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Influence of the difficulty of the Matching Familiar Figures Test-20 on the assessment of reflection–impulsivity: An item analysis

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Abstract

This study is an item analysis of the Matching Familiar Figures Test-20. We examined error scores in the Matching Familiar Figures Test-20 to determine the influence of the difficulty of the test on the assessment of reflection–impulsivity. The sample included 700 participants aged between 6 and 12 years. The results obtained from the corrected item–total correlation showed moderate but significant values for the discrimination index in all age groups, although the lowest values were found in the 6-year-old group. The item difficulty data show that the test is quite difficult for 6-year-old participants and quite easy for 12-year-old participants, and more likely to show individual differences between these ages. The results suggest that the difficulty of the MFFT20 is appropriate for children between 6 and 12 years. However, because of some floor and ceiling effects, the results of this test for ages 6 and 12 should be interpreted very cautiously, especially for the 6-year-old group.

Keywords: Reflection–impulsivity; Item analysis; MFFT20; Test; Difficulty; Item difficulties

1. Introduction

The Matching Familiar Figures Test, MFFT (Kagan, 1965), has been the main instrument for the assessment of the reflection–impulsivity cognitive style in children aged between 6 and 12 years. However, the MFFT has many limitations and its cautious use has been recommended (Ault, Mitchell & Hartman, 1976; Cairns & Cammock, 1978).

The Matching Familiar Figures Test-20, MFFT20 (Cairns & Cammock, 1978), was developed in an attempt to improve the reliability of the MFFT. Different studies have supported the psychometric improvements of the test (Buela-Casal, Carretero-Dios, De los Santos-Roig & Bermúdez, 2003; Cairns & Cammock, 1982 1984).

Buela-Casal et al. (2003) studied errors and latencies in the MFFT20 in children between ages 6 and 12. The latency–error correlation in the 6- and 12-year-old groups was −.56. The authors suggested that this result can be explained by the difficulty of the test for these ages. Items that are too difficult for 6-year-olds and items that are too easy for 12-year-olds do not produce a high negative correlation between latency and errors. Furthermore, the results showed that latencies stabilize at the age of 8, whereas errors continue to decrease. These results support the pioneering hypotheses of Zelniker and Jeffrey (1979), which suggested that differences between reflectives and impulsives do not decrease with age. The authors stressed that children do not necessarily become more reflective, but simply more efficient at solving the items of the MFFT. The performance in the MFFT and MFFT20 reflects the difficulty of the test – the competence of the subject – and not only the construct assessed (Keller & Ripoll, 2004).

Only one study (Cairns & Cammock, 1978) has explored the difficulty of the items of the MFFT20. In this study, the discrimination index of the items was used as an indicator of difficulty (item–total error correlations). As a result of the item analysis of 30 MFFT-type items, 20 were selected on the basis of discrimination indices (item–total error correlations). However, the study had certain limitations. First, the discrimination indices were only calculated for a group of 98 children with ages ranging from 11.4 to 12.2 years. Although the MFFT20 is used for the 6- to 12-year age interval, there are no data available about the psychometric behavior of the items in all the age groups the test can be applied to. Secondly, the item–total

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Table 1
Distribution by sex and age group

Age (years)	Boys	Girls	Total
6	52	30	82
7	58	39	97
8	81	38	119
9	83	31	114
10	60	44	104
11	77	37	114
12	40	30	70
Total	451	249	700

error correlations were calculated using Pearson's product–moment technique. However, this calculation procedure tends to overestimate correlation values, hence the recommendation to use the corrected item–total correlation (Nunnally & Bernstein, 1994). Finally, and given that items with the highest correlations with the total test are not likely to be extreme in difficulty in either direction, Cairns and Cammock (1978) considered the results as an indirect index of the difficulty of the items of the MFFT20. However, in the item analysis of performance tests it is recommended to calculate a specific item difficulty index, and Cairns and Cammock (1978) failed to do so.

The aim of this study is to carry out an item analysis of the MFFT20 error scores obtained by Buela-Casal et al. (2003) to determine the influence of the difficulty of the test on the assessment results (Block, Block & Harrington, 1974; Block, Gjerde & Block, 1986).

2. Method

2.1. Participants

The sample comprised 700 school children aged between 6 and 12 years — 451 boys (M=8.96, SD=1.83) and 249 girls (M=9.01, SD=1.94). Table 1 shows the distribution by sex and age group.

Each age group included subjects from different educational institutions (private, public, and "concerted", i.e., partly public and partly privately funded). All children were native speakers of Spanish and were enrolled in standard primary education courses. Any student with a record of psychological disorders listed in the DSM-IV was excluded from the study. This information was obtained from the reports provided by the psychologists of each school before the proper sampling was made. The reports listed students with psychological disorders according to the criteria of the DSM-IV, identified in the internal evaluation carried out by the team of psychologists of each school. Due to the very low number of cases found (n=16), the sample size did not allow for any comparisons between normal and clinical samples. We chose not to consider such participants in order to avoid the bias of extreme data in the item analysis (Wood, 1990).

2.2. Instruments

The Matching Familiar Figures Test-20, MFFT20 (Cairns & Cammock, 1978, 1982) was employed.

Table 2
Mean difficulty of items (DF) and corrected item–total correlation (citc) by age group

Item	6-year-olds n=82		7-year-olds n=97		8-year-olds n=119		9-year-olds n=114		10-year-olds n=104		11-year-olds n=114		12-year-olds n=70	
	DF	citc	DF	citc	DF	citc	DF	citc	DF	citc	DF	citc	DF	citc
1. Page a	.31	.30**	.34	.40**	.37	.40**	.45	.37**	.42	.38**	.47	.37**	.48	.37**
2. Scissors	.48	.33**	.50	.40**	.71	.43**	.65	.39**	.74	.38**	.78	.47**	.84	.24*
3. Glasses	.20	.46**	.32	.39**	.29	.60**	.34	.44**	.52	.42**	.47	.34**	.52	.51**
4. Cowboy	.39	.35**	.40	.35**	.57	.44**	.57	.41**	.52	.41**	.58	.43**	.71	.28*
5. House	.21	.38**	.30	.50**	.38	.37**	.43	.50**	.50	.42**	.51	.53**	.60	.46**
6. Spaceship	.36	.42**	.56	.48**	.57	.34**	.62	.36**	.53	.36**	.62	.45**	.60	.23
7. Page b	.46	.39**	.55	.62**	.75	.41**	.74	.55**	.80	.47**	.85	.39**	.82	.48**
8. Giraffe	.15	.35**	.23	.52**	.40	.57**	.46	.46**	.50	.47**	.62	.36**	.62	.51**
9. Airplane	.21	.36**	.18	.39**	.22	.37**	.30	.47**	.29	.45**	.30	.45**	.34	.33*
10. Flower	.24	.24*	.30	.31**	.36	.44**	.42	.44**	.42	.53**	.50	.45**	.44	.57**
11. Ship	.43	.60**	.41	.42**	.53	.56**	.59	.48**	.53	.46**	.69	.41**	.75	.37**
12. Store	.26	.35**	.40	.45**	.45	.45**	.51	.46**	.55	.49**	.57	.38**	.71	.43**
13. Cat	.16	.18	.32	.42**	.49	.50**	.50	.43**	.49	.52**	.58	.54**	.50	.50**
14. Motorboat	.10	.34**	.20	.50**	.27	.51**	.29	.58**	.39	.52**	.42	.49**	.50	.55**
15. TV	.43	.43**	.47	.49**	.57	.31**	.69	.48**	.71	.48**	.80	.47**	.78	.38**
16. Duck	.12	.24*	.44	.31**	.56	.37**	.56	.38**	.64	.60**	.71	.28*	.70	.39**
17. Lamp a	.23	.39**	.26	.30**	.36	.53**	.47	.42**	.44	.39**	.57	.56**	.61	.29*
18. Dress	.14	.36**	.29	.48**	.25	.53**	.36	.53**	.42	.44**	.46	.55**	.52	.39**
19. Bear	.24	.28*	.26	.46**	.39	.54**	.42	.52**	.46	.51**	.60	.42**	.55	.21
20. Lamp b	.26	.33**	.28	.38**	.37	.33**	.49	.26*	.57	.59**	.61	.33**	.64	.32*
M	.27	.35	.35	.43	.44	.45	.49	.45	.52	.46	.59	.43	.61	.39
SD	.12	.09	.11	.08	.15	.09	.13	.07	.12	.07	.14	.08	.13	.11

Note: DF = Item difficulty; citc = corrected item–total correlation; *p<.05. **p<.01. M=mean score; SD=standard deviation.