AAF Technology in Atypical Populations:Adaptation of Protocols for Autism/Down Syndrome

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Purpose

The purpose of this presentation is to outline the optimal AAF protocols and highlight the importance of the Priming and Fitting process developed for the typical stuttering population by Monkhouse, BRS/FD-SLP, PhD at the Stuttering Institute of Princeton and to specify the AAF protocol modifications that were necessary based upon a collaborative process with Hoens, an AAC Specialist, when AAF technology was used with atypical populations such as Autism and Down Syndrome.

Traditional Stuttering Population - Protocol

Technology to improve fluency has been available in pocket form for the last 50 years, but like the use of the old pocket form hearing aids, these devices represented an outward sign of disability, ultimately causing embarrassment and rejection of the device. To further complicate matters, the population of persons who stutter (PWS) is considered small and given these small numbers fluency enhancing technology has some of the same issues as orphan drugs. It is only in the last 10 years that a discretely designed AAF device has become available in hearing aid form. Monkhouse's 40 years of research and clinical practice with stuttering includes 15 years with DAF and AAF technology. Based upon this body of knowledge, Stigora and Monkhouse in 2003 collaboratively designed protocols that resulted in high efficacy with this population. The protocols comprise 3 distinct phases: Pre Evaluation, Evaluation, and Post Evaluation. Included in the Evaluation and Post Evaluation phases is the Priming Protocol, which facilitates the client to "warm up" and attend to the signal. To date, the importance of this protocol has received little attention and has been somewhat perfunctory with no standardization. Monkhouse and Hoens however, contend that this protocol is perhaps the most important one in achieving overall system efficacy.

Atypical Population - Protocol

Technology to improve communication skills has been available for more than 30 years and is referred to as Augmentative and Alternative Communication (AAC). In the Developmental and Intellectual Disability (DD) population the emphasis is first on functional communication with the goal of eliciting speech. Academic learning is incorporated as the child/adult demonstrates interactive receptive and expressive skills. Some forms of AAC (hearing aids, prostheses, etc.) may be considered radical interventions given the history of the DD population. (Shapiro, 1993; and Trent, 1995) . In 2005 Monkhouse and Hoens began a collaborative process incorporating AAF technology to improve the quality of life for people with Autism/Down Syndrome. And it is their contention that AAF technology can be perceived as a form of AAC (Monkhouse & Hoens, 2008, 2009). The work is still seminal and there remains no literature to guide the process. Serendipitous efficacy of the device was attained due to these high levels of collaboration. The Circle of Support (COS) was integral for support and maintenance and the different SLP perspectives made it possible to construct a fitting protocol that would facilitate the consumer's ability to attend to the signal and maximize communicative competence.

Discussion

The role of the priming and fitting protocol for AAF technology has received little attention as it relates to efficacy in any population. Monkhouse suggests that the sequential steps behind the priming protocol are much the same as an athlete warming up before an event, or a musician/vocalist tuning his/her instrument. It is both an internal and external event. It is a regulation process of all systems. The process builds upon itself. When done properly the user is prepared to engage in natural conversation. Hence he is *"tournament tough."*

Proper attention to the process of "*warming up"* attention to the signal makes programming easier. Attention to the signal is subtle for the user. When the signal is too loud/soft the user's voice is over/under amplified. When the signal is too slow/fast the user's rate of speech becomes unnaturally slower/faster. When the FAF setting is too high or low the user is irritated by it. When the settings are optimal, the user usually will comment that ("it feels better", my speech feels easier", "my heart is smiling",) and can point to the part of the body that is experiencing the change. Interestingly, the atypical population has the same reaction and communicates their feeling (Monkhouse & Hoens 2008; 2009).

Stuttering destroys the melody of speech. When the melody is disrupted the speaker loses his/her rhythm, which negatively impacts the thought process and the speaker's message. Ultimately, fluency strategies of the priming protocol help a person reonnect with the flow or melody of speech. When a PWS becomes aware of the rules of good oratory, s/he uses better breath support, chunking strategies, practice of meter (iambic and trocheic patterns, etc). Kalinowski and others believe that the device helps PWS emulate "choral speech." Stigora and Monkhouse believe that the richness of their priming protocol paired with the device provides sustained the support necessary to foster the melody of speech while maintaining breath support to facilitate chunking of information which maintains high signal clarity.

In atypical populations where the melody of speech is destroyed *(stuttering, repetitive speech, monotone, etc.*) AAF technology seems to be acting as a regulator and facilitates the flow. Hoens and Monkhouse believe that the brain is synchronizing the information to the second signal which, more holistically, taps into the right and left sides of the brain, thereby facilitating improved attention, articulation, language, melody and fluency. Hoens and Monkhouse believe further research is warranted.

Conclusion

When considering working with atypical populations, there needs to be an understanding of how the device interacts with the brain function and how an individual naturally speaks. The priming protocol is the optimal place to teach a prospective user how to incorporate the technology with fluency strategies. In essence, fluency strategies with the device incorporate teaching the user how to "listen more attentively" to the signal, thereby freeing him/her to listen more intently to the communicative partner. Effectively done, communication becomes associative as opposed to cognitive, freeing the person from the struggle. *For the typical population, we propose that metacognition acts as a secondary regulator. For the atypical population metacognition is not engaged whereby the circle of support acts a secondary regulator.* In either case when a person becomes engrossed in a conversation, that person becomes more relaxed. Using the strategies makes speaking more effortless and interactive.

PRE-EVALUATION:		TYPICAL		ATYPICAL			
	Introduction	Client	BRS/FD-SLP, PhD	Con-sumer	AAC Specialist	COS	BRS/FD-SLP, PhD
RECIPIENT	Reviews research, websites, articles, TV presentations, etc	Lead			Lead	Lead	
	Educates support agencies, school, COS on technology				Lead	Lead	
	Develops interest in investigating technology				Lead	Lead	
	Addresses anxiety issues and skepticism				Lead	Lead	
	Contacts the BRS/FD-SLP, PhD who specializes in the technology	Lead			Lead	Lead	
BRS/FD-SLP,PhD Role	Phone Consult						
	Develops rapport/trust with…		Client				AAC/COS
	Investigates motivations for contact		Client				AAC/COS
	Investigates history - stuttering/communication		Client				Consumer
	Offers information about the device		Client				AAC/COS
	Shares knowledge - Manages expectations		Client				AAC/COS
	Identifies prefitting requirements		Client				AAC/COS
	Discusses fitting/device Costs & reimbursement mechanisms		Client				AAC/COS
	Recommends evaluation appointment		Client				AAC/COS
	Post Phone Consult						
	Reports back to other members				Collab	Collab	
	Discusses impressions, compares to research, shares concerns				Collab	Collab	
	Discusses financing issues and funding streams					Lead	
	Appointment scheduled or confirmed	Lead			Collab	Collab	
	** Denotes "as appropriate"*						

EVALUATION: Pre Device		TYPICAL		ATYPICAL			
	Pre Meeting/Pre Device at Testing Site	Client	BRS/FD-SLP, PhD	Con-sumer	AAC Specialist	COS	BRS/FD-SLP, PhD
RECIPIENT	Participants at Testing site	Lead	Lead	Lead	Collab	Collab	Lead
	Reports needed:						
	ENT Report	Optional		Required	Collab	Collab	
	Audiology Report	Required		Required	Collab	Collab	
	Ear Mold Impression(s)	Required		Preferred	Collab	Collab	
	PSI Questionnaire	Lead		*Required		*Lead	
	Acclimation to the environment to reduce anxiety and tension			Required	Collab	Collab	
BRS/FD, SLP PhD	Meeting/ Pre Device in Testing Room						
	Expands rapport/trust with…		Client				ALL
	Obtains permission for Video/Audio recording of sessions	Lead		Collab		Collab	
	Probes/gathers additional history from…		Client				COS/AAC
	Engages in conversation to establish fluency/communication baseline	Fluency	Lead	Language *Fluency			Lead
	Severity Rating (SR) scored in everyday situations (1-10 pts:1=fluent; 10= very severe)	Required	Required	*Optional	*Required	*Required	*Required
	Cognitive function assessed to determine modifications of protocol				Collab	Collab	Consumer
	Verify impressions;maximize trial, avoid unwanted/unexpected behaviors				Collab	Collab	Consumer
	Gauges comfort level	Optional	Client	Required	Collab	Collab	Consumer
	Reads a short passage *(SSI preferred);* a picture prompt, talk about self, repeat a nursery rhyme, to establish oral reading/monologue baseline; making notations of communication skills (stress and intonation, slurring of words, length of utterance), atypical behaviors	Required Reading prompt Fluency	Lead	Required Best Fit Language *Fluency	Collab	Collab	Collab
	Completes feedback, using SR or other scale, of communicative competence in reading/monologue baseline *(1-10 pts:1=fluent; communicative competency 10= very severe; communicative incompetency)*	Required SR	Required	Required *Scale	Collab	Collab	Required
	Meeting/Trialing Device in Testing Room						
	Discusses the various AAF models (strengths & weaknesses)		Lead				COS/AAC
	Explains, demonstrates trial procedure		Lead				Lead
	Offers short presentation of signal to desensitize consumer to a foreign object in the ear			Required			Lead
	Fits preferred ear with preferred model *(CIC, ITC, BTE, CF)*	All	Lead	Only BTE, CF	Collab	Collab	Lead
	If hearing Loss	Weaker Ear		Both			
	If cerumen issues	Occasional		Always			
	Custom mold tends to produce a louder more directed signal	Preference		Attentional			
	Device settings (typical settings DAF = 60ms; FAF =500Hz; Volume =2or3)	Vol=2	Lead	Vol=3			Lead
	PROCEED TO THE PRIMING PROTOCOL - SEE PRIMING PROTOCOL TABLE						

EVALUATION: (Continued)		TYPICAL		ATYPICAL			
	Meeting/Functional Application of the Signal - (reading task/monologue/nursery rhyme)	Client	BRS/FD-SLP, PhD	Con-sumer	AAC Specialist	COS	BRS/FD-SLP, PhD
BRS/FD, SLP PhD	Consumer reads a second passage OR picture prompt, recites a nursery rhyme for practicing protocol, new measurement and device comfort	Required Reading	Lead	Required Best Fit	Collab	Collab	Collab
	Makes notations regarding fluency, melody, posture, communication	Fluency	Lead	*All	Collab	Collab	Lead
	Rates fluency/language skills. Post exercise *(1-10 pt scale)*	Required		*Optional	Required	Required	
	Device settings modified based upon results – *(signal change sensitivity; multiple changes of signal may negatively impact performance)*	Occasional		Often			
	Review priming protocol strategies as appropriate	Metacognitive		Learning			
	Read a third passage OR picture prompt, nursery rhyme	Required	Lead	*Optional			
	Data collected using 1-10 pt scale	Required		*Optional	Required	Required	
BRS/FD, SLP PhD	Meeting/Functional Application of the Signal - (connected speech)						
	Says well known/universal passage (eg. prayer or "Pledge of Allegiance")	Required	Lead	*Optional	Collab	Collab	Collab
	Makes notations regarding fluency, melody, posture, communication	Fluency	Lead	All	Collab	Collab	Lead
	Rates fluency/language skills. Post exercise *(1-10 pt scale)*	Required		*Optional	Required	Required	
	Encourages open discussion - Shares Rating Changes & Feelings	Required		*Required	Required	Required	

EVALUATION: Post Trial & Personal Device & Support		TYPICAL		ATYPICAL			
	Meeting at Testing Site	Client	BRS/FD-SLP, PhD	Con-sumer	AAC Specialist	COS	BRS/FD-SLP, PhD
	If device purchased	Lead		*Collab	Collab	Lead	
	Second appointment for fitting personal device		Lead				Lead
BRS/FD, SLP PhD	Device is programmed & inserted with previously determined settings	Required		Required			
	Stuttering Institute of Princeton - Priming Protocol reviewed/modeled	Required		Required	Collab	Collab	
	Practices protocol	Required		Required	Collab	Collab	
	Device settings modified ("tweaked") based upon results	Lead		*Required		Lead	
	Client is trained on care and maintenance	Lead		Collab	Collab	Lead	
	Priming protocol review sheet & other materials given out	Recipient	Lead		Recipient	Recipient	Lead
	Client is expected to practice priming protocol daily with device. Make 10 follow up phone calls over the course of 2 months to inform about experience with device	Required		*Required	Collab	Required	

STUTTERING INSTITUTE OF PRINCETON - PRIMING PROTOCOL		TYPICAL		ATYPICAL			
	Pre Speaking Training-"Warm Up" and Attend To The Signal (Note: system activated only on voiced speech sounds)	Client	BRS/FD-SLP, PhD	Con-sumer	AAC Specialist	COS	BRS/FD-SLP, PhD
	Prompted to generate short utterance to elicit comfort and attention to signal	Required	*Lead	Required	*Collab	Collab	*Lead
BRS/FD-SLP-PhD	Verbal encouragement/reduce immediate rejection of distorted signal			*Required	*Collab	Collab	*Collab
	Vocalizations Of Increasing Length And Complexity	Required	*Lead	Required	*Collab	Collab	*Lead
	Train and practice using the "Ah" vowel	Required	*Lead	Required	*Collab	Collab	*Lead
	Train and practice using the "Ah" vowel to lead into a word	Required	*Lead	Required	*Collab	Collab	*Lead
	Train and practice how to give full value to all vowels in a word with appropriate meter (stress & intonation)	Required	*Lead	Required	*Collab	Collab	*Lead
	Train and practice chunking/highlighting strategies *(Breath Phrases= max 5 to 9 words in the pattern with ongoing phonation before a breath, highlighting last word of each chunk for maximal clarity)*	Required	*Lead	Required	*Collab	Collab	*Lead
	Successful strategy starts with single syllable sound of *"Ah .. followed by "Ah one.. then followed by Ah one, two.." in a successive pattern whereby the Ah pattern has up to 15 syllables in multiple words (increasing length and complexity of speech).* ***The goal is to organize breath support to facilitate chunking/highlighting of information to maintain high signal clarity.***						
	Rote/Automatic Memory Activities						
	Train and practice counting	Required	*Lead	Required	*Collab	Lead	*Lead
	Train and practice days of the week	Required	*Lead	Required	*Collab	Lead	*Lead
	Train and practice months of the year	Required	*Lead	*Required	*Collab	Lead	*Lead
Evaluation Only	Increased sensitivity to assess automatic vs cognitive skills			Response & Rate	*Collab	*Collab	*Collab
Evaluation Only	Engagement in priming protocol to facilitate training of process, offer encouragement/address covert warning signals				*Required Collab	*Required Collab	
Evaluation Only	Assess Comfort Level			Response	*Required Collab	*Required Collab	Lead
	Develop awareness of natural rhythm & intonation of optimally chunked phrases in reading passage OR picture prompt, nursery rhyme	Required	*Lead	*Required	*Collab	Lead	*Lead
	Model and practice natural rhythm and intonation of optimally chunked phrases in reading passage OR picture prompt, nursery rhyme	Required	*Lead	*Required	*Collab	Lead	*Lead
Evaluation Only	Use Nursery Rhymes "Hickory Dickery Dock" "Twinkle, Twinkle Little Star" etc.			Typical	*Collab	Collab	Lead
Evaluation Only	Train/reiterate using phone number chunking	Typical	*Lead				
Evaluation Only	Train and practice how to give full value to all vowels in a sentence	Typical		*Common	*Collab	*Collab	*Lead
Evaluation Only	Train and practice how to highlight the last word of each chunked phrase – this may be taught using favored TV show host voice.			*Common	*Collab	*Collab	*Lead
	Successful strategy starts with a two word presentation *"Ah ... Monday Tuesday...Ah Wednesday Thursday" in successive pattern. Then proceed to a three word presentation with the months of the year.. Ah... January February March in successive pattern whereby the Ah pattern has up to 27 syllables in single & multisyllable words with an increase in cognitive load bringing the speaker closer to conversational speech.* ***The goal is to foster melody while maintaining breath support to facilitate chunking/highlighting information to maintain high signal clarity.***						
	Priming Protocol is Reviewed and Practiced Throughout Evaluation & Post Evaluation Protocol. Expectation is it is Done Every Day. Successful priming for the client or consumer/COS takes approx 10 minutes to complete						

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