HEADSET MICROPHONE COMPARISON - SPEECHWARE'S NEW FLEXYMIKE DEC VS NEW SENNHEISER ME3-II

Objective

To compare SpeechWare's new, second-generation, *FlexyMike Dual Ear Cardioid (DEC)* headset microphone against the new *Sennheiser ME3-II* headset microphone for accuracy in Dragon NaturallySpeaking.

Background

SpeechWare of Brussels are making design improvements to their *FlexyMike DEC* headset microphone. The new model will have the same capsule as the existing model but will feature a 'telescoping' or adjustable headband and vertical cable connector in one side for improved wearer comfort. The following images show the improved *FlexyMike DEC* design --note the "intriguing" 3rd image in which the headset is used as a Desktop microphone with very long range dictation (!) thanks to the unique *SpeechWare USB MultiAdapter* under Green LED or light:

During the *FlexyMike DEC* redesign phase, Sennheiser announced that they had replaced their *ME3-EW* headset microphone (a long-standing favourite with the speech recognition community) with a new version called the *Sennheiser ME3-II*.

Old Sennheiser ME3-EW

Replacement Sennheiser ME3-II

Versus the old *Sennheiser ME3-EW*, the *Sennheiser ME3-II* has a shorter microphone boom, the shape of the element in contact with the face is now round and not tear-dropped shaped and the microphone capsule has a metal grille housing on both sides. The *Sennheiser ME3-EW* had an all plastic microphone capsule enclosure.

Sennheiser say that the microphone capsule itself in the new *Sennheiser ME3-II* is identical to the microphone capsule in its predecessor *Sennheiser ME3-EW*. However, I compared the two microphones by making a sound recording in Windows 10 with both microphones connected to the

microphone in port of the computer and set at the same microphone in sound level. I found that the new *Sennheiser ME3-II* was significantly 'less hot' (i.e. produced less sound) than the previous *Sennheiser ME3-EW* and was also significantly <u>less hot</u> than the <u>FlexyMike DEC</u> (recording files available on request). There was no difference in the sound levels either Sennheiser model when connected to the computer with a *Buddy 7G USB* Sound adapter. In this case, the new *Sennheiser ME3-II* gave the same loud and clear sound as did the *Sennheiser ME3-EW*.

Tests were carried out compare the accuracy in Dragon Naturally Speaking of the upcoming new *FlexyMike DEC* model to the accuracy of the new *Sennheiser ME3-II*.

<u>Testing protocol</u>

Word recognition accuracy in Dragon Naturally Speaking was evaluated under exact identical conditions for each microphone using my <u>'mouth simulator'</u> test.

Specific test parameters were as follows:

Dragon NaturallySpeaking version	Dragon Professional Individual 14
Language model	UK English
Windows version	Windows 10 (64-bit), build 10586
Computer specification	• HP ENVY dv6 Notebook PC • Intel i7, 2.3 GHz quad core • 8 Gb RAM • Samsung 840 EVO solid-state drive (SSD) • Soundcard – IDT High Definition Audio

For the testing, Dragon Professional Individual 14 was chosen as the Dragon version rather than the latest Dragon Professional Individual 15 version. This version was chosen because our mouth simulator test protocol is based on giving each microphone exactly 5 minutes of enrolment training. Enrolment training has been removed in the latest version of Dragon (Professional Individual 15) and has been replaced by 'deep learning'. Basically, in version 15, Nuance say that dictating several hundred lines of text, making the necessary corrections and running the Acoustic and Language Model Optimiser does the same job as enrolment training in previous versions.

The following setups were tested:

Microphone	Audio input sound connection
Sennheiser ME3-EW with Speech Recognition Solutions Sennheiser 6" adapter cable	Mic in (sound card)
Sennheiser ME3-II with Speech Recognition Solutions Sennheiser 6" adapter cable	Mic in (sound card)
SpeechWare FlexyMike DEC	Mic in (sound card)
Sennheiser ME3-EW	Buddy 7G USB sound adapter
Sennheiser ME3-II	Buddy 7G USB sound adapter
FlexyMike DEC	SpeechWare USB MultiAdapter in <u>Blue LED mode</u>
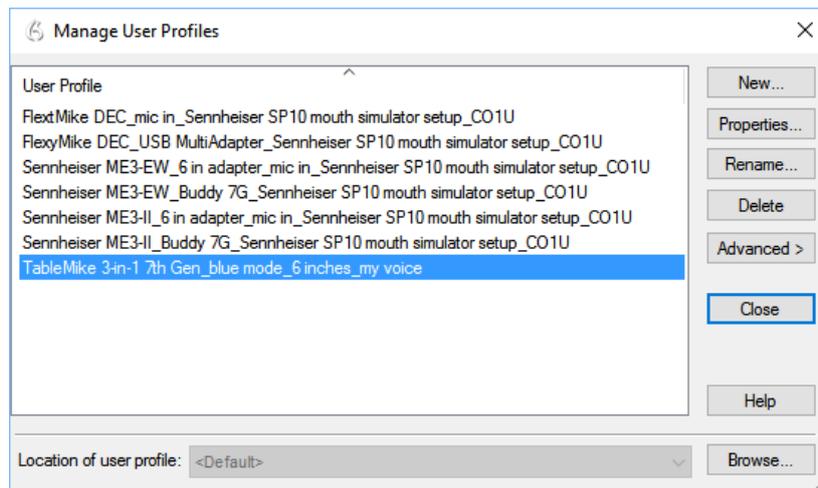
User profiles in DPI Individual 14

To explain the choice of testing in Blue LED mode in of the *SpeechWare USB MultiAdapter* mentioned in the last row of the above table --this sound adapter is the only USB adapter supporting a very 'hot' long range dictation mode (under Green LED mode) meant for the USB TravelMike and less sensitive headsets, as well as for using the *FlexyMike DEC* as a desktop microphone too (!), which is an amazing option if ever you are tired of wearing the microphone after many hours of continuous dictation. SpeechWare obviously recommends the Blue LED (normal range dictation mode) for the *FlexyMike DEC*, when used in a normal conventional way.

Note that the actual *SpeechWare FlexyMike DEC* model tested was the current design model rather than the actual new design model. SpeechWare assured us that the microphone capsule in the new design will be exactly identical to microphone capsule in the current design.

For testing the Sennheiser microphones with a USB Sound adapter, I chose to use the *Buddy 7G USB* sound adapter. This is my preferred sound adapter for use with the *Sennheiser ME3* as it has a proven track record of producing high accuracy and I have never received any negative customer feedback with this combination.

Results

The accuracy results (with a UK English language model) were as follows:

	Accuracy (%)		Dropped words		Average accuracy (%)	Average dropped words
	No noise	With 70 dBA noise	No noise	With 70 dBA noise		
Old Sennheiser ME3-EW with 6" adapter cable to mic - in	98.8	98.7	0.6	1	98.8	0.8
New Sennheiser ME3-II with 6" adapter cable to mic - in	98.5	98.1	1	0.8	98.3	0.9
Speechware FlexyMike DEC to mic - in	98.5	98.5	0.6	1	98.5	0.8
Old Sennheiser ME3-EW with Buddy 7G	98.3	98.3	0	0.2	98.3	0.1
New Sennheiser ME3-II with Buddy 7G	98.5	98.5	0.2	0.8	98.5	0.5
FlexyMike DEC (original design) with SpeechWare USB MultiAdapter in Blue LED (normal mode)	98.5	98.5	0.6	0.8	98.5	0.7

* Best average results in red (new ME3-II and FlexyMike DEC results)

Conclusions

1. In the case of sound card only (mic – in) audio connection, the *Speechware FlexyMike DEC* was **marginally <u>better</u> than the recently introduced *Sennheiser ME3-II*** in terms of accuracy performance.

2. The *FlexyMike DEC* with *SpeechWare USB MultiAdapter* in Blue LED mode **was <u>identical</u>** to the *Sennheiser ME3-II* with *Buddy 7G* in terms of accuracy performance. However, setting the *SpeechWare USB MultiAdapter* in Green LED mode allows the *FlexyMike DEC* not only to be used by people with very soft voices but also, as a rather unique long-range dictation desktop microphone (!).

3. In the case of a sound card only audio connection, the accuracy of the *replacement Sennheiser ME3-II* appears **to be <u>reduced</u> versus its predecessor** *Sennheiser ME3– EW* but accuracy appears to be the same when connected to the computer via a *Buddy 7G USB* sound adapter.

4. Since performance of the **three headsets is top notch**, headband design, functionality, comfort and weight may play a substantial role in the final choice. In this context:

Ancillary criteria	New ME3-II	Old ME3-EW	New FlexyMike DEC
Headband design	Fixed		Adjustable
Ergonomics	Good	Good	Best
Comfort	Good	Good	Best
Weight	Heavy	Heavy	Lighter

Final thoughts

I am a little concerned about the apparent reduction in sound input levels with the *Sennheiser ME3-II* when connected to a PC sound card via the mic – in port. I have always told my customers that the *Sennheiser ME3-EW* is capable of delivering good results when a speaker needs to speak in a low volume into the microphone (e.g. a user in an open plan environment who does not want to annoy their neighbours with sound of his or her dictation). I may have to revise this advice with the replacement *Sennheiser ME3-II*.

Based on my findings, I will advise customers to only use the new *Sennheiser ME3-II* with a sound adapter such as the *Buddy*. However, this concern does not appear to be relevant with the *FlexyMike DEC* as it produces a substantial sound input when connected via the microphone in port of the computer even when running with the *SpeechWare USB MultiAdapter* under Blue LED normal mode.

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