task too demanding, so therapy sequencing attention needs to focus first on improving word or sentence memory. Application of a dichotic separation task would be considered premature and should be delayed until other foundation skills have been strengthened.

Chermak & Musiek (2002) allude to the need for similar sequencing of therapy interventions by commenting that skills such as detection and discrimination should be acquired prior to engaging in tasks that require more complex psychoacoustical processing.

In summary, a general guideline that we follow is prosodic impairments first, followed by auditory discrimination and auditory closure, then binaural integration, and finally binaural separation.

ADMINISTRATION CONSIDERATIONS

Length and Frequency of AT

Neuroplasticity, or the ability to change brain function, and specifically auditory processing, requires frequent, intense and repetitive exercises (Musiek et.al., 2013). Meaningful change requires frequent if not daily AT. While the numerous trips to the audiology clinic may have been onerous at one time, the use of computers and software has allowed access to AT that can be done

with the regularity and the rigour that neuroplastic changes demand for affect.

CBAT allows for frequent and even daily training at home, often at the convenience of the school or family schedule, or at a time when an individual is most alert (Thibodeau, 2013). This flexibility increases the likelihood of the program being completed and the desired outcome attained. Realistic implementation of a rigorous AT regime, which is necessary to affect neuroplastic changes, must be balanced against the likelihood of such a regime being completed. A discussion with the family and insight into their daily demands and priorities will often be helpful in designing the appropriate AT plan.

Our typical AT program runs for approximately 12 weeks, although behavioural changes may be observed as early as 4 to 6 weeks. We have followed many individuals through elementary and high-school over the course of several years and encountered various lengths of intervention. We have found that shorter intervention periods of 6 weeks, while able to render significant changes in test scores, are often insufficient to spur continued improvements commensurate with chronological age development. Longitudinal follow-up over the course of 3 to 4 years with our clients revealed better retention of the gains made, and spontaneous, continued improvement commensurate with chronological development if intervention continued for at least about 10 weeks. Comparison with data from other CAPD treatment centres and further research into this area would allow us to streamline our service provision and maximise efficacy of our intervention programs.

Execution

Timing of intervention should be chosen with the best possible chance of completion in mind. We tend to recommend that AT be undertaken where there is a reduction in extracurricular activities or other therapies as the child or parent, who is usually the ‘cab-driver’, is burnt-out or fatigued. CAPD children tend to prefer and need their quiet times – times spent at home “doing nothing”. Summer AT, with school out, often works as one of the best times for compliance and completion. Other families, though, may have a longstanding summer tradition that cannot be broken, in which case AT could be timed to coincide partly with other holiday periods such as Winter or Spring Break.

Correct administration of the program must also be monitored. I have found a high incidence of CAPD in the parents of children with CAPD (Lau, 2010), with the result that care must be taken so that instructions are not misunderstood or, at times, forgotten. Clearly written instructions are often useful references. However, this must not be considered sufficient; regular checks and monitoring by the clinician are still required.

When it comes to daily training, CAPD children do not learn well under conditions where they are anxious, upset or feel unsafe. CAPD children are susceptible to misunderstandings and can misconstrue comments, jokes and teasing, often resulting in unintended hurt feelings. It is essential that these emotions be kept to a minimum both when choosing the environment in which to do AT as well as the therapist or assistant working with the child. Likewise, do not attempt to do AT if there is emotional turmoil or other unrest at home, particularly negative tensions. While there may be the best intentions to pursue therapy, it will often yield outcomes with no observable benefit.

CLIENT CONSIDERATIONS

Age of Intervention

AT is most effective in younger individuals whose brain is the most malleable and most responsive

to reorganization. It is, therefore, obvious that early intervention, where possible, is highly desirable.

A successful AT program requires an actively involved and motivated individual (Musiek, Chermak & Weihing, 2013), and this becomes a key intervention factor at this young age. As children graduate to high school, often homework and academic pressures compete with AT requirements and schedules. These children are typically slower at their work and often have classwork that needs to be finished up at home. Unfortunately, these are also the students who are fatigued after school and need their breaks and vacation times.

Young adolescents, from about 14 years and older, are often unwilling to participate in an AT program, particularly if they have struggled throughout their school career. They tire of being prodded, tested, doing extra work, and attending therapy sessions after school. Very often, for these children, prior tests, tutoring and extra help have not been that useful, so the children lose faith in interventions, their own abilities and self-confidence and, as a consequence, may refuse to cooperate.

We have also encountered situations where the adolescent individual does not identify with the diagnosis, or does not perceive a “problem”. While ‘coercion’ and bribes may work with the younger set, it is often futile to force AT participation on the adolescent. It may be better to wait until the adolescent becomes self-motivated and voluntarily requests therapy, which usually occurs when a problem arises.

For these reasons, we generally recommend that AT be completed prior to a student’s entering high school. This said, if the high school calendar is sufficiently organised, AT is still possible with excellent outcomes. We have found that even in adults (middle-aged, those with head-injuries, and older!), changes can be made through intense, repeated AT, and that test outcomes indicate that brain remapping can occur.

Severely-Involved Clients

Our clinic strongly supports CBAT, as we have found it efficient and effective to work with and to train those who live nearby or great distances away, while at the same time allowing an individual to still have time for family, academic, extracurricular and social activities.

Where language skills are severely impoverished, for example in patients with Down syndrome or severe Autism Spectrum Disorder where there is no spontaneous expressive language and cognitive limitations, AT must be modified to provide concrete reinforcements, strong, clear and unambiguous visual sport and realistic language-based interactions. This allows for AT to realise functionally significant training tasks that can improve generalizations in this population (Musiek et.al., 2013).

In these severely-involved cases, typical CBAT may not be the approach of choice and traditional therapy sessions may be more successful. AT tends to progress more slowly and treatment periods may extend over several months; but, with perseverance, slow and steady improvements can often be seen.

We frequently fall back on the traditional AT approach proposed by Raymond Carhart and Daniel Ling (cited in Rodel, 1985) for the habilitation of individuals with hearing loss: awareness, identification, discrimination, recognition and comprehension stages using both non-speech and later speech signals in involved and challenging cases. Due to the variability in the population, this approach needs to be implemented within a plan that includes one-to-one therapy and parents or caregivers being trained to provide appropriate review and practise at home. In these cases, such

informal AT may become an essential sequenced approach where CBAT is incorporated or introduced into the therapy plan only as the necessary skills are developed.

In other cases, it may be beneficial to provide a combination of face-to-face informal AT sessions and CBAT. We use this combination in cases where CBAT does not fully target all the therapy goals, or where there may be attention deficit which requires constant refocus and reminders. Such a combination is also useful where foundation skills must be developed prior to prescribing any CBAT program.

Finally, our comments and observations arise from over a decade of CAPD treatment experience, we emphasize that this article is based on our own clinical experiences and we would welcome any dialogue or comments that could enhance the provision of services to the CAPD population.

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