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Commentary

THE DEVELOPMENT OF THE ENGLISH-MALTESE ASSESSMENT OF SPEED OF HANDWRITING (EMASH)

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Abstract. This commentary discusses the development of the *English-Maltese Assessment of Speed of Handwriting* (EMASH), a novel bilingual (English and Maltese) writing speed diagnostic assessment battery. The EMASH is an adaptation of the *Detailed Assessment of Speed of Handwriting* (DASH), a previously standardized English assessment battery developed by Barnett, Henderson, Scheib & Schulz, 2007 with the aim of identifying handwriting difficulties. Given the lack of evaluation instruments that measure writing speed performance that are standardized on the local population, or are in the mother tongue, this study sets out to realize the translation and adaptation of the DASH for the Maltese population. The DASH is not scientifically appropriate to administer and score on Maltese children since it is standardized on a UK population.

Keywords: handwriting speed, DASH, assessment battery, bilingual, writing disorders.

1 Introduction

The EMASH measures the handwriting speed of 14-15-year-old Maltese students and identifies students experiencing difficulties with writing speed, those who find writing difficult and students who are at risk of writing disorders (namely dysgraphia). The test can also guide professionals evaluate handwriting.

2 Research aims

The EMASH aims to: (1) develop a novel writing speed diagnostic assessment battery; (2) develop local norms on handwriting speed of 14-15-year-old Maltese students; (3) conduct measures of validity and reliability; (4) support the request for access arrangements in national exams.

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3 Writing Speed tests

Three principal methods of assessing writing speed include copying (Stabach, 1915; Wallen, Bonney & Lennox, 1996), writing to dictation (Horne, Ferrier, Singleton & Read, 2011) and free writing (Allcock, 2001; Christensen, 2004).

Average speeds on copying tasks revealed a growth from 54 letters per minute (LPM) at age 8-9 to 133 LPM at age 17-18 (Wallen et al., 1996). Results of writing to dictation revealed that students aged 11–12 wrote at an average speed of 16 words per minute (WPM), which for this test was equivalent to a speed of 62 LPM (Horne et al., 2011).

In order for tests to simulate examination conditions, they need to include a free writing task. However, free writing places cognitive demands on the pupil, such as the generation and structuring of ideas (Berninger, 1994; Hayes & Flower, 1980). Hence average rates on free writing tasks tend to be significantly slower. Allcock (2001) found the median handwriting speed of 11-year-olds to be 13.9 WPM and that of 16-year-olds to be 16.9 WPM. Christensen (2004) reported the handwriting speed of 13 year old students, to be 8.5 WPM.

The assessment adapted for the purpose of this research, *Detailed Assessment of Speed of Handwriting* (DASH; Barnett, Henderson, Scheib & Schulz, 2007) is the only test of handwriting speed that offers an overview of the types of writing tasks children are expected to execute in an educational environment. The five subtests of the DASH were developed in the UK and standardized on a sample of students aged between 9-16 years. The tasks *Copy Fast*, *Copy Best* and *Free Writing* are timed. The *Copy Fast* and *Copy Best* subtests involve the copying of the pangram *The quick brown fox jumped over the lazy dog*. In the *Free Writing* task, the students are first given a spider diagram (with prompts such as *school, friends, holidays, pets* etc.) which is discussed for a minute. They are then required to write a paragraph about *My Life* in ten minutes. Pilot studies have revealed that this topic enables students to generate material easily without too much thought or effort (Barnett et al., 2007). The two subtests, *Alphabet Writing* and *Graphic speed,* are equally timed. Whereas the *Alphabet Writing* task assesses the fluency and quality of handwriting (Graham, Berninger, Abbott, Abbott & Whitaker, 1997), the *Graphic Speed* test measures perceptual motor competence (see Figure 1) which results from the interaction between sensory perception

and motor actions in increasingly skillful behaviors (Frost, Wortham & Reifel, 2010).

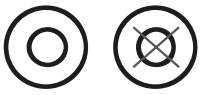

Figure 1. The Graphic Speed subtest

4 Research questions

Given the lack of evaluation instruments based on criteria adequate for Maltese school age children that measure speed performance and observe aspects of legibility of writing, this study sets out to develop such a tool. It also aims to address the following research questions:

a) How can the DASH be used to support or change current educational practices?
b) How do Maltese 14-15-year-old students perform at both the Maltese and English tests of handwriting speed?
c) Is the EMASH a valid and reliable tool to identify speed of writing difficulties in young adolescents?

5 Consent

Ethical approval was sought and obtained from the DASH authors, the Faculty Research Ethics Committee (FREC) and the University Research Ethics Committee (UREC) at the University of Malta; the Education Division; the Secretariat for Education; the college principals; the heads of schools and the participants' parents.

6 Modifications to test content and administration in the development of the EMASH

Four out of five DASH subtests were modified during the development of the EMASH. Eight modifications were made and are outlined in Table 1. An exact replica of the graphic speed test used in the DASH was used in the EMASH.

Table 1: Modifications to the DASH subtest names during the development of the EMASH

DASH	EMASH	
barnett et al (2007)	Research version	
	English	Maltese
Copy Best	Copy Neatly	Ikkopja Pulit
Copy Fast	Copy Quickly	Ikkopja Malajr
Alphabet Writing	Copy from the Board	Ikkopja mill-Bord
Free Writing	Free Writing	Kitba Kreattiva

The *Copy Best* and *Copy Fast* subtests were renamed *Copy Neatly* and *Copy Quickly* respectively as two different pangrams were used in the EMASH. The Maltese pangram created for this research is *Kien liebes gozz Hwejjeġ u ċraret vera qodma u m'għażluhx fil-pront* (*He was wearing a pile of very old clothes and cloths and was not chosen promptly).* This was developed through consultations with relevant professionals (Mifsud, 2016). The new English pangram *A mad boxer shot a quick, gloved jab to the jaw of his dizzy opponent* was selected from the site 'Fun with Words' (n.d.) because it is composed of 54 letters, to equal the number of letters in the Maltese pangram. This would allow for parallel comparisons in data scoring.

Minor changes were also made to the test administration. In the *Copy Best* and *Copy Fast* subtest in the DASH, the pangrams are distributed to the students on strips of paper for collection at the end of the test. In the *Copy Quickly* and *Copy Neatly* subtests in the EMASH, the pangrams are printed on the test papers with lines below them for students to write on. This new form of test administration makes it easier for testers as they do not have to collect strips of paper at the end of the testing session. No changes were made to test administration involving the time mark. The DASH requires participants to insert a time mark (//) after the first minute in the pangram copying tasks, and every two minutes in the free writing task.

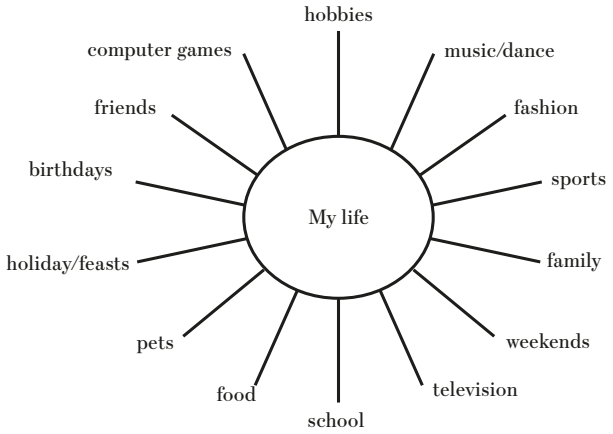

Figure 2. The spider diagram of the English free writing subtest of the EMASH

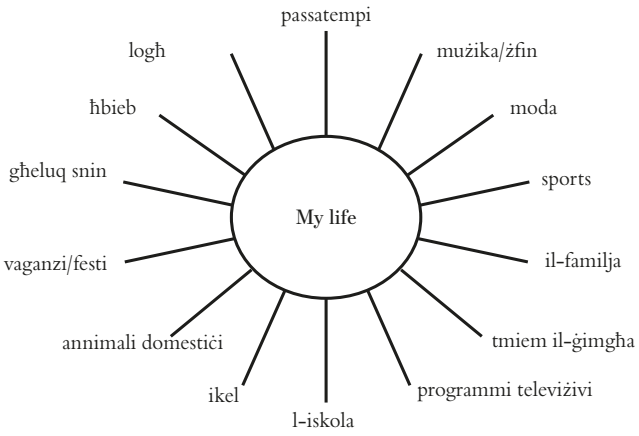

Figure 3. The spider diagram of the Maltese free writing subtest of the EMASH

Another modification made to the DASH was that of the *Alphabet Writing* task which was replaced by a *Copy from the Board* task. The latter task simulates copying from the white board during lessons, hence making the EMASH a useful diagnostic tool for classroom teachers. Students are required to copy the projected text as fast as possible, but legibly, as they would be asked to do in a classroom setting. The text chosen for the English subtests was taken from state annual past papers, pitched at track 3[1] of the Form 4 Syllabus, addressing Attainment Levels 4-6 (Education Division, 2007) (see Appendix A). The text chosen for the Maltese subtest was taken from the 2013 state Form 4 annual past paper, pitched at track 3 of the Form 4 Syllabus (Department of Curriculum Management, 2014–15) (see Appendix B). These texts were selected for two reasons. First, both texts are pitched at the level which students are expected to have reached at this stage, and therefore they should be familiar with the diction. Second, the texts do not have many punctuation marks (e.g. direct speech or question marks) making it less demanding for students to copy.

For the *Free Writing* task, in which participants are required to write about *My Life*, some of the prompts were changed to make them more culturally suitable. For example, 'feasts' was added to 'holiday' and 'clubs' was replaced with 'weekends'. The title of the Maltese free writing subtest was *Xi Nħobb Nagħmel (What I like to Do) (see Figure 3)* because it allows for the same prompts used in the English spider diagram (see Figure 2) to be used. This is so that testers may administer only one test version should they choose to do so.

The plan for the *Free Writing* task is presented in the DASH in the form of a spider diagram. Although the DASH presentes a page large spider diagram, the EMASH presents a smaller spider diagram followed by lines, for practical purposes. This makes test administration more practical as the tester does not have to distribute the plan to each student, and collect it again afterwards, as is suggested in the DASH.

A sans serif font (Verdana), was used for the EMASH to avoid serif fonts that have hooks at the ends of the letters that tend to make letters run together, hence making reading more difficult for students with learning difficulties. The Verdana font was selected since a Matriculation and Secondary Education Certificate (MATSEC) study has shown that this font is viewed by students as the most readable font (MATSEC Support Unit, University of Malta, 2017).

7 Conclusion

This commentary discusses the development of a bilingual (English and Maltese) assessment of handwriting speed which was constructed to parallel a previously standardized UK assessment for the purpose of diagnosing writing difficulties in both educational and clinical contexts. A pilot study concerning the viability of the EMASH was carried out in order to identify the challenges encountered by the participants and feedback from students and professionals, and to amend the tool and administration criteria accordingly. A cross sectional, quantitative research methodology was applied to the pilot study. About 20% of the sample of the total population of participants recruited for standardization was recruited for this study. Participants were stratified by age, ability and school type. They were secondary school students (age range 14 to 15 years) in Form 4 classes, attending state, church and independednt schools. The ratio of the participants was 10 (state): 3 (church): 1 (independent). This reflects the Maltese student population attending state, church and independent schools. Participants were also selected by ability. An equal number of high ability, average and low ability students were selected based on their academic performance, with students who attained high grades at exams being classified as high ability students, and those who attained low grades as low ability students. Prior to the pilot study, domain-related experts including practitioners (such as occupational therapists and educational psychologists) and university lecturers, were invited to offer their professional feedback on face and content validity of the test questions in order to determine how relevant the test items were for the purpose intended. It is beyond the scope of this paper to discuss the results of the pilot study.

Once the results of the pilot study are evaluated and the EMASH updated accordingly, the test will be administered to approximately 400 students. The sample will be stratified by age, school type and geographical districts. The parental consent form will be distributed to all the Form 4 students of the selected schools, in order to recruit students of different abilities. This is so since in state schools students are set by ability and in church and independent schools the abilities are mixed. Analysis of Variance (ANOVA) will be used to establish whether mean scores differ significantly between the several independent groups, in this case clustered by geographical districts, school type, gender and writing tasks. Mixed multilevel modelling will be used to estimate the variance component at each level of nesting and determine the within school and between school variance for writing speed scores. The Pearson correlation test will be carried out to assess the relationship between the variables, for instance, learning disability and writing speed, and to determine if learning disability affects writing speed. For predictions, regression analyses will be used, and for the standardization process, reliability statistics will be utilized. Data validity and reliability measures will be carried out by retesting 10% of the participants and comparing performance of participants on the EMASH and the DASH in parallel forms testing.

8 Funding

The main author has been granted paid study leave for one scholastic year.

1 Students in secondary schools may be following programmes of learning at different levels of difficulty in a number of subjects. These educational programmes may be referred to as Track 3, Track 2 and Track 1, Track 3 being the most demanding.

9 Conflicts of Interest

The author/s report/s no conflicts of interest.

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Appendix A

Text to be copied for the English *Copy from the Board* subtest

"Until very recently, most experts[2] on climate have said that it is highly unlikely that record temperatures and unusually heavy rains are linked to global warming. However now, it has been discovered, that there is a connection between some weather events and global warming. Several hundred scientists from all over the world contributed to the detailed report. According to the report, climate change makes extreme weather events more probable. The researchers say that a drought may be twenty times more likely because of man-made climate change. However, not all the weather events the scientists studied in their report were linked to climate change."

(Adapted from the comprehension text of the 2014 English Annual State Past Paper for Form 4 Secondary – Track 3)

Appendix B

Text to be copied for the Maltese *Copy from the Board* subtest

"Siġra indiġena Maltija hija s-siġra nazzjonali, is-siġra tal-Għargħar, li tħaddar is-sena kollha. Il-weraq tagħha huma rqaq, fuq zkuk kannella fl-aħmar, u huma dawn li jagħmlu s-siġra tiflaħ ħafna għan-nixfa u l-melħ. Il-frotta ta' din is-sigra tissejjaħ prinjola. Ġo fiha issib iż-żerriegħa li tinxtered mar-riħ. Kull żerriegħa ssibilha par ġwienaħ wesgħin, qishom tal-karta, biex ittir, u għalhekk is-siġra l-ġdida ma tikbirx tmiss m'oħra. L-Għargħar hija siġra rari li fl-Ewropa u tinstab biss f'Malta u Spanja. Fil-gżejjer Maltin tikber fis-selvaġġ f'xi ħames postijiet biss, u f'uħud minn dawn l-inħawi tikber ma' xi blat minkejja li jkun hemm nuqqas ta' ħamrija."

(Adapted from the 2013 Maltese Listening Comprehension Teacher's Paper for Form 4 – Track 3 in turn adapted From an article by Zach Engerer, published in the December issue of 2009, volume 306, of *Sagħtar*)

Translation

(A Maltese indigenous tree is the national tree, the Araar tree, which is an evergreen tree. Its leaves are very narrow, on brownish red twigs, and they are these that make this tree resistant to droughts and salinity. This tree's fruit is called pine cone. Inside there are seeds that disperse with the wind. Every seed has a pair of wide wings, similar to paper, which enables it to glide, and so the new tree does not grow in close proximity to another. The Araar tree is a very rare tree in Europe, and is found only in Malta and Spain. On the Maltese islands this tree growns in the wild, in only five locations, and in some of these places, it grows in rocky areas despite the lack of soil.)

2 Experts not cited.