Chapter 12

The Standard Progressive Matrices in Turkey

N. Ekrem Duzen, Nail Sahin, John Raven, C. Jean Raven

Background

This chapter summarizes the Turkish standardization of the Standard Progressive Matrices (SPM).

The only tests of intelligence or general mental ability in Turkey prior to SPM were the Wechsler Intelligence Scale for Children-Revised (WISC-R) and Stanford-Binet Scale of Intelligence. Both have been widely used in Turkey, especially in health institutions and schools. A Turkish adaptation and standardization of WISC-R had been realized in eighties (Savasir and Sahin, 1988). Although no broadly based adaptation of the Stanford-Binet Scale has been undertaken, clinicians rely on their accumulated experience in interpreting the scores and they use it as a signaling apparatus rather than a measurement device. As a result, the absence of national norms does not appear to be a practical disadvantage although the test increasingly fails to meet the needs of the clinicians with regard to ever increasing complexity of multi-channel information and the test itself has not been brought up to date.

The standardization of the Standard Progressive Matrices (SPM) was begun as part of a larger project concerned with the selection and identification of gifted children. It was the first project of its kind in Turkey. The overall project, consisting of several studies, encompassed a general framework as well as a specific application. An outline of the selection and the identification process for gifted children, including the use of the SPM, can be found in Sahin and Duzen (1994a, 1994b). The more specific Turkish standardization of SPM was summarized by Sahin and Duzen (1994c). Since that time, however, progress has been interrupted due to financial and administrative reasons which were more common in Turkey at that time than they are today.

Sahin and Duzen (1994c) provide preliminary data on the correlations between SPM raw scores and age alongside the correlations between SPM and WISC-R scores (both of Turkish versions). Although these correlation coefficients were derived from a group of potentially high-ability children, they nevertheless indicate something about the reliability of the SPM since the reliability of the WISC-R is well known. Strikingly, these preliminary results were almost identical to those reported by Raven, Court and Raven (1995) for British samples.

Since 1994 no significant contribution to the measurement intelligence and/or general mental ability has been reported for Turkey, although a number of studies were carried out within scope of graduate theses, dissertations, and other academic research projects. However, the need for a non-verbal intelligence test with group administration has been continuously felt not only for studies of specific groups like the gifted but also in connection with such things as vocational training among different age and ability groups. It is therefore with more than a sense of relief that we have at last been able to revisit the original data and produce Turkish norms for the SPM. We hope that, despite their limitations, they will prove useful to professionals and researchers.

The Normative Sample – and Some Information about Turkey.

The size and the structure of the sample on which the data to be presented in this chapter are based was chiefly determined by the design of the original project that incidentally made the SPM standardization possible. The main limitation is that the sample had to be drawn from Ankara, the capital of Turkey. This restriction is not, however, so serious as might appear because of the extensive population movements that have been taking place since the mid 1900s.

Until the seventies, Turkey remained mainly a rural society, carrying with it associated behaviors and beliefs. Although the duration of formal education in the urban areas was not high (3 to 8 years, on the average), in rural parts it was so low (rarely more than three years, even if one had a chance to go to any kind of school) that literacy was a significant index of social status, prestige, and wealth. At the turn of the nineties (ie when the data on which the present study is based were collected), the urban/rural ratio of the country's population had been reversed from 30/70 to 70/30 in less than 30 years. The first decade of the 21st century has brought the ratio to 80/20.

Such vast population shifts from rural to urban areas had changed the country's demography enormously (Basaran, 2004; Baydar, 1999). Most affected were the big cities, the so-called metropolitan areas. More than two thirds of all domestic migration was absorbed by the three biggest cities. The newly settled rural population did not become urbanized easily and quickly. Quite the contrary, adjustment to urban life was, and is, a relatively slow process (Tümertekin, 1968). Therefore, the distinctions between urban and rural were preserved physically and conceptually for long periods in and around urban areas.

Domestic migration is a continuing process, although it might be said that it has slowed down over the last five years. On the other hand, population movements inside the cities have complicated the picture. In other words, since the population flow was too fast, cities had to expand rapidly. In doing so, they did not always offer commensurate expansion of the facilities that a city is expected to offer. The result was a stratification of settlements inside big cities. These represent the urban, the rural, and the transitions between the two (see Benedict, Tümertekin, & Mansur, 1974).

One of the most dramatic indicators of stratification is literacy. The literacy rate hardly reached 70% for males and 50% for females in many rural parts of the country during late eighties and early nineties. There were significant regional differences, with western and northern parts being highly literate whereas middle, eastern, and southeastern parts were highly disadvantaged in terms of literacy and many other factors like economic wealth and liberal social life. These regional differences were directly transferred to urban areas, albeit disproportionately. These transfers caused cities to encompass strata with concomitant literacy ratios.

One particularly striking aspect of this stratification is that many people from certain regions of the country occupy nearby districts in metropols. In other words, it is more or less possible within the big cities to find areas that replicate the demographics of the regions from which their residents came. Although no systematic mapping has been reported, bits and pieces of information make it a well known fact that big cities are composed of small villages, towns, and cities rather than being a unified amalgamation of many elements (Keyder, Aksit, & Aricanli, 1980).

Although there are considerable individual differences within all groups in willingness to adjust to and integrate with urban life, it is very interesting to observe (and it would be challenging to investigate) the way

in which these attitudes and behaviour vary with the area of the country from which they came (Kagitcibasi, 1998).

Given the stratified structure of big cities with respect to regional (including urban/rural) distinctions, it seemed likely that it would be possible to draw a sample that would make it possible to represent such differences. Ankara is the second biggest city in Turkey and had a population of three million at the time of this study. Therefore, it seemed not too difficult to draw a sample which would be reasonably representative of the country as a whole if the stratification was done properly. For this reason, the locations of the schools in the sample were chosen to represent a cross section of the different kinds of district.

In all, 15 primary schools were selected using information supplied by the Ministry of National Education. These schools served different districts of Ankara, ranging from downtown to the extreme periphery. As will be seen later, while most were state schools, some were private.

Within schools, pupils came from all grades from 1st to 8th. A total of 2458 pupils (1170 girls and 1288 boys) were tested. Table 12.1 gives a general picture of the sample.

At this point, in view of its importance later, it may be noted that the urban-rural backgrounds of the pupils was inferred from the location of the schools in which they were enrolled. This was possible because, for example, people from rural areas mostly settle in new areas on the outskirts of the city where people from their hometowns, mostly their relatives (having bonds of kinship in varied degrees) are already living whereas, as indicated above, those living in the city centers mostly come from urban backgrounds.

The previously mentioned information was supplemented by information obtained by questionnaire. For example, information about backgrounds was checked using such information as the names of the

Table 12.1. *Classic Standard Progressive Matrices*
Composition of the Turkish standardization sample.

Grade	1	2	3	4	5	6	7	8	Total
Girls	72	93	145	203	364	152	72	69	**1170**
Boys	64	121	153	253	375	164	87	71	**1288**
Total	136	214	298	456	739	316	159	140	**2458**

areas in which the family had been living and how long they had lived there. Information was also obtained about the public or private schooling of the pupils' parents.

In all, 410 pupils came from private schools and the rest, 2048, from state schools. This ratio is fairly representative of public to private schooling at the time at which the data were collected. Table 12.2 depicts this breakdown.

It may be noted here that private schools also enrolled pupils from rural regions. However, these were mostly the children of people who are 2nd generation of migrants, already adjusted to urban life, rather than new migrants. Such is an increasing trend and, at present, it is possible to observe the 3rd generation of migrants who have almost no affiliation with their rural roots at all.

Below is a summary of additional information about the sample. Table 12.3 depicts the educational and occupational statuses of parents with additional information about the type of place in which they spent most of their lives.

Procedure

Data collection began in the spring of 1992 and finished in spring 1993. Data from the 4th and 5th grades were obtained first. Then, in fall 1992, data from 3rd and 6th grades were collected. Finally, the 2nd and 7th grades and the 1st and 8th grades were tested in spring 1993. All data were collected under direct administration and supervision of the first author. All administrations were on a group basis in the regular classes and classrooms of the schools. All pupils in the selected school classes were tested without further sampling within classrooms or within schools. In order to prevent the pupils making extra preparations, testing was done on normal school days, without prior notice being given to the pupils.

Turkish Norms

Given the limitations of the sample among the younger and older age groups it was decided to produce norms for the age group 6 years 6 months to 14 years 6 months. This reduced the effective sample size from 2458 to 2397. Table 12.4 presents 1993 Turkish norms, which are then compared with the 1979 UK data in Table 12.5.

From Table 12.5 it is clear that the UK norms are, on the whole, slightly higher than the corresponding Turkish figures. Expectedly, the differences are smaller at higher percentiles and larger at lower ones.

Table 12.2. *Classic Standard Progressive Matrices*
Urban/rural background by whether attending a public or private school.

	Public Schools	Private Schools	Total	%
Rural Origins With Different Regional Backgrounds	1341	0	1341	55%
Urban Origins Relatively Homogeneous Backgrounds	707	410	1117	45%

Table 12.3. Parents' educational and occupational status together with area of residence.

PARENTS' EDUCATIONAL STATUS	**MOTHERS**	**FATHERS**
No Schooling	11.2	3.1
Some Primary School (1st to 5th grades)	38.4	27.1
Secondary School (6th to 8th grades)	11.2	16.6
High School or Lyceé (9th to 11th grades)	17.6	18.6
College (2 years) or Higher (4 years) Education	18.4	28.6
Postgraduate degree	3.1	5.8

PARENTS' OCCUPATIONAL STATUS	**MOTHERS**	**FATHERS**
Retired	0.7	3.3
Unemployed (Housewife in case of Mothers)	70.0	1.1
Worker (Blue collar)	2.2	15.7
Worker (White collar government officials)	17.7	27.9
Farmer	0.1	0.7
Craftsman/Shopkeeper	0.8	18.6
Small Business/Free-lance	3.7	18.3
Higher Government Official or Equivalent	3.5	9.1
Private Sector (Own or Higher Manager)	1.3	5.3

LOCATION where pupils spent most of their lives	%
Village (Pop. under 2000)	6.0
Town (Pop. 2000-20.000)	1.6
City (Pop. 20.000-500.000)	23.6
Big City (Pop. over 500.000)	68.9

Table 12.4. *Classic Standard Progressive Matrices*
Smoothed Summary Norms for Turkey (Ankara-stratified) 1993.

	Age in Years (Months)								
	6½	7	7½	8	8½	9	9½	10	10½
Percentile	6(3) to 6(8)	6(9) to 7(2)	7(3) to 7(8)	7(9) to 8(2)	8(3) to 8(8)	8(9) to 9(2)	9(3) to 9(8)	9(9) to 10(2)	10(3) to 10(8)
95	24	29	33	37	42	45	47	47	48
90	20	24	29	34	39	42	44	45	46
75	17	20	25	29	33	37	39	40	41
50	**13**	**15**	**18**	**21**	**24**	**27**	**29**	**31**	**32**
25	10	13	15	17	20	22	24	25	26
10	8	10	11	12	12	13	13	14	14
5	6	8	10	11	11	11	11	12	12
n	67	49	87	104	54	186	108	381	411

(continued)

	Age in Years (Months)							
	11	11½	12	12½	13	13½	14	14½
Percentile	10(9) to 11(2)	11(3) to 11(8)	11(9) to 12(2)	12(3) to 12(8)	12(9) to 13(2)	13(3) to 13(8)	13(9) to 14(2)	14(3) to 14(8)
95	48	48	49	51	52	52	52	53
90	46	46	47	49	51	51	51	52
75	42	42	42	43	44	46	48	50
50	**33**	**34**	**34**	**35**	**36**	**39**	**41**	**43**
25	27	27	28	28	28	28	29	32
10	14	14	14	15	15	17	18	19
5	12	12	12	12	12	12	13	14
n	274	115	168	104	119	59	72	38

Contributions to the Variance in Scores

Given what has been said about the relatively recent emergence of Turkey from being a predominantly rural society, it seemed important to try to assess the potential importance of this factor in creating the UK-Turkish difference. Our first step toward doing this was to calculate the mean scores for each age group for the urban and ex-rural populations separately. The results are presented in Table 12.6. This shows that the scores of the pupils studying in schools serving areas in which the majority of the population had been living in towns for some time are significantly ($p<.001$) higher than those of pupils living in schools serving mainly populations who had recently migrated from rural areas. It should be noted that urban-

Table 12.5. *Classic Standard Progressive Matrices*
1993 Turkish data in the context of 1979 British norms.

	Age in Years (Months)																
	6½ 6(3) to 6(8)		7 6(9) to 7(2)		7½ 7(3) to 7(8)		8 7(9) to 8(2)		8½ 8(3) to 8(8)		9 8(9) to 9(2)		9½ 9(3) to 9(8)		10 9(9) to 10(2)		10½ 10(3) to 10(8)
Percentile	UK	**TR**	UK	**TR**	UK	**TR**	UK	**TR**	UK	**TR**	UK	**TR**	UK	**TR**	UK	**TR**	UK
95	33	**24**	34	**29**	37	**33**	40	**37**	42	**42**	44	**45**	46	**47**	48	**47**	49
90	30	**20**	32	**24**	35	**29**	38	**34**	40	**39**	42	**42**	44	**44**	46	**45**	47
75	22	**17**	26	**20**	30	**25**	33	**29**	36	**33**	38	**37**	41	**39**	42	**40**	43
50	**16**	**13**	**19**	**15**	**22**	**18**	**25**	**21**	**31**	**24**	**33**	**27**	**36**	**29**	**38**	**31**	**39**
25	13	**10**	14	**13**	15	**15**	17	**17**	22	**20**	25	**22**	28	**24**	32	**25**	33
10	10	**8**	12	**10**	12	**11**	14	**12**	17	**12**	17	**13**	19	**13**	23	**14**	27
5	9	**6**	10	**8**	11	**10**	12	**11**	13	**11**	14	**11**	14	**11**	17	**12**	22
n	112	**67**	138	**49**	148	**87**	174	**104**	153	**54**	166	**186**	198	**108**	172	**381**	194

(continued)

	Age in Years (Months)																
	11 10(9) to 11(2)		11½ 11(3) to 11(8)		12 11(9) to 12(2)		12½ 12(3) to 12(8)		13 12(9) to 13(2)		13½ 13(3) to 13(8)		14 13(9) to 14(2)		14½ 14(3) to 14(8)		15 14(9) to 15(2)
Percentile	UK	**TR**	UK	**TR**	UK	**TR**	UK	**TR**	UK	**TR**	UK	**TR**	UK	**TR**	UK	**TR**	UK
95	50	**48**	51	**48**	52	**49**	53	**51**	54	**52**	54	**52**	55	**52**	56	**53**	57
90	48	**46**	49	**46**	50	**47**	51	**49**	52	**51**	53	**51**	54	**51**	54	**52**	55
75	44	**42**	45	**42**	46	**42**	47	**43**	49	**44**	49	**46**	50	**48**	50	**50**	51
50	**40**	**33**	**41**	**34**	**41**	**34**	**42**	**35**	**43**	**36**	**44**	**39**	**45**	**41**	**46**	**43**	**47**
25	34	**27**	36	**27**	37	**28**	38	**28**	39	**28**	41	**28**	42	**29**	42	**32**	42
10	29	**14**	31	**14**	31	**14**	32	**15**	33	**15**	35	**17**	36	**18**	36	**19**	36
5	24	**12**	25	**12**	26	**12**	27	**12**	28	**12**	29	**12**	30	**13**	33	**14**	33
n	187	**274**	164	**115**	164	**168**	174	**104**	185	**119**	180	**59**	196	**72**	189	**38**	191

rural differences may have been contributing significantly to the obvious differences between higher and lower percentiles. As numerous studies reviewed in the Manual for Raven's Progressive Matrices and Vocabulary Scales (Raven, Raven, & Court, 1998 [updated 2003]; 2000 [updated 2004]; Court & Raven (1995) – and especially the Irish standardization (Raven, 1981) – have shown, major urban-rural differences are to be expected. (While there were major differences between different areas of the UK at the time of the 1979 standardization [with the Monklands area of Scotland, which then had the worst and most distinctive socio-economic conditions in Europe, and not the more rural areas, having the lowest scores] these differences were entirely explained by variance in socio-economic status.)

Table 12.6. *Classic Standard Progressive Matrices*
Mean scores of pupils studying in schools primarily serving long standing urban populations compared with those primarily serving populations recently migrated from rural areas.

	SPM Total Score			
	Urban		Rural	
AGE	Mean	N	Mean	N
6½	14.9	45	14.7	22
7	15.1	34	12.9	15
7½	23.7	68	17.2	19
8	23.2	51	15.4	55
8½	33.9	35	25.7	18
9	36.7	42	20.9	144
9½	33.9	58	26.8	50
10	38.5	118	24.7	263
10½	38.1	307	30.8	104
11	36.8	140	25.4	134
11½	33.3	30	29.9	85
12	33.9	66	27.6	102
12½	38.1	31	32.9	73
13	38.9	40	34.5	79
13½	44.3	13	39.0	46
14	46.5	15	34.5	57
14½	46.1	12	38.3	26

Having shown that scores do vary with whether pupils came from predominantly an urban vs. a rural background and noted that, at least in the UK and USA, much of the variance between areas was accounted for by variance in socio-economic status, it seemed important to investigate the relative importance of urban-rural origins and socio-economic status in Turkey.

Socio economic status is generally assessed using an index based on the income and prestige of the main breadwinner's occupation. However, as has also proved to be the case with the concept of "intelligence", while many variables – such as cultural level of the home, childrearing practices, and parental values – are associated with this basic dimension, attempts to unscramble their differential effects have proved notably unsuccessful. In contrast, a single index of the social prestige of the main breadwinner's

occupation has turned out to be remarkably robust. Unfortunately, as is the case in the present study, it has not always proved easy to get reliable information on parental occupation or income, while data on parental education seems easier to collect.

It cannot, however, necessarily be assumed that the relationships summarized in the last paragraph will apply in Turkey. It has, for example, been observed that, while higher levels of income contribute to the acquisition of higher educational qualifications, the converse less often follows: higher educational qualifications do not necessarily lead to higher income. Equally, the educational level of the mother may be more important than that of the father.

In an attempt to assess the relative importance of each potentially relevant variable, multiple regression techniques were employed. The first step was, as in Table 12.7, to partial out the effects of age.

The next finding was that, once the effects of age had been removed, as hinted above, the data on the main breadwinner's occupation was so unreliable that it failed to account for any of the remaining variance in SPM scores. That left urban vs. rural background, mother's education, and father's education.

Across the whole sample, the correlation between age and RPM score was .38, implying that it accounted for 14% of the total variance. The combined predictive power of all the variables together yielded a correlation of .55, or just over 30% of the variance.

Age and mother's education level together yielded a multiple correlation of .52. Age, mother's education, and urban-rural origin upped this to .54. Thus it seemed that mother's education accounted for most of the variance attributed to urban-rural origin in Table 12.6. Finally, the addition of Father's occupation raised the multiple correlation coefficient to the .55 mentioned above.

In an effort to clarify whether mother's education or rural vs urban living was the more basic variable, the regression analysis was re-run forcing in rural-urban first (Table 12.8). Even so, the rural-urban distinction could explain only a small portion of the variance (R^2=.075), while rural-urban and mother's education together explained more (R^2=.124). When father's education was added R^2 rose to .133. When the order of variables was further manipulated, urban-rural being the first and mother's education the last, the picture remained much the same.

These results clearly indicate that, although the differences between life in rural and urban areas do have a lasting effect on test scores, that effect is trivial compared with the effects of mother's level of education.

Table 12.7. *Classic Standard Progressive Matrices*
Correlations between variables contributing to variance in scores

	SPM Total Score	Age	Mother's Education	Rural-Urban
Age	.38**			
Mother's Education	.28**	-.21**		
Rural-Urban	.28**	-.17**	.67**	
Father's Education	.25**	-.19**	.77**	.61**

** Correlation is significant at the 0.01 level (2-tailed).

Table 12.8. *Classic Standard Progressive Matrices*
Correlations between variables contributing to variance in SPM score, with grade substituted for age

	SPM Total Score	Grade	Mother Education	Rural-Urban
Grade	.46**			
Mother's Education	.28**	-.14**		
Rural-Urban	.28**	-.08**	.67**	
Father's Education	.25**	-.12**	.77**	.61**

To put it differently, urban-rural backgrounds take effect only if mothers' educational level is in expected direction. Then, it may be argued that mothers might be attaining adequate levels of education to offset disadvantages arising from rural backgrounds. However, the case is somewhat otherwise. The level of education that mothers in urban areas might attain is quite low, on the average, and it was much lower in the early nineties. This may sound a bit counterintuitive but given the fact that, except for their historically urbanized portions, the big cities in Turkey are indeed just recently urbanized settlement areas which are mainly inhabited by people of rural origins. Although such a mode of urbanization might lead to the attainment of some higher level of education, it did not create a real distinction from actual rural parts of the country. Therefore, similarity in background might be sufficient to lead pupils of literate mothers from actual rural backgrounds to surpass their cohorts who were children of mothers who were living in cities but with somewhat 'concealed' rural origins with inadequate education levels.

In the light of these results, it seemed worth checking on another variable that might help to explain the non-age variance. The generic inference here is that non-age variance could be accounted by factors which are in some way compensating for simple age differences. A meaningful

test of this observation is to try the same analyses with another variable which could be used as equivalent to age. In our case, there appeared another variable which could be used to indicate the developmental differences as reliably as age groups but with more predictive value. That variable is school grade, in the sense of "year-group within the school system" rather than "mark".

Although the correlation between age and grade is .94 ($p < .0001$), grade predicts SPM score more accurately than does age. The raw correlation is .46 (as against .38). When grade is combined with mother's educational level, the multiple correlation increases to .57. And grade, mother's education, and urban-rural origin bring the figure up to .58. Finally, it reaches the highest level when all variables (class, mother's educational level, urban-rural origin, and father's educational level) are included ($R = .59$). It is once more apparent that, even though father's educational level does indeed make a contribution to "explaining" the variance, it adds little on its own.

Distributions of SPM Total Scores by Age Group

Figure 12.1. Classic Standard Progressive Matrices
Turkish Standardisation
Distribution of Total Scores by Age Group

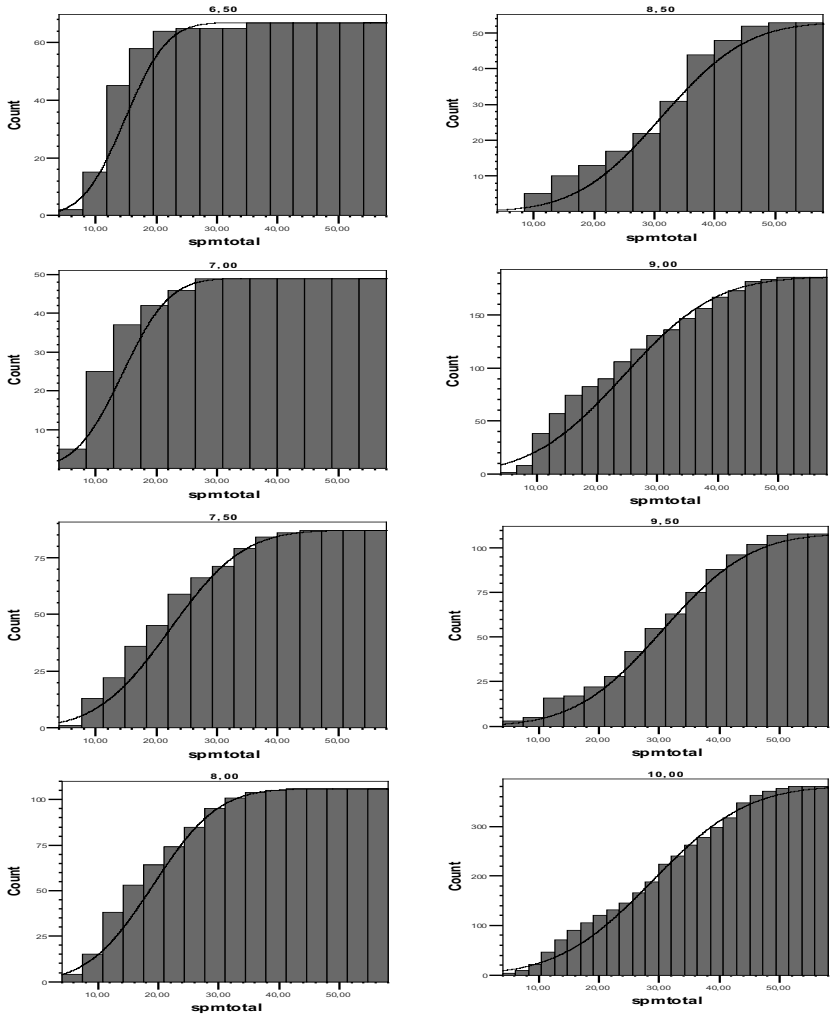
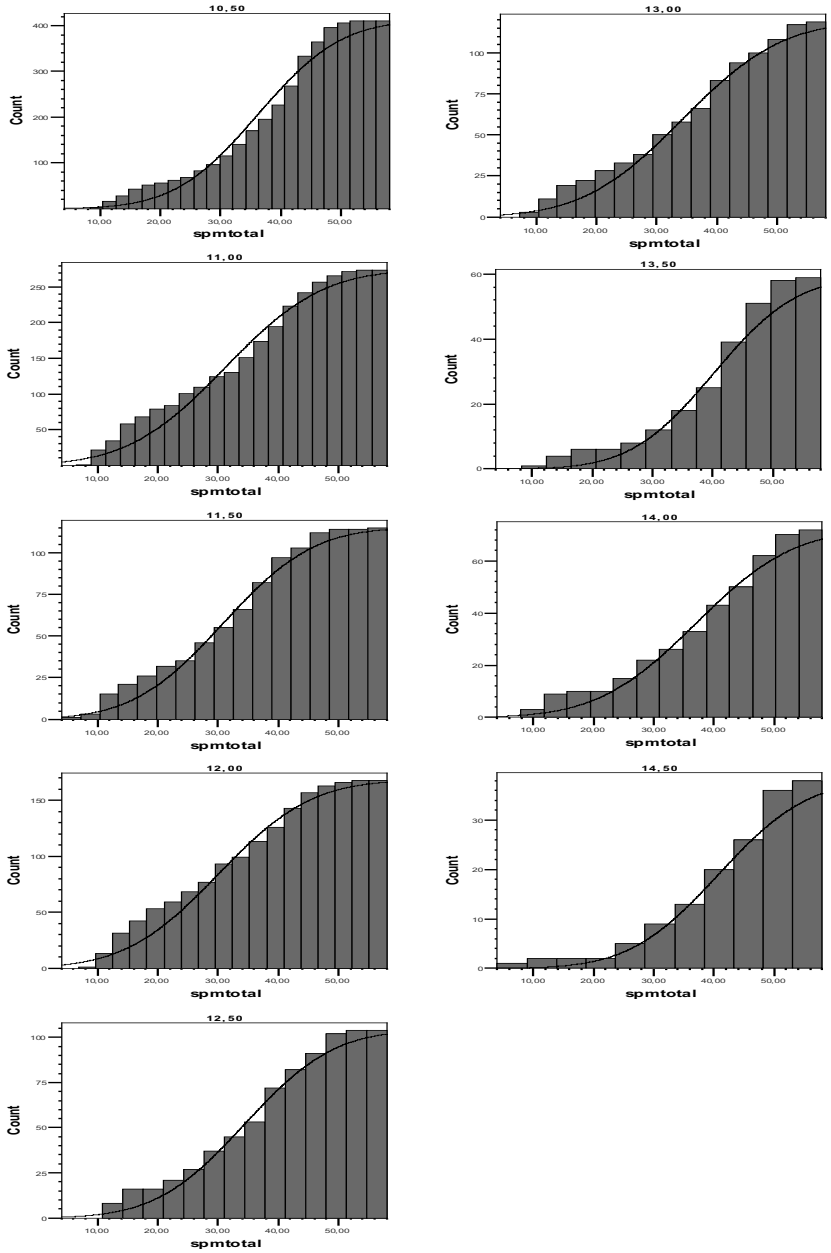


Figure 12.1. Classic Standard Progressive Matrices
Turkish Standardisation
Distribution of Total Scores by Age Group
(continued)



Conclusions

The Turkish standardization of the SPM unexpectedly shed light on a number of points which had not previously been part of our concerns. The results lead us to search for new variables to better explain non-age variance. One noticeable result of this was that urban-rural background, as such, turned out to have much less effect on pupils' performance than expected. More important was the educational level of the parents – and especially that of the mother. This result to a degree calls into question the widespread belief that a rural background by itself will have deleterious effects due to lack of countless facilities and conveniences associated with urban life. It is not immediately obvious that the effects of such disadvantages can be easily counteracted by such a "simple" thing as mother's level of education.

It is possible to speculate more on the hows and whys of the effects of mother's education given the stratified nature of both urban and rural backgrounds specific to Turkey. However, to argue on the basis of the data at hand, we might refer to another variable which also functions to explain non-age variance. This variable is grade. It is interesting to observe that the correlations between the demographic variables (especially urban-rural) and grade are so much lower than the equivalent correlations with age. Moreover, the correlation between SPM Total Score and Grade is .46 – in contrast to a correlation of .38 with age. It may be that grade is functioning as some kind of compensatory variable to offset the effects of other demographic variables, including the urban-rural distinction, which are expected to contribute to differences in scores. However, in our case, grade seems to steal those effects from other variables. Why grade rather than age brings about such a balance could be explained on the basis of its being a factor of adjustment. The most likely explanation could be that 'grade' here might be playing a socializing role (with all motivational attributes attached to it) something which a more neutral factor like age cannot operate likewise. Consequently, when pupils of different ages gather around the same grade they enjoy the benefits of the contacts that that network can bring about. This is to say, grade provide pupils with a way to meet their intrinsic need to compensate the disadvantages of different (or not commonly shared) backgrounds.

In this sense, the power of mother's educational level over non-age variance gains more meaning. This explanation points to the conclusion that when and where pupils find a chance to balance out effects arising

from their disadvantageous backgrounds they immediately use it as much as they can, whether this be their mothers' or cohorts' educational levels, or something else.

The features of the standardization sample and the results summarized in this chapter allow us to suggest that the urban parts of Turkey are indeed not 'urban' enough to justify producing different norms for urban and rural regions or backgrounds. The critical point here is that urban backgrounds are not readily associated with access or attainment to higher education levels. Rather, the two are much closer than it might first seem that even a slight difference originating from a positive contribution to disadvantageous backgrounds balances such expected differences.

It might be interesting to investigate the longitudinal alterations and developments in mutual positions of different regional backgrounds around demographic variables as expressed in test performances. Subsequently, follow up studies with SPM and further measurements with other types of Progressive Matrices, including Advanced Progressive Matrices, have the potential to reveal the nature and sources of individual differences. In this sense, measurement of intelligence could once more be conceived an issue of a broader understanding than an issue of assessing psychometric properties of a mental performance.

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