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The Effects Of Intellectual Functioning On Economic Status Attainment*

This chapter focuses on an issue that is well-rooted in the social and behavioral sciences tradition, yet still engaging and controversial: the relationship between intelligence and social structure. Central to the research on this issue is the attempt to elucidate the complicated dynamic association between individuals' location in the social structure, partially "inherited" from their parents, their own intellectual capacities, and the effect of these capacities on their career through the life-course. In this chapter, we present the results of analyses that help us to draw basic inferences about the role of intelligence in a person's economic success.

There are two important reasons for presenting our analyses. The first reason pertains to studying the relationship between intelligence and an individual's location in the social structure in Poland. Most similar studies have been conducted in relatively stable societies, with long-standing democratic traditions and well-established rules of economic status attainment. Thus, an intriguing question arises: is the role of intellectual

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competence in the process of social status attainment similar, or is it different, in a society undergoing a radical political, economic, and social change?

In Poland at the end of the 1980s, new mechanisms were gradually introduced to form the capital, labor, and consumer markets, providing foundations for reactivating the capitalist system. Political and economic transformation introduced basic alterations into the hitherto stabilized social mobility patterns. Those modifications gave priority to new values, such as industriousness, openness, and intellectual competence, which started to replace the personality values cherished at the time of "real socialism" that may be briefly characterized in terms of mediocrity, loyalty, and passivity.

The second reason for presenting our analyses deals with the concept and measurement of intelligence, which are still controversial issues. There is no doubt that *intelligence* lacks an accepted, precise definition, and the tools to measure it are frequently questioned (see, for example, Anderson 2001; Firkowska-Mankiewicz 1993; Matczak 1994; Neisser 1979). However, assuming that intelligence is defined by its measurement, one should look at tests of intelligence, more or less conventional in their content and form, insofar as they serve as the measurement standards. Most commonly used tests of this kind have originated in the psychometric tradition. Their goal has been to measure the biologically determined aspects of intellectual abilities identified as *fluid intelligence*, or culture-determined aspects of these abilities known as *crystallized intelligence*, or a combination of these two (Cattell 1971; Raven, Raven, and Court 1998). However, there are also some unconventional measures of intellectual functioning, involving not only strictly psychometric indicators but also indicators that capture how the individual handles the complex and intellectually demanding situations of real life (Kohn and Schooler 1983). It seems interesting to apply different measures of intellectual functioning in the same study, in order to assess what role is played by the aspects involved in each of these measures and their effect on an individual's economic status.

In the research reported in this chapter, we applied three tests for measuring intellectual functioning. The first—Raven's Standard Progressive Matrices—is the traditional tool for measuring general intelligence that is known around the world and often applied in studies of cognitive competence. The second measure, less conventional but nevertheless also applied in various countries, is the Kohn and Schooler Index of Intellectual Flexibility.

On a very limited sample, we compare these two measures. In addition, using the panel study of 1988–1993–1998, we use the third measure: an *ad hoc* created index of intellectual capacity to examine the impact on

economic status of an individual's ability to solve formal problems and logical reasoning.

Data

A panel study of urban dwellers in Poland, conducted in 1992 and 1998, provides the main empirical basis for this chapter. This is a study administered in parallel to the panel study of 1988–1993–1998 presented in all chapters of this volume. The 1992 study, devoted to social structure and personality (see Slomczynski, Janicka, Mach, and Zaborowski 1999) involved a national sample of urban dwellers aged 18 to 65 (N = 2,248). A randomly drawn subsample of 185 persons from this study was approached again in 1998, that is, six years later. This subsample became part of a larger study on the "winners" and "losers" of the Polish transformation period (Zaborowski et al. 2000). However, in the last part of the chapter, we return to the 1988–1993–1998 panel study. Using its data, we present the effect of intellectual functioning on income when the effect of education is controlled.

Intellectual Functioning and Its Determinants

Two dimensions of intellectual functioning—cognitive competence and the ability to handle complex social situations—were measured using (a) the Standard Progressive Matrices test (SPM) and (b) the Multi-indicator Index of Ideational Flexibility (MIF).

The Standard Progressive Matrices test, one of the most frequently used for measuring cognitive ability, is grounded in Spearman's theory of intelligence (1923/1927; Raven, Raven, and Court 1998, 2000) and captures *eduction ability*. As Jaworowska and Szustrowa (2000: 8) points out: "Eduction ability is an ability to gain a new insight, to find sense in chaos, to reach beyond provided information, to create new concepts, in the first place, nonverbal, that allow for correct thinking. This ability is relatively independent from one's experience." The concept of eduction ability is very close to *fluid intelligence* (Cattell 1971).

The Raven nonverbal test, which involves perceptional material not related to the field of acquired knowledge, is a commonly applied measure of fluid intelligence. Many studies, conducted over a span of sixty years that have passed since the first version of the test was conceived, have empirically

demonstrated that it is the best single measure of general intellectual functioning (Raven, Raven, and Court 2000: 60).

The SPM test consists of sixty problems grouped in five series. These problems are in the form of graphic patterns that present single-or multi-element schema with a missing fragment that needs to be found. The respondent has to find this fragment among six or eight suggested possibilities. Making the right choice therefore requires the ability to think logically and to draw conclusions. Initially very simple, the problems become gradually more and more difficult as each of the series progresses. The SPM test is usually applied without imposing time constraints.

In our study, we applied the SPM in 1998 in its full version but with a time limit (20 minutes). We standardized the raw results of the test, with a mean of 100 and a standard deviation of 15. Hence, we obtained results comparable with those of other studies that have used the same standard parameters.

The Kohn and Schooler Multi-indicator Index of Ideational Flexibility originates in studies of individuals' ability to cope with intellectually challenging situations. In a long series, spanning more than thirty years, of studies on social structure and personality undertaken by these researchers and their collaborators from a number of countries, intellectual flexibility has always been measured using this new scale rather than the standard intelligence tests.

Initially, the Kohn and Schooler index was composed of seven indicators of both verbal and nonverbal abilities (for details see Kohn and Schooler 1983; Kohn and Slomczynski 1993). These indicators are: (1) the Goodenough estimate of intelligence based on the analysis of the results of the Draw-a-Person test; (2) appraisal of the artistic conception of the drawing according to the Witkin scale based on the evaluation of the same Draw-a-Person test; (3) summary appraisal of the Embedded Figure test, consisting of locating within a complex geometrical figure a simpler figure, which is also provided as a separate picture (for the first three indicators, see Witkin, Dyk, Faterson, Goodenough, and Karp 1962); (4) the interviewer's estimate of the respondent's intelligence made after conducting a long interview that requires a lot of thinking; (5) the frequency with which the respondent agreed to the interviewer-read statements formulated in a manner such that consistently positive, agreeing responses would indicate a mechanical make-up of the respondent's replies; (6) appraisal of the adequacy of the respondent's answer to a question about advertising on radio and television, with responses that included a justification of the for-or-against argument indicating an ability to reason; and (7) a rating of the

adequacy of the respondent's answer to a question about the possible location of a hamburger stand or a newspaper kiosk, with responses containing a more or less detailed justification for the chosen location indicating an ability to cope with ambiguous situations.

The authors of the index stated: "None of these indicators is assumed to be completely valid; but we do assume that all the indicators reflect, in some substantial degree, men's flexibility in attempting to cope with the intellectual demands of a complex situation" (Kohn and Schooler 1983: 111–112). Using these indicators in factor analysis allowed the establishment of two dimensions of intellectual flexibility: *perceptual* (with the indicators being the first three of the seven listed), and a more symbolic dimension that the authors labeled *ideational*. In the original version, *ideational flexibility* involved the last four of the seven indicators, and, in addition, the result of the Embedded Figure test—the only nonverbal indicator in this set.

The Multi-indicator Index of Ideational Flexibility used in our study does not involve the result of the Embedded Figure test. We applied the simplified version of the index, which has long been used in cross-national research studies (Kohn and Slomczynski 1993; Kohn et al. 2000).

Table 5.1 presents the measurement models of ideational flexibility in 1992 and 1998. In both these models the highest factor loadings are associated with the interviewer's assessment of the respondent's intelligence. American studies provide similar findings (see Kohn and Schooler 1983: 113; Schooler, Mulatu, and Oates 1999: 487). Hence, the ability to present one's knowledge and skills in a positive way, to make a good impression, is basically important for intellectual flexibility. This index also measures verbal ability and reasoning.

Table 5.1. Measurement Model of Ideational Flexibility, 1992 and 1998

	Year of study					
	1992			1998		
Indicators	Mean value	Standard deviation	Factor loadings	Mean value	Standard deviation	Factor loadings
"Kiosk" question	2.19	0.72	0.643	2.24	0.71	0.563
"Commercials" question	3.00	1.08	0.503	3.44	0.85	0.480
Agree score	2.50	2.55	-0.518	1.83	2.04	–0.549
Interviewer's assessment	2.53	1.01	0.787	2.65	1.01	0.678

The Multi-indicator Index of Ideational Flexibility does not correlate strongly with the Raven test. The raw correlation is 0.36, and the correlation adjusted for attenuation is 0.45. Thus, we treat the two measures as distinct dimensions of intellectual functioning. We assume that each could have different causes and consequences. In the following sections, we demonstrate how both measures depend on parental capital and the education of respondents, and how they influence economic status.

Parental Human Capital, Offspring's Education, and Intellectual Functioning

We constructed two separate variables to take into account the human capital of the parents as a possible determinant of offspring's intellectual functioning. One of these variables captures high human capital, and the other, low human capital. In the case of high human capital, the value of 1 is assigned to all parents having education on at least the secondary level or having an occupational status on a managerial or professional level; the value 0 is assigned to all other respondents. In the case of low human capital, the value of 1 is assigned to all respondents both of whose parents had education at the basic vocational level or lower; the value 0 is assigned to all other respondents.

Table 5.2 presents the impact of parental human capital, education, and sex on two dimensions of intellectual functioning, measured by the Raven test (SPM) and the Multi-indicator Index of Intellectual Flexibility (MIF). The proportion of variance in each of these dependent variables explained by human capital of the parents, education, and gender is similar: $R^2 = 0.224$ for SPM and $R^2 = 0.243$ for MIF. All independent variables taken together are significant for intellectual functioning. This does not mean, however, that particular variables affect each of the dimensions of intellectual functioning, measured by SPM or MIF, in the same way.

High human capital of the parents has a positive and statistically significant effect on getting good scores by adult respondents in SPM (beta = 0.151). However, in the case of the index of ideational flexibility the analogous effect (beta = 0.114) is not significant. The data suggest that the educational resources of the family in which the individual was raised are highly important for the development of the individual's cognitive competence, yet these resources are less important for developing an ability to cope with complex social situations, as reflected by MIF. We should note also that neither the cognitive competence measured by SPM nor that

measured by MIF is significantly affected by a low level of parental human capital, although a sign of the coefficient is as predicted.

In general, as education increases, both SPM and MIF increase significantly. However, the effect of attained education on intellectual functioning is clearly higher in the case of MIF (beta = 0.403). In time frame, the relationship between education and intellectual functioning is undoubtedly dynamic. Both factors affect each other over the individual's life span: better intellectual potential in childhood helps in obtaining higher levels of education, which, in turn, contribute to better intellectual functioning in adulthood (Husen 1951; Jencks et al. 1972).

Table 5.2. Regression of Cognitive Ability (Raven's SPM) and Ideational Flexibility (Kohn/Schooler MIF) on Sex, Parental Human Capital, and Education

	Regression Models		
Independent variables	B	SE	Beta
A. Cognitive ability (Raven's SPM), 1998			
Sex (Male = 1)	6.696	2.009	0.223**
Family social capital (High =1)	5.200	2.593	0.151*
Family social capital (Low =1)	–3.805	2.409	–0.121
Education	1.620	0.412	0.283**
Constant	79.193	5.376	
Adjusted R^2 = 0.224			
B. Ideational flexibility (Kohn/Schooler MIF), 1998			
Sex (Male = 1)	0.047	0.124	0.024
Family social capital (High =1)	0.249	0.158	0.114
Family social capital (Low =1)	–0.241	0.147	–0.120
Education	0.146	0.025	0.403**
Constant	–1.527	0.322	
Adjusted R^2 = 0.243			

**p < 0.01 *p < 0.05

As Table 5.2 reveals, gender does not play a significant role in the case of ideational flexibility as measured by MIF. However, gender affects the scores

on the SPM test (beta = 0.223), and it is females who score lower. One reason for that may be the nonverbal and more perceptual character of Raven's Standard Matrices – better suited to men, who are more inclined to solve space and perceptual tasks. The other reason is parents' socialization practices – treating preferably boys especially in relation to children's independence and confidence in their capacities (Firkowska-Mankiewicz 1996; see also Linn and Peterson 1985; Macoby and Jacklin 1974). The difference that develops in adolescence appears to continue in adulthood but becomes less significant through job experience.

Intellectual Functioning and Economic Status

For the 1992 and 1998 waves of the panel study, we measure economic status using an index composed of four variables: the logarithm of average monthly income per capita in the respondent's household, the household possession of durable goods, the respondent's estimate of how much money he or she would be able to provide on short notice in order to buy a needed product, and an estimate of how often the respondent lacks the means to cover necessary household expenses. The measurement models for 1992 and 1998 are presented in Table 5.3. Lambda coefficients, greater than 0.6, demonstrate that all indicators are reliable measures of a common construct – economic status.

Table 5.3. Measurement Model of Economic Status, 1992 and 1998

	Year of study					
	1992			1998		
Indicators	Mean value	Standard deviation	Factor loadings	Mean value	Standard deviation	Factor loadings
Family income per capita (log)	7.08	0.55	0.757	6.24	0.50	0.707
Household goods	4.23	1.53	0.556	2.57	1.99	0.521
Ability to secure financial resources	3.10	1.55	0.767	3.30	1.60	0.792
Deprivation	3.55	2.65	-0.775	3.20	2.71	-0.798

We will begin the discussion of economic status with Model I in Table 5.4, presenting the independent "pure" effects of age and gender, education,

and the two dimensions of intellectual functioning, SPM and MIF, both measured in 1998.

According to the model, neither age nor gender significantly influences the economic status of respondents in 1998. Among the remaining variables, the most important determinant of economic status is education (beta = 0.373). Its importance for economic success – shaky in earlier years when educational credentials provided no clear guarantee of economic gains – is unquestionable nowadays. It is interesting that the attained level of formal education provides a more important guarantee of economic success than does the actual level of intellectual competence. Although cognitive competence, measured in 1998 by the Raven test, remains the second most important determinant of the respondent's economic status, its direct effect on this status appears much weaker (beta = 0.157) in comparison with the effect of education. The ability to cope with complex social situations, measured by the index of intellectual flexibility, had no effect on economic success.

Is the situation the same, or is it different, when considering a possible lagged effect of intellectual functioning on economic status? We have measured ideational flexibility for 1992; however, Raven SPM was not administered at that time. Taking into account a known high stability of SPM across time (Raven et al. 2000), we estimated its value for 1992 on the basis of the relationship with age.[1] In Table 5.4, Model II contains the prediction of economic status in 1998 on the basis of gender, age, education, and both SPM and MIF for 1992.

The most intriguing difference between the results for Model I and Model II is that MIF registered for 1992 has a clearly significant effect on economic status in 1998, while the same measure six years later appears to be nonsignificant. Why was the significance of MIF in predicting economic success wiped out between 1992 and 1998? This result cannot be explained by the changing correlation between MIF and education over time. Actually, the correlation between MIF and education is higher in 1992 than in 1998 (0.564 and 0.422 respectively). The most plausible explanation pertains to the measurement of MIF. In 1998, the interviewer's evaluation of the respondent's intelligence was probably more affected, as compared to 1992, by factors not related to the respondent's intellectual capacity.

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[1] Estimated on the basis of the equation $\log SPM_{92} = a + B_1 * SPM_{98} + B_2 *$ Age, where a, B_1 and B_2 were computed on the basis of regression $\log SPM_{98}$ on the same independent variables. In practice, the correlation between estimated SPM_{92} and real SPM_{98} is very high ($r = 0.91$).

Table 5.4. Regression of the 1998 Economic Status on Cognitive Ability (Raven's SPM), Measured in 1998 and Estimated for 1992, and Ideational Flexibility (Kohn/Schooler MIF), Measured in 1998 and in 1992, Controlling for Sex, Age, and Education

	Regression Models		
Independent variables	B	SE	Beta
A. Model I (Intellectual functioning measured in 1998)			
Sex (Male = 1)	0.169	0.106	0.108
Age (Years)	0.009	0.006	0.096
Education (years of schooling)	0.012	0.023	0.373**
Raven's SPM	0.008	0.004	0.157*
Kohn/Schooler's MIF	0.052	0.062	0.062
Constant	–2.684	0.499	
Adjusted $R^2 = 0.257$			
B. Model II (Intellectual functioning measured in 1992)			
Sex (Male = 1)	0.178	0.104	0.115
Age (Years)	0.004	0.006	0.041
Education (years of schooling)	0.080	0.025	0.270**
Raven's SPM, 1992 (estimated)	0.279	0.131	0.174*
Kohn/Schooler's MIF, 1992	0.164	0.062	0.212**
Constant	–2.230	0.485	
Adjusted $R^2 = 0.282$			

**$p < 0.01$ *$p < 0.05$

Generally, however, the results are remarkable: two separate measures of intellectual functioning, SPM and MIF, correlated with each other, exercise an independent influence on economic success. The impact of these psychological variables is statistically significant for the six-year lag. Intellectual capacity measured by SPM continues to have an effect on economic success measured concurrently. However, for MIF, it loses its effect over time.

Large Sample and *Ad Hoc* Measure of Intellectual Ability

In the 1988–1993–1998 panel study, we did not include any standardized or already tested measures of intellectual ability. However, on the basis of three indicators, we created an index that captures respondents' ability to cope, on an intellectual level, with the interview situation. These indicators are: (1) the frequency with which the respondent agreed to the interviewer-read statements formulated in a manner such that consistently positive, agreeing responses would indicate a mechanical make-up of the respondent's response; (2) the quality of answers to questions demanding simple percentage calculations; and (3) the quality of answers to open-ended questions. All these indicators correlate moderately with each other; we constructed a summative index, called ADM.[2] Taking into account the content of indicators, ADM is most similar to MIF, although ADM does not contain the interviewer's assessment of the respondent's intelligence.

Initially, we constructed this measure for all three waves of the panel study. In this chapter, however, we report only the results for ADM measured in 1993, because we want to compare the impact of ADM on economic success with that of MIF, using a similar time lag. As Table 5.5 demonstrates, intellectual ability measured by ADM influences economic status achieved five years later. This influence is present when education, gender, and age are controlled.

Conclusion

Most studies on the relationship between intelligence and an individual's location in the social structure have been conducted in relatively stable societies, with long-standing democratic traditions and well-established rules of economic status attainment. In these studies, it is claimed that intelligence is an important factor in determining economic success, although, periodically, heated controversy has reemerged about the mechanism by which this link is established. Unquestionably, from Jencks et al. (1972) to Herrnstein and Murray (1994), social and behavioral scientists have intensively debated the interpretation of this mechanism. The controversy continues, especially in the

[2] This index was developed in a study devoted to the impact of education on attitudes toward democracy (Slomczynski and Shabad 1999).

study of Herrnstein and Murray (1994) (see also Fischer, Hout, Jankowski, Lucas, Swidler, and Voss 1996; Kohn 1999; Flynn 2000).

Table 5.5. Regression of the 1998 Economic Status on *Ad Hoc* Measure of Intellectual Functioning (ADM), Controlling for Sex, Age, and Education

	Regression models		
Independent variables	B	SE	Beta
Sex (Male = 1)	0.085	0.044	0.043*
Age (Years)	0.003	0.002	0.043
Education (years of schooling)	0.165	0.008	0.476**
Ad hoc measure of intellectual functioning	0.098	0.032	0.069**
Constant	–1.872	0.119	
Adjusted $R^2 = 0.257$			

**p < 0.01 *p < 0.05

However, the positive (albeit not very strong) correlation between intelligence and economic success in capitalist societies has not been questioned. The analyses presented in this chapter show that the role of intellectual competence in the process of economic status attainment in a society undergoing radical changes is similar to that in a stable capitalist society. Thus, this chapter, similarly to the earlier study conducted in Poland (Slomczynski and Mach 1996), contributes to establishing a fundamental and general pattern of the relationship between the psychological traits of individuals and their economic well-being. In a sense, it contributes to what is known as the social psychology of status attainment (Sewell, Hauser, and Featherman 1976; Kerkchoff 1976; Campbell 1983; Hauser, Warren, Huang, and Carter 2000).

We claim that different measures of intellectual functioning capture different aspects of the same larger psychological trait. The interpretation of Raven's Standard Progressive Matrices in terms of fluid intelligence and Kohn and Schooler's Multi-indicator Index of Ideational Flexibility in terms of crystallized intelligence seems to be in accordance with the intentions of the authors of these tests. Under this interpretation, the impact of fluid intelligence on economic status is not very dependent on time – it is present for both concurrent measurement and time lag measurement. Crystallized intelligence seems to have predominantly

a delayed effect on economic success. However, it is remarkable that two well-established tests, the Standard Progressive Matrices and the Multi-indicator Index of Ideational Flexibility, taken together as an exercise do not cancel each other's effects. Moreover, *ad hoc* measure of intellectual ability reveals the impact of this variable on economic success, especially if this success is measured some years later.