

# Development of the *Maree Career Matrix*: a new interest inventory

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## Abstract

In this article, the authors report on the development of an interest inventory (the *Maree Career Matrix*) for South Africans with a minimum of Grade 9 second language English or Afrikaans proficiency. The instrument was completed by 1106 learners in Grade 11 in the Gauteng, Mpumalanga, and North West provinces of South Africa. Rasch analysis was done; inter-category correlations, reliability coefficients, and differential item functioning values were calculated; and validity and norm tables were established. We concluded that the *Maree Career Matrix* is easy to use and has good psychometric qualities, takes relatively little time to administer, provides reliable and valid results, is standardised, and can be applied to large groups with relative ease. Additional research is needed to gather data on the profiles of people in other age brackets and to trace their progress, the aim being to further investigate and enhance the predictive value of the *Maree Career Matrix*.

## Keywords

Interest inventory, *Maree Career Matrix*, self-estimates of interest and confidence about aptitude, sense of self-efficacy

Alika and Egbochuku (2009) and Metz and Guichard (2009) maintain that cultural, educational, gender, and socio-economic factors should always be taken into account for career counselling to remain relevant. Yet, to date, only a few psychometric tests have been designed in South Africa for the diverse South African population (Maree, 2009, 2013a). Criticism of North American and Eurocentric career counselling theory and intervention in developing countries

led to calls for research on methodologies more congruent with these countries' particular contexts (Lopez Levers, May, & Vogel, 2011). It was argued that, in addition to adapting and restandardising some of the models, strategies, questionnaires, and tests developed in North America and Europe, new paradigms, strategies, interventions, questionnaires, and tests should be designed, developed, and standardised for career counselling in developing country contexts.

People's career choices influence virtually every aspect of their lives, including their financial position, their lifestyle, and their sense of self. Accordingly, few decisions in life are as important as the choice of a career (Maree, 2013a). Every effort should therefore be made to determine and assess those factors that can best predict career success, such as interests and abilities (the two dimensions most often associated with career counselling assessment). However, even in the 21st century, it is impossible to predict with certainty who will be successful in their chosen careers and go on to design fulfilling lives and make meaningful social contributions. A combination of career interests, self-efficacy, and academic achievement generally influences people's choice of, and achievement in, a particular field of study and career (Patrick, Care, & Ainley, 2011). Research has shown, for instance, that not only interests (measured with standardised inventories or self-estimates of interests) but also self-estimates of abilities and self-efficacy can be very helpful in helping people make appropriate career choices (as opposed to 'right' career choices – there are no 'right' or 'wrong' career choices, just appropriate or less appropriate career choices) (Ainley, Jones, & Navaratnam, 1990; Gati, Fishman-Nadav, & Shiloh, 2006).

For the purposes of this article, a position is regarded as a set of work tasks performed by an individual, a job as group of positions that require the execution of similar tasks, an occupation as a group of related jobs, a career as a series of positions occupied by an individual during his or her life course, and a vocation as a calling or what an individual is 'called for' (M. L. Savickas, personal communication, July 12, 2014).

The next section covers some important *Maree Career Matrix (MCM)* areas of interest.

## **Interest-related dimensions**

### *Stability of interest profiles*

According to Du Toit, Prinsloo, Gevers, and Harilall (1993), there is general agreement that interest profiles begin to stabilise at about 17 years of age. Hansen and Campbell (1985), too, believe that interest profiles stabilise at this age, that is, near the end of the secondary school years, and that by the age of 25 years, interest profiles are stable for most people. Hansen (2005) also claims

that the younger people are, the less stable their interests are likely to be. However, some people's interest profiles do change considerably over time. Rottinghaus, Coon, Gaffey, and Zytowski (2007), basing their views on the findings of a 30-year follow-up study conducted on junior and senior high school learners, established that '[v]ocational interests are tenacious and have far-reaching effects across decades. Their predictive validity is among the highest of all psychological constructs' (p. 20). This finding accords with Hansen (2005), Low, Mijung, Roberts, and Rounds (2005), and Swanson's (1999) finding that interests are among the most stable psychological constructs over time.

### *Self-efficacy and prediction of career success*

Self-efficacy, defined by Bandura (1986) as 'people's judgements of their capabilities to organise and execute courses of action required to attain designated types of performances' (p. 391), refers to people's control over their thoughts, feelings, actions, and their perceived ability to achieve certain goals (Savickas, 1994), as well as their estimation of their capacity to perform certain kinds of action efficiently. Bandura (1997) argues that self-efficacy strongly influences people's actions, their sense of control, and their self-agency, while Swanson (2012) believes that a strong 'sense of self-efficacy is an important contributor to the attainment of occupational success' (p. 522). He goes on to say that '[r]esearch suggests that a solid sense of self-efficacy is an integral factor in the attainment of further competencies and success' (p. 525). Gottfredson (2002) states,

A reader familiar with Holland's developmental views who did not know that the following sentence was written by Bandura (1991), might guess that Holland wrote it: 'People's beliefs in their [self-] efficacy influence the choices they make, their aspirations, how much effort they mobilize in a given endeavor, how long they persevere in the face of difficulties and setbacks'. (p. 257)

### *The importance of obtaining self-estimates of interests*

Athanasou and Cooksey's (1993) research revealed that test-takers can and do provide valid estimates of their interests (Athanasou, 2007) – often remarkably consistent with their scores on standardised interest inventories (J. Athanasou, personal communication, July 9, 2010). These authors stress the importance of evaluating the results of interest questionnaires and inventories against the results of self-estimates of interest. They agree with Mischel (1977) that '*what the person tells us directly turns out to be as valuable an index as any other indirect sign*' (p. 248) and Burisch (1984) who argues that the usefulness of

inventories and questionnaires has not been substantiated. In related research, Hansen (2005), Hirschi and Läge (2008), and Zytowski (1999) recommend that clients should be asked to predict their results on interest inventories to see whether these scores correlate positively with measured scores. The two sets of results can then be compared and the similarities and differences discussed by career counsellors and clients. Healy and Mourton's (1983) findings suggest that self-estimates of career interests are good indicators of readiness to make career choices.

## **Rationale for the study**

The rationale for the development of the *MCM* (Maree, 2016; Maree & Taylor, 2016) is the need to construct up-to-date, interest-related inventories in developing country contexts (South Africa in particular; Maree, 2013b). Because of the paradigm shift (Kuhn, 1996) in career counselling theory and practice brought about by the dramatic changes in the world of work, innovative approaches to career counselling and career decisions are vitally needed (Amundson, Niles, & Harris-Bowlsbey, 2004; Sharf, 2013).

There is general agreement that people's interests (both measured and self-estimates of interests) and confidence in their abilities are key factors in predicting the choice of and success in a career. We therefore set out to design an interest inventory that would focus on people's expressed career interests as well as on self-estimates of their ability (confidence) to succeed in given careers. No such (South) African-developed inventory is currently available. The types of career options presented in the inventory would also be relevant to the career options available in South Africa.

The aim of the research was to develop a South African inventory of career interests and self-estimates of confidence about aptitude for certain careers. The inventory would then facilitate the identification of clients with little or no exposure to the world of careers and/or with little or inadequate understanding of their own interest profiles, understanding why certain clients display certain career interest and confidence profiles, helping clients understand their profiles, and motivating them to investigate the world of work actively, and expediting psychological research by using it alongside other career inventories and tests in psychological research to triangulate findings (Maree, 2008).

## **Method**

### *Sampling*

Three urban schools in Gauteng, four semi-urban/rural schools (two in Mpumalanga and two in the North West Province), and three rural schools were selected (one in Mpumalanga and two in the North West Province).

Regarding socio-economic status (SES), six schools had an ‘average’ SES (assumed to be relatively homogeneous), two schools were fairly low in terms of SES, and two schools were fairly high in terms of SES.

### *Participants*

The population was defined as all learners in secondary public schools in South Africa. The following guidelines governed the research:

1. Only public schools were included.
2. Three ‘average’ urban schools in Gauteng (‘average’ in terms of SES; therefore assumed to be relatively homogeneous), four semi-urban/rural schools (two in Mpumalanga and two in North West), and three rural schools were selected (one in Mpumalanga and two in North West). Our premise was that the ‘best’ sample would be the one that reflected the demographic profile of the provinces as accurately as possible. In other words, we planned to ensure the allocation to the sample of urban/semi-urban or semi-rural/rural and average/low/high SES to make our approach as sound as possible in respect of the purposive sampling. Regrettably, this did not prove to be entirely practicable as some headmasters were unwilling to participate in the study.

Test-takers ( $n = 1\ 106$ ) were selected from the 10 schools referred to above, and a specific number of learners were selected at each school. Grade 11 learners were selected because Grade 11 end-of-the-year marks co-determine whether or not learners will be accepted into tertiary training institutions and also because there seems to be general agreement globally that interest profiles stabilise in this period. In a number of cases, additional learners were included so as not to disrupt the schools’ programmes. However, these learners’ results were not considered for purposes of the standardisation of the inventory. The demographic characteristics of the sample are shown in Table 1.

### *Instrument*

*The MCM.* The *MCM* consists of a list of 152 careers that fall into 19 career categories made up of 8 careers each. Test-takers are requested to report the extent to which they are *interested* in each of 152 careers, disregarding whether they think they could actually do the kind of work required in particular careers. They are asked to use the following 3-point Likert rating scale:

- 2 = *Definitely interested*;
- 1 = *Unsure*;
- 0 = *Definitely not interested*.

Next, they are requested to indicate how *confident* they are that they will be able to do the work in a particular career. In other words, they should disregard whether they are interested in doing the kind of work required and focus only on their confidence about being able to do the work in the particular career. The following 3-point Likert rating scale is used:

- 2 = *I will definitely be able to do the work;*
- 1 = *Unsure;*
- 0 = *I will definitely not be able to do the work.*

**Table 1.** Demographic characteristics of the sample.

Group	<i>n</i>	%
Gender		
Boys	441	39.9
Girls	540	48.8
Missing	125	11.3
Language		
Afrikaans	135	12.2
English	167	15.1
Ndebele	61	5.5
Sepedi	135	12.2
Sesotho	29	2.6
Swati	33	3.0
Tsonga	30	2.7
Tswana	219	19.8
Venda	13	1.2
Xhosa	32	2.9
Zulu	93	8.4
Other	34	3.1
Missing	125	11.3
Type of school		
Urban	496	44.8
Semi-urban	353	31.9
Rural	257	23.2

Once scores for each of the 19 career categories have been calculated, raw scores are used to compile a matrix for each test-taker that plots his or her interest and confidence scores.

The *MCM* is available in English and Afrikaans. It can be used with South Africans with a minimum of Grade 9 second language English or Afrikaans proficiency level. Data for other groups will be gathered over time and made available as supplements to the current manual. Assessment practitioners will be alerted as these become available.

## Procedure

The empirical investigation in this study was divided into six phases spanning over a decade. These phases are described in detail below.

The first (developmental) phase in the construction of the *MCM* (2002–2004) was the development of a number of career categories in a bid to conceptualise and present the world of careers and the world of interests in a way that would be useful to clients. An intensive literature study was undertaken, and various contemporary career guides and manuals and related websites were perused to see what these sources said about the world of career categories and careers. The number of different career categories was based on Holland's (1997) conceptualisation of the world of interests and the world of careers. The 18-fold distinction in the *South African Vocational Interest Inventory* (SAVII; Du Toit, 1992; Du Toit et al., 1993), Kuder's (1977) 10-fold conceptualisation of distinguishable stereotype career interest categories, and Rothwell and Miller's (Miller, 1968; Miller, Taylor, & Rothwell, 1994) conceptualisation of 12 stereotypical career preferences were also considered. Table 2 shows the final 19 career categories measured by the *MCM*.

**Table 2.** List of career categories measured by the *MCM* and abbreviations used.

	Scale name	Abbreviation
1	Practical-technical	PT
2	Practical-creative and consumer science	PC
3	Musical	MUS
4	Arts and culture	AC
5	Word artistry	WA
6	Office work (administrative and clerical activities)	OW
7	Marketing	MAR
8	Information and communication technology	ICT
9	Mathematics and/or accounting industry	MAT
10	Social, community services, and teaching	SCT
11	Entrepreneurship	ENT
12	Adventure activities, nature, and outdoor life	ANO
13	Sport	SPO
14	Research	RES
15	Medical and paramedical services	MPS
16	Tourism and the air traffic industry	TATI
17	Legal practice: security diplomatic or civil service	LEG
18	Executive and management practice	EMP
19	Engineering and the built environment	ENG

*MCM*: Maree Career Matrix.

The second phase, comprising the first pilot study, began in 2005 and ended in 2007. During this period, the *Career Interest Profile* (CIP; Maree, 2014; Maree

& Sommerville, 2008) was developed – a narrative inventory that can be used to elicit learners’ career-life stories and that yields qualitative career-related information. In the CIP, learners are requested to choose the 5 categories from 19 stereotypical career categories they preferred most and the 5 they liked least.

In the third phase (2008), the second pilot study, a preliminary attempt was made to develop a psychometric instrument to assess the CIPs of learners. Eventually, 19 different stereotypical career categories emerged. During various administrations of the preliminary inventory to groups of Grade 11 learners whose mother tongue was either the same as or different to the language of the inventory, the learners were requested to underline the terms, phrases, and words they were unfamiliar with and did not understand. The inventory was also submitted to teachers and lecturers working in the field of career counselling for their comments. A number of careers, terms, and phrases were then amended and further simplified on the basis of the learners’ and teachers’ responses.

In the fourth phase, successive versions of the inventory (a self-report inventory) were administered to approximately 4000 learners between 2008 and 2012 (Maree & Pietersen, 2015), resulting in the inventory’s current format. After analysing the results and attending to feedback from the learners and leading national and international scholars, we decided (mid-2012) to retain the initial 19 career categories. Each category was operationalised in terms of eight different but related individual careers. Next, we submitted the inventory (now named the *MCM*) to 12 local and international experts at universities for their comments, following which the inventory was further amended.

In the fifth (application) phase, the applicability of the inventory was evaluated after which it was administered for standardisation purposes in April–May 2013 and again in August–September 2013. In the sixth and final (application) phase (March–July 2014), the data were analysed statistically and the results interpreted. The analysis was based on an examination of the validity and reliability of the inventory to determine whether it could be administered fairly to all test-takers.

### *Ethical considerations*

Ethical approval for the research was obtained from the University of Pretoria, education departments, and the principals of the participating schools. Informed consent from the parents of the participating learners and assent from the participating learners were sought and obtained.

### *Data analysis*

Descriptive statistics (the means, standard deviations, skewness, and kurtosis values for the *MCM* interest and confidence scales) were calculated to describe



the features of the sample. Cronbach's alpha coefficients were calculated to determine the internal consistency of the interest and confidence scales for the 19 interest categories to determine test-retest reliability as well as the test-retest reliability of the *MCM*. A *t*-test was carried out to investigate the difference between mean scores on the *MCM* interest and confidence categories between the boys and the girls. An analysis of variance (ANOVA) was performed to examine mean differences across language groups in the *MCM* interest categories and post hoc Scheffé tests were calculated to determine statistically significant differences between the language groups. Finally, the *MCM* items were subjected to Rasch analysis to determine the presence of any item bias. The item difficulty parameters were compared for the boys and the girls and then across the language groups.

## Results

### *Descriptive statistics*

The means, standard deviations, skewness, and kurtosis values for the *MCM* interest and confidence scales are shown in Table 3. The minimum score on the interest and confidence categories was 0, and the maximum possible score was 16. Office work received the lowest average rating (2.06), and Executive and management practice received the highest average rating in terms of interest (5.89). Practical-technical received the lowest average rating (3.50) and Entrepreneurship the highest average rating (6.58) in the confidence categories.

Regarding interests, the following scales had skewness values greater than 1: Practical-technical; Office work; Mathematics and/or accounting industry; Adventure activities, nature, and outdoor life; and Sport. Only Practical-technical in the confidence categories had a skewness value above 1, but this still fell within the acceptable range of less than 2. Regarding interests, Practical-technical and Office work each had a kurtosis value over 1, but the value for Office work fell outside the  $\pm 2$  range, indicating a very sharp peak. It therefore appeared that very few of the learners were likely to show an interest in Office work (administrative and clerical activities).

### *Rasch analysis*

*Item difficulty parameters and inlier-pattern-sensitive fit statistic (INFIT) mean-square values for the MCM items were calculated and are shown in Table 4. The convention is that rating scale items with fit values above 1.40 (underfit) or below 0.60 (overfit) indicate signs of misfit to the model (Wright, Linacre, Gustafson, & Martin-Löf, 1994). Only two items showed evidence of misfit, and they fell in the Sport and Information and communication technology categories.*

Both indicated that they were measuring something other than the rest of the items in the scales were measuring.

### *Internal consistency reliability*

Cronbach's alpha coefficients were calculated for the interest and confidence scales for the 19 interest categories. These are shown in Table 4. All categories had reliability coefficients  $>.70$ , with Arts and culture consistently having the lowest and Information and communication technology consistently having the highest reliability coefficient.

### *Test–retest reliability*

Of the 1106 learners in the study, 992 completed the *MCM* a second time (with an average of 4 months between assessments) to allow us to determine test–retest reliability. The test–retest reliability for the interest as well as the confidence categories is shown in Table 4. All reliability coefficients were higher than  $.70$ , indicating good stability of scores over time.

### *Group differences*

*Gender.* A *t*-test was carried out to investigate the difference between mean scores on the *MCM* interest and confidence categories between the boys and the girls. Table 5 shows the results of a *t*-test aimed at investigating the difference between mean scores on the *MCM* interest categories between the boys and the girls.

Only four categories (Arts and culture; Research; Travel, airline, and tourism industry; Legal) revealed no statistically significant differences between the boys and the girls. The boys scored statistically significantly higher than the girls in the following interest categories: Practical-technical; Musical; Marketing; Information and communication technology (ICT); Mathematics and/or accounting; Entrepreneurship; Adventure activities, outdoor, and nature; Sport; Executive and management practices; and Engineering and the built environment. The girls scored higher than the boys in the following *MCM* interest categories: Practical-creative; Word artistry; Office work; Social, community services, and teaching; and Medical and paramedical services.

**Table 3.** Descriptive statistics for the interest and confidence scales of the *MCM* ( $n = 1\ 106$ ).

Scale	Interest scales						Confidence scales					
	Mean	<i>SD</i>	Skewnes s	<i>SE</i>	Kurtosis	<i>SE</i>	Mean	<i>SD</i>	Skewnes s	<i>SE</i>	Kurtosis	<i>SE</i>
1. PT	2.64	3.01	1.276	.074	1.102	.147	3.50	3.54	1.102	.074	0.654	.147
2. PC	4.09	3.76	0.834	.074	-0.187	.147	5.03	3.91	0.664	.074	-0.363	.147
3. MUS	4.47	4.22	0.816	.074	-0.293	.147	4.92	4.17	0.675	.074	-0.430	.147
4. AC	4.41	3.51	0.594	.074	-0.469	.147	4.78	3.39	0.565	.074	-0.315	.147
5. WA	3.62	3.39	0.940	.074	0.187	.147	4.34	3.55	0.754	.074	-0.074	.147
6. OW	2.06	2.68	1.782	.074	3.612	.147	4.16	3.92	0.839	.074	-0.199	.147
7. MAR	4.38	4.18	0.828	.074	-0.272	.147	5.44	4.44	0.552	.074	-0.708	.147
8. ICT	4.32	4.55	0.849	.074	-0.511	.147	4.46	4.27	0.843	.074	-0.254	.147
9. MAT	3.10	3.30	1.160	.074	.714	.147	3.90	3.53	0.921	.074	0.242	.147
10. SCT	4.06	3.50	0.746	.074	-0.244	.147	5.04	3.75	0.557	.074	-0.466	.147
11. ENT	5.70	4.15	0.353	.074	-0.832	.147	6.58	4.24	0.187	.074	-0.884	.147
12. ANO	3.43	3.54	1.057	.074	0.463	.147	4.18	3.76	0.766	.074	-0.290	.147
13. SPO	3.92	4.36	1.057	.074	0.038	.147	4.67	4.56	0.823	.074	-0.455	.147
14. RES	4.52	3.72	0.671	.074	-0.329	.147	4.59	3.56	0.688	.074	-0.166	.147
15. MPS	4.25	4.07	0.802	.074	-0.304	.147	4.77	4.12	0.663	.074	-0.411	.147
16. TATI	4.87	3.75	0.581	.074	-0.502	.147	5.55	3.83	0.398	.074	-0.655	.147
17. LEG	3.93	3.86	0.873	.074	-0.209	.147	4.69	4.00	0.653	.074	-0.539	.147
18. EMP	5.89	4.02	.210	.074	-0.983	.147	6.38	3.99	0.227	.074	-0.769	.147
19. ENG	4.35	4.25	0.794	.074	-0.398	.147	4.69	4.06	0.644	.074	-0.456	.147

*MCM*: *Maree Career Matrix*; *SD*: standard deviation; *SE*: standard error.



**Table 4.** Rasch analysis parameters and reliability for scales in the *MCM*.

Category	Rasch analysis					Cronbach's alpha		Test-retest <sup>a</sup>	
	Difficulty	Difficulty	INFIT	INFIT	Interest	Confidenc	Interes	Confidenc	
	low	high	low	high		e	t	e	
1. PT	-0.56	1.76	0.83	1.25	.747	.812	.759	.753	
2. PC	-0.77	0.77	0.89	1.33	.791	.798	.769	.755	
3. MUS	-0.6	0.63	0.73	1.37	.832	.829	.789	.772	
4. AC	-0.81	1.06	0.87	1.18	.730	.725	.737	.719	
5. WA	-0.78	0.62	0.88	1.22	.755	.776	.736	.733	
6. OW	-0.37	0.58	0.84	1.22	.750	.822	.700	.725	
7. MAR	-0.64	0.57	0.86	1.38	.855	.871	.714	.729	
8. ICT	-0.69	1.01	0.75	1.67	.888	.882	.818	.800	
9. MAT	-0.5	0.42	0.89	1.14	.761	.784	.772	.750	
10. SCT	-0.86	0.41	0.85	1.27	.746	.773	.763	.736	
11. ENT	-1.07	1.04	0.88	1.11	.801	.826	.755	.728	
12. ANO	-0.39	0.48	0.76	1.18	.791	.809	.770	.766	
13. SPO	-0.54	0.95	0.65	1.78	.873	.883	.827	.806	
14. RES	-0.51	0.36	0.83	1.19	.757	.771	.738	.729	
15. MPS	-0.44	0.29	0.86	1.25	.824	.838	.826	.794	
16. TATI	-0.5	1.06	0.81	1.31	.749	.774	.715	.700	
17. LEG	-0.81	0.8	0.76	1.33	.807	.819	.768	.745	
18. EMP	-1.48	1	0.69	1.32	.793	.808	.708	.725	
19. ENG	-0.46	0.63	0.76	1.26	.847	.839	.814	.790	

*MCM*: Maree Career Matrix; INFIT: inlier-pattern-sensitive fit statistic.

<sup>a</sup>Test-retest reliability values have not been corrected for attenuation.

**Table 5.** Mean differences across gender groups in the *MCM* interest categories.

<i>MCM</i> category	Boys ( <i>n</i> = 441)		Girls ( <i>n</i> = 540)		<i>t</i>	<i>df</i>	<i>p</i>	<i>d</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>				
1. PT	3.59	3.44	1.94	2.39	8.530	758	.000	.56
2. PC	3.03	2.97	4.84	4.08	-8.034	966	.000	-.51
3. MUS	4.79	4.36	4.24	4.07	2.029	979	.043	.13
4. AC	4.14	3.57	4.52	3.46	-1.706	979	.088	-.11
5. WA	3.28	3.26	3.84	3.47	-2.553	979	.011	-.16
6. OW	1.81	2.39	2.30	2.85	-2.928	978	.003	-.19
7. MAR	4.91	4.30	3.84	3.94	4.034	904	.000	.26
8. ICT	5.71	4.92	3.16	3.82	8.935	818	.000	.58
9. MAT	3.40	3.28	2.97	3.35	2.021	979	.044	.13
10. SCT	3.26	3.17	4.67	3.65	-6.486	975	.000	-.41
11. ENT	6.25	4.12	5.05	4.05	4.571	979	.000	.29
12. ANO	3.84	3.80	3.10	3.35	3.169	885	.002	.20
13. SPO	4.71	4.68	3.10	3.87	5.759	852	.000	.37
14. RES	4.68	3.77	4.39	3.70	1.212	979	.226	.08
15. MPS	3.41	3.70	5.02	4.26	-6.349	975	.000	-.40

16. TATI	4.66	3.80	4.92	3.72	-1.115	979	.265	-.07
17. LEG	3.73	3.79	4.02	3.90	-1.193	979	.233	-.08
18. EMP	6.13	3.93	5.59	4.08	2.077	979	.038	.13
19. ENG	5.97	4.43	3.14	3.66	10.736	851	.000	.70

*MCM*: Maree Career Matrix; *SD*: standard deviation.

*Language.* Because members of more than 11 language groups were included in the sample, it was decided to group the African language groups together for language comparison – previous research indicated that this is an acceptable method for comparing language groups (Ramsay, Taylor, de Bruin, & Meiring, 2008). The groups for comparison were thus Afrikaans ( $n = 135$ ), English ( $n = 167$ ), and African language ( $n = 645$ ). An ANOVA was performed to examine mean differences across language groups in the *MCM* interest categories. The results showed statistically significant effects in all categories apart from the Sport and Engineering and built environment categories. Most effect sizes, however, were small to negligible (Table 6). The African language group scored higher than the other two groups on almost all 19 interest scales.

*Post hoc Scheffé* tests indicated statistically significant differences between the language groups in the following interest categories. The African language group scored higher than the Afrikaans group on the following interests: Practical-technical; Arts and culture; Word artistry; Office work; ICT; Social, community services, and teaching; Entrepreneurship; Medical and paramedical services; Travel, airline, and tourism industry; Legal; and Executive and management practices. The Afrikaans group scored higher than the English group on Adventure activities, outdoor, and nature. The African group scored higher than the English group on Musical; Social, community services, and teaching; and Legal. The English group scored higher than the Afrikaans group on Musical; Marketing; ICT; and Executive and management practices.

### *Differential item functioning*

The *MCM* items were subjected to Rasch analysis to determine the presence of any item bias. The item difficulty parameters were compared for the boys and the girls and then across the language groups. Scores higher than 0.50 logits were flagged as possible differential item functioning (DIF) values (Table 7), as recommended by Lai, Teresi, and Gershon (2005).

Regarding DIF across the gender groups, of the 152 items, only 30 items from 13 of the 19 categories met the criteria for DIF. Regarding DIF across the language groups, of the 152 items, 38 items from 17 of the 19 categories met the criteria for DIF. In most cases, the direction of the items cancelled out the effect

of DIF at the scale level. Overall, the size of the DIF was generally less than 1 logit.

**Table 6.** ANOVA for mean differences across language groups in interest categories.

<i>MCM</i> category	Afrikaans ( <i>n</i> = 135)		English ( <i>n</i> = 167)		African language ( <i>n</i> = 645)		<i>F</i>	<i>p</i>	$\eta_p^2$
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>			
1. PT	2.15	2.68	2.52	3.05	2.85	3.07	3.359	.035	.007
2. PC	3.53	3.79	3.63	3.19	4.25	3.84	3.229	.040	.007
3. MUS	3.52	3.75	3.75	3.85	4.96	4.33	10.321	.000	.021
4. AC	3.56	3.12	4.30	3.73	4.56	3.52	4.520	.011	.009
5. WA	2.36	2.79	3.27	3.44	3.91	3.42	12.830	.000	.026
6. OW	1.41	2.07	1.83	2.31	2.27	2.82	6.825	.001	.014
7. MAR	3.42	3.78	4.84	4.22	4.37	4.19	4.547	.011	.010
8. ICT	3.10	4.00	4.74	4.90	4.43	4.48	5.830	.003	.012
9. MAT	1.78	2.23	2.83	3.08	3.49	3.46	16.395	.000	.034
10. SCT	3.46	3.35	3.51	3.32	4.29	3.55	5.474	.004	.011
11. ENT	4.21	3.41	5.25	3.75	5.94	4.31	10.622	.000	.022
12. ANO	4.27	3.77	2.89	3.27	3.44	3.61	5.600	.004	.012
13. SPO	4.18	4.82	4.05	4.43	3.71	4.20	0.897	.408	.002
14. RES	4.27	3.72	3.96	3.54	4.73	3.80	3.160	.043	.007
15. MPS	3.18	3.47	3.83	3.89	4.66	4.21	8.805	.000	.018
16. TATI	3.93	3.34	4.62	3.51	5.03	3.90	4.992	.007	.010
17. LEG	2.75	3.19	3.29	3.47	4.31	4.03	11.837	.000	.024
18. EMP	3.71	3.22	5.80	4.03	6.26	4.04	23.393	.000	.047
19. ENG	3.89	4.20	4.01	3.97	4.66	4.36	2.797	.061	.006

ANOVA: analysis of variance; *MCM*: Maree Career Matrix; *SD*: standard deviation.

## Discussion

The *MCM* demonstrates good psychometric properties and hence shows considerable promise as a new instrument in the field of interests and career counselling. The descriptive statistics indicate that some of the interests will likely receive higher frequencies of endorsement, be more popular than others, which is to be expected as career interests are not equally distributed in the population (Bakker & Macnab, 2004). They also show that while learners will feel confident about being able to do particular work, they may not necessarily be interested in it (e.g., office work).

Rasch analysis indicated good fit to the model, with only two items demonstrating misfit. Closer inspection of the definitions of these items indicated poor wording, which was subsequently improved to ensure clearer understanding going forward. The internal consistency reliability of the interest and confidence scales was satisfactory, and the test–retest reliability values indicate good stability of results over time.

**Table 7.** Number of items displaying differential item functioning across language and gender group for each *MCM* scale.

Number	Code	Language	Gender
1	PT	4	2
2	PC	1	3
3	MUS	1	4
4	AC	1	3
5	WA	2	1
6	OW	2	3
7	MAR	4	0
8	ICT	2	2
9	MAT	2	0
10	SCT	2	0
11	ENT	2	1
12	ANO	2	0
13	SPO	0	3
14	RES	2	3
15	MPS	3	2
16	TATI	2	2
17	LEG	2	0
18	EMP	2	1
19	ENG	0	0

*MCM*: Maree Career Matrix.

The differences found across gender groups were consistent with those found throughout the interest literature (Lubinski & Benbow, 2006; Su, Rounds, & Armstrong, 2009). The boys tended to show more interest in the Science, Technology, Engineering, and Mathematics (STEM) fields, outdoor and physical activities, and business activities than the girls. The girls tended to show more interest in the helping professions, and the creative and writing occupations. Although the *MCM* is interpreted ipsatively, the nature of the differences prompted the development of separate norms for boys and girls should practitioners wish to make such comparisons. This study revealed a number of career categories with large mean differences; yet, fewer than 20% of the items indicated DIF. Scale differences can generally be attributed to real differences in interests rather than to item bias. However, it is recommended that future studies investigate DIF in greater depth.

The size of the differences between the language groups in the study appeared negligible for the most part. There was some evidence of DIF across the language groups; yet, this might well have been a function of the samples. DIF did not appear to impact scores at the scale level, so is not cause for concern. Future studies should look at item bias more intensively.

The number of career categories proposed is open to discussion and critique and will inevitably not include every possible career in the entire occupational

structure. Moreover, at this stage, *MCM* results cannot be generalised to people in all age groups, and the inventory can be administered only to South Africans with a minimum of Grade 9 second language English or Afrikaans proficiency. Additional research is needed to gather data on the profiles of people in other age brackets and to trace their progress – this will yield more information on and enhance the predictive value of the inventory.

## **Conclusion**

Against the backdrop of the growing demand for contemporary interest inventories in (South) Africa, we set out to develop and standardise a career inventory with satisfactory psychometric properties that could be fairly applied in the contexts indicated and that would be useful to clients seeking career counselling. Based on the findings reported in this article, we concluded that the *MCM* is easy to use and has good psychometric qualities. It takes relatively little time to administer, provides reliable and valid results, is standardised, and can be applied fairly to large groups of people with relatively little trouble. We trust that the *MCM* will help career counsellors' clients create meaning during their career journeys, choose careers that will enable them to construct themselves adequately, uncover the 'magic' in their personal career-life stories, design successful lives, and make meaningful social contributions.

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