

EDITORS OF THIS ISSUE

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ABSTRACT

If we assume the world is being experienced the same by everyone, we are wrong. Every person's perceptual system is unique and the world of inputs is perceived individually as well. This also applies to the auditory system, so how we hear the world of sounds, and what we like or dislike of what we hear, varies from person to person. Simply put, every person perceives sound differently. To explain this, a number of factors come into play, including the acoustic properties of the sound, learned associations between sound and the emotional state of the individual, the surrounding context, input from other senses, and the listener's personality, mood and exposure to sound¹.

At Oticon, we are aware of the importance of individual hearing preferences and believe that every hearing solution should be uniquely tailored to its user. We call this Personalisation. To support this, we have developed **YouMatic** for our **Inium-based** hearing aids. In short, YouMatic controls the variations in processing style to meet the needs and preferences of the user. This solution allows you to reach beyond the audiogram and standard presets to personalise your fittings with a new level of detail to match every client's individual perceptual characteristics and preferences for sound.

When addressing the question of whether this new approach actually makes a difference and, whether it generally improves the outcome of the treatment, the answer is yes. It positively affects one of the most important outcome measures, namely satisfaction, which shows to improve significantly².

1. McDermott, H.J., Auditory Preferences and Aesthetics: Music, Voices and Everyday Sounds, in *Neuroscience of Preference and Choice*. 2012, Elsevier Inc. p. 227-256.
2. Schum, D.J. and Pogash, R.R., 2014. Patient Satisfaction with the Alta Fitting Approach, Oticon Whitepaper, Oticon A/S.

The why, what and how of YouMatic

Modern advanced technology hearing instruments provide a significant amount of flexibility in the setting of sound processing features. Although a significant amount of information is available for describing how gain and compression should be set based on the patient's hearing loss, little information is available in research literature about how other signal processing features should be configured on an individual basis. In fact, in many fittings, these features are left in the default setting based on the manufacturers' recommendations. This is a "one size fits all" approach that goes against all modern consumer trends.

With YouMatic, you are able to accommodate the individual user's preferences and abilities in the response and sound of the hearing instrument. When fitting Oticon Inium-based hearing aids, data describing the user's individual characteristics can be taken into account, which in turn prescribes a personal profile and defines the setting of YouMatic. It is this setting that configures how a range of signal processing features should be managed.

The information used to configure YouMatic encompasses auditory capacity (the hearing threshold), the user's age and perceptual preferences based on auditory lifestyle, sound quality preference, listening style and general response to sound and noise.

These are all areas that in our experience, both clinically and through research, are important for choosing the best starting point for the hearing-impaired individual. YouMatic matches the response of the hearing instrument to the user's preferences in the situations encountered throughout the day. This is made possible by the fact that the instruments constantly analyse the acoustic environment based on parameters such as input level, type of input signal, SNR in input level, changes in the input level (short- and long-term), binaural level differences and binaural SNR differences, and decides on best individual instrument setting for the situation.

YouMatic performance levels

The concept of YouMatic is the same for all of our Inium hearing instruments. Within the different product families Alta, Nera and Ria, the performance, accuracy and amount of automatic features YouMatic controls vary. This means that YouMatic is available at three different performance levels and price points: Premium, Advanced and Essential. The more advanced the version of YouMatic, the more detailed and accurate it can be configured and fitted to match users' individual preferences for sound (Table 2 and 3).

Feature version	Available in family	Settings in VAC rationale	Settings in NAL rationale
YouMatic Premium	Alta	5 main profiles 15 steps	3 main profiles 9 steps
YouMatic Advanced	Nera	N/A	3 main profiles 7 steps
YouMatic Essential	Ria	N/A	1 main profile 3 steps

Table 1. The three different performance levels of YouMatic and the amount of personalised settings within each fitting rationale.

The fitting process that simply factors in more information about the user

We devised the Preference Manager functionality in Genie to uncover important perceptual areas of clients' sound preferences and abilities.

Our hypothesis was that there is a certain correlation between users' perceptual sound preferences and what can be described as the optimal settings applied in the hearing instrument. To explore this correlation, 195 users were included in a study in which their responses to a range of questions relating to auditory lifestyle, sound quality preference, listening style, and perceived response to sounds were correlated with their preferred instrument settings.

This led to four distinct questions which showed a statistical correlation with the users' preferred hearing instrument settings. These four questions are now used in the Preference Manager as part of determining the personal profile in Genie (Figure 1).

The preference manager questions, used to gain vital information about the user and to form the instrument

response with YouMatic, are the same for all Inium Performance product families. Answering the questions (supported by listening to sound demos) helps to reach a best starting point for the first experiences with the given instrument. Later in the fitting process, the initial configuration of YouMatic can be modified by adjusting the user's personal profile. This is preferably done when the user comes back for follow-up, based on the user's initial experiences with the hearing instruments. This optimisation is carried out in the YouMatic Manager, where adjustments to a personal profile will change the settings of several technologies and help systems. In the YouMatic Manager screen, this cluster of changes and their effects are displayed on the "dashboard meters".

YouMatic is a meta-trimmer concept which offers combinations of set parameters in the help systems, carefully designed to benefit the hearing instrument user. The YouMatic combinations can therefore be fine-tuned on a general level, but not on the level of single features as this could create sub-optimal settings.

YouMatic Premium (VAC)						
FEATURE		LIVELY	EXACT	BALANCED	GENTLE	STEADY
Omni type	Normal Power	Opti Omni Opti Omni	Opti Omni Opti Omni	Opti Omni Opti Omni	Speech Omni Opti Omni	Speech Omni Opti Omni
Directional Automatics	Normal Power	Tri-mode Tri-mode	Tri-mode Tri-mode	Tri-mode Tri-mode	Tri-mode Tri-mode	Tri-mode Tri-mode
Directional with Low Frequency Compensation	Normal Power	Off On	Off On	Off On	Off On	Off On
Noise Management						
Maximum reduction - Noise only		12 dB	12 dB	12 dB	12 dB	12 dB
Maximum reduction - Speech in noise		4.5 dB	6.75 dB	9.75 dB	11.25 dB	11.25 dB
Transient Noise Management		Off	Off	On / Situation Dependent	On / Situation Dependent	On / Situation Dependent
Gain adjustment (for VAC, above 2 kHz)		- +3.0 dB	- +2.5 dB	- +1.5 dB	None	None
Speech Guard E						
Time constant setting		Fast	Medium	Medium	Medium	Slow
Floating linear window		12 dB	12 dB	12 dB	12 dB	12 dB
Spatial Noise Management						
Maximum reduction		6 dB	6 dB	6 dB	6 dB	6 dB
SNR difference to activate		-10 dB	-7.5 dB	-5 dB	-2.5 dB	-2.5 dB

Table 2. The five personal profiles and sub-steps in YouMatic Premium for VAC. Each profile encompasses a range of parameters such as noise management, directionality, compression speed etc.

YouMatic Advanced (NAL)				
FEATURE		EXACT	BALANCED	GENTLE
Omni type	Normal Power	Opti Omni Opti Omni	Opti Omni Opti Omni	Opti Omni Opti Omni
Directional Automatics	Normal Power	Tri-mode Tri-mode	Tri-mode Tri-mode	Tri-mode Tri-mode
Directional with Low Frequency Compensation	Normal Power	Off On	Off On	Off On
Noise Management				
Maximum reduction - Noise only		12 dB	12 dB	12 dB
Maximum reduction - Speech in noise		6.75 dB	9.75 dB	11.25 dB
Transient Noise Management		Off	On / Situation Dependent	On / Situation Dependent

Table 3. The three personal profiles and sub-steps in YouMatic Advanced for NAL. Each profile encompasses a range of parameters such as noise management and directionality.



Figure 1. Preference Manager in Personal Profile.

People First

People First is our promise
to empower people
to communicate freely,
interact naturally and
participate actively