COLOGNE GRADUATE SCHOOL
in Management, Economics and Social Sciences

Vol 2 | No 4

CGS WORKING PAPER

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Dominik Becker (CGS, University of Cologne)
Klaus Birkelbach (University of Duisburg-Essen)

Cologne Graduate School
in Management, Economics
and Social Sciences
Albertus-Magnus-Platz
50923 Köln
www.cgs.uni-koeln.de

University of Cologne

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Dominik Becker (University of Cologne, Germany)

Klaus Birkelbach (University of Duisburg-Essen, Germany)

3/22/2011

Authors' Affiliation:

Dominik Becker, M.A. (Corresponding Author)
University of Cologne
Cologne Graduate School in Management, Economics and Social Sciences
Richard-Strauß-Str. 2
50931 Cologne
Germany
Phone: +49 (0)221 470 1221
Mail: dominik.becker@wiso.uni-koeln.de

PD Dr. Klaus Birkelbach
University of Duisburg-Essen
Faculty of Educational Sciences
Berliner Platz 6-8
45117 Essen
Germany
Phone: + 49 (0)201 183 4506
Mail: klaus.birkelbach@uni-due.de

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Abstract

The *theoretical* contribution of this paper is to regard teachers' evaluations with a prognostic claim about students' future academic ability as a result of a special social situation in the classroom. We assume that after teachers have framed the social situation, particular scripts of action will determine the criteria on which teachers ground their evaluations. In concrete terms, we propose a theoretical approach that integrates existing meritocratic and 'habitus' explanations in the comprehensive framework of frame selection theory with its important distinction between a more automatic and a more rational type of information processing.

Our *empirical* contribution is to test the hypotheses that we deduced from our theoretical assumptions in a set of structural equation models. Using data from the Cologne High School Panel (CHiSP), we find that even when controlling for the path structure of the model, indicators for both kinds of concepts are statistically significant. However, regardless of the underlying type of information processing, the predictive power of indicators operationalizing the meritocratic explanation is comparatively higher.

Keywords: teachers' evaluations, inequality in educational opportunities, frame selection theory, structural equation modeling

1 Introduction

In this paper we aim to cover two research questions in the field of educational inequality that have been neglected so far: First, the literature seems to agree about the issue that teachers' recommendations concerning students' transition from primary to secondary school are an important dimension of social inequality in educational opportunities in the three-tiered German educational system at the secondary level (Becker 2003; Bos and Pietsch 2004; Ditton 2007; Pietsch and Stubbe 2007). However, only little is known about whether there are similar mechanisms with regard to the transitions from higher secondary school to university. Second, rational-choice explanations of educational inequality have put great effort in modeling the expectations and considerations of both students and their parents (Breen and Goldthorpe 1997; Esser 1999; Goldthorpe 1996), but theories of action of teachers' assessments have not progressed with similar pace (Ditton 2007).

This paper's contribution is to regard teachers' evaluations about students' future academic ability as a result of a specific *social situation* in the classroom. In the following theoretical section (section 2) we will first replicate the general model of sociological explanations as it has been introduced by Coleman (1990). Then we will specify the logic of teachers' definition of the social situation when evaluating their students more precisely, and we will try to derive an adequate explanation of the formation of these assessments. To be precise, we propose a theoretical approach that integrates existing meritocratic and 'habitus' explanations in the comprehensive framework of frame selection theory with its important distinction between a more automatic and a more rational type of information processing (section 2.1). After that we will summarize some well-known findings of German educational research about predictors of teachers' *recommendations* and integrate them in our frame selection explanation of teachers' *evaluations* (section 2.2). In section 3, we briefly describe our data, indicators and research design. Since we hypothesize a more

complex path structure for some of our theoretical concepts, we will test our hypotheses via structural equation modeling (SEM). In section 4, we discuss our main findings from our structural equation models. Most important, students' average grade is the strongest predictor in our models while intelligence comes second. This leads us to the conclusion (section 5) that the meritocracy explanation of teachers' evaluations – regardless of the underlying type of information processing – is empirically more pronounced than the explanation based on habitus criteria. However, since we recognized a couple of cross-loadings for potentially habitus-related variables, we demand from further studies to develop a more elaborated measurement model of both teachers' and students' habitus than we were able to analyze with our data. Considering also teachers' backgrounds would then lead to a multilevel structural equation model with teachers' evaluations nested in both student- and teacher-level contexts.

2 Theory and Hypotheses

A general model of sociological explanations was given in the seminal book by Coleman (1990) wherein he differentiates between macro-level and micro-level propositions as a general form of modeling individual behavior in specific social contexts. The three-step procedure from the macro-level to the micro-level and back to macro-level was extended by Esser (1993, 1996, 1999) who labeled the steps as the *logic of the situation*, the *logic of selection*, and the *logic of aggregation*.

The logic of the situation describes the top-down link from macro-level to micro-level and contains assumptions about both the conditions of the social situation and the alternatives of individual actors. Expectations and evaluations of actors are linked to the conditions and alternatives of the social situation via *bridge hypotheses*.

The logic of selection aims to explain individual decisions on the micro-level based on an underlying theory of action. If the latter is described explicitly, scholars usually make use of *rational choice* (*RC*), *subjective expected utility* (*SEU*) or *frame selection theory* (*FST*).

The logic of aggregation 'simply' embodies the bottom-up link between individual behavior on the micro-level and the collective explanandum on the macro-level via *transformation rules* that may vary depending on the respective context. Figure 1 displays this general scheme of sociological explanations.

Figure 1 about here

Subject matter of our investigation is a specific form of teachers' evaluations concerning their students' abilities for academic studies. In concrete terms, we refer to teachers' nominations whom of their students they consider to be able to start academic studies and, likewise, whom they consider to lack these prerequisites.[1]

For an explanation of the emergence of these particular evaluations a more detailed description of the social situation in the classroom is fruitful. Since teachers' evaluations will of course depend on their respective expectations of students' prospective achievement, our aim is to specify the relevant *bridge hypotheses* that are necessary to link these expectations and evaluations to the conditions of the underlying social situation.

2.1 The Social Situation in the Classroom

In the literature about teachers' *recommendations*, it is assumed that the latter are actually based on rational decisions and a 'correct' definition of the situation in order to guarantee that these recommendations are somehow optimal for the students (Ditton 2007).[2] In this sense, a 'correct'

[1] A more detailed description of our data and our dependent variable is given in section three.

[2] Apart from Germany, we only know of the Netherlands as a country where students receive an explicit teacher recommendation after primary school with regard to secondary school choice. However, in the Dutch case, teachers' recommendations are strongly influenced by students' results in a (compulsory) national achievement test (Tolsma et al. 2010) – while both criteria were introduced in 1968 (in course of the Mammoth Law) in order to achieve a more meritocratic school system (Dronkers 1993). A couple of studies noted that, maybe due to a success of all integrative ambitions, the effect of students' social backgrounds on teachers' recommendations decreased over time (see

definition of the situation should be shaped by the idea of meritocracy and should consider both the actual achievement and the future development possibilities for the students. This idea legitimizes for the selective function of the educational system. Hence, we should keep in mind that when we talk about 'rational' recommendations of the teachers, we always imply a kind of Weberian *ideal type* (Weber 1968:19-22) of objectivity and rationality that might (and ideally also should) thoroughly serve as a frame for teachers' recommendations. However, all *actual* recommendations will never be more than a subjective and thus more or less imperfect realization of this ideal type of rationality.

In many – not all – German federal states ('Bundesländer'), teachers' recommendations concerning the transition from primary to the three-tiered secondary school ('Hauptschule', 'Realschule', and 'Gymnasium') are legally binding (for a more detailed description of the German educational system see Hillmert and Jacob 2010; Jürges and Schneider 2006; Pietsch and Stubbe 2007). Because of the minor permeability between lower and higher education within the stratified German school system, there are only small chances to adjust a false (but nonetheless binding) recommendation of the teacher or a false parental transition decision during the future educational course (see e.g. Glaesser and Cooper (forthcoming)). Actually, teachers' recommendations are more or less valid forecasts of students' future achievement – potentially based on both an evaluation of their actual performance and additional information about familial endorsement even spanning students' prospective educational transitions – and thus have far reaching consequences for students' further life course.

However, with regard to teachers' *evaluations* in our data, which are - in contrast to the former - neither made public to the students nor have a binding character for them, an explanation based

Dronkers 1983 for a review). This might be a reason why no current literature on social inequality concerning the *formation* of teachers' evaluations in the Dutch school system could be found. As a consequence, we are restricted to derive our hypotheses from the German literature.

on a too narrow notion of rationality may fall too short. One major reason is that these subjective evaluations lack any dependence on structural necessities of the school system - meaning that teachers' subjective assessments of students' academic ability will neither be influenced by assumptions about their direct impact on students' transition decisions nor by outright norms of the respective school environment. Thus, we can assume that beyond at first glance intuitively rational criteria, teachers might have additional, rather implicit expectations for students with different background variables that will explain their explicit evaluations.

To be sure, we do not claim that teachers' evaluations are not rational at all. Quite the contrary is true: Tentatively, we assume that whenever teachers ground their evaluations on meritocratic criteria like students' academic performance, this would be a rather automatic form of processing, therefore a highly efficient coping strategy in terms of Simon's (1955) notion of *bounded rationality*.

At this point, it is fruitful to refer to Esser's and Kroneberg's enhancement of Kahnemann and Tversky's (1984) early version of the frame approach towards a general theory of action (Esser 1996, 2010; Esser and Kroneberg 2010; Kroneberg 2006; Kroneberg et al. 2008; Kroneberg et al. 2010). The idea behind the frame concept is that in most cases, the actual situation is defined in an automatic-spontaneous mode (as-mode), depending on a match of the actor's perceptions with internally stored mental models. The match is determined by (1) the significant symbols of a situation, (2) to which extent the latter are perceived and (3) how strongly they are anchored in the actor's mind. Only in cases without such a match a reflecting-calculating definition of the situation (rc-mode) is needed. Once a particular situation has been defined, more concrete *scripts* of action reduce the complexity of possible alternatives of actions. Same as the frame-selection, the script-selection also varies between an automatic activation of available scripts, acquired through the process of socialization and depending on both the internalization of norms and the habitualization of routines (*as-mode*) and a rational reflection about the alternatives at hand (*rc-*

mode). On each level, the match between the social situation and its mental frame determines which form of processing is intuitively chosen. If the actor's definition of a social situation is without any doubts, then the *as-mode* is the adequate since most efficient coping strategy. However, if there *is* 'definitional complexity', a more rational penetration of the social situation might be more conducive.

As regards teachers' evaluations as they had been surveyed in the Cologne High School Panel (CHiSP), the frame of the underlying social situation should be rather unambiguous: the demand of an anonymous, non-binding assessment of students' future academic potential. Thus, teachers should recognize the demands of this situation more or less automatically (*as-mode*).

Now we have to ask which *scripts* are at the teachers' disposal in this situation of a non-binding assessment. Our answer would be that this particular frame requires a script of professional pedagogic diagnostics. As already sketched above, we assume that as long as teachers' evaluations are grounded on meritocratic criteria like students' academic performance; they behave according to occupational standards that are deep-rooted in every teacher's mind. Thus, evaluations which are based on meritocratic criteria will emerge rather automatically in line with the *as-mode*.

However, though probably most legitimate, these will be not the only criteria which determine teachers' actual evaluations. In total, we will enumerate three different variants of processing that might come into play besides meritocracy.

First, sociologists could learn from Bourdieu's (1986) theory about different forms of capital that the *habitus* of upper-class students which is defined as a system of dispositions (socially acquired schemes of perception, thought and action that are stable over time) perfectly matches with the habitus of their teachers who usually originate from the same social stratum and thus have incorporated a similar system of social dispositions. This positive social discrimination of upper-class students is twofold: First, upper-class students usually are more familiar with codes (or

routines) that are necessary to acquire the cultural goods that are taught in class. Second, these first-order codes depend, in turn, on second-order codes of perception, communication and self-control strategies that are themselves acquired in socialization and may affect even factors like motivation and aspiration (Bourdieu 1986; Bourdieu and Passeron 1990). Thus, upper-class students with more cultural capital will not only have more knowledge about school-relevant contents but they will also be more able to perceive and to communicate according to norms and via symbols that come up to the expectations of their teachers (also see Dumais 2006:85f).[3] *As long as* this match of symbolic codes *only unconsciously* influences teachers in their evaluations, this would still be in line with the *as-mode* of automatic processing. As Kroneberg (2006:18) points out, there will be greater activation of an *as-mode* script S_j

- the higher its general availability ($a_j \in [0, 1]$),
- the higher its accessibility given the selection of frame F_i ($a_{j|I} \in [0, 1]$), and
- the higher the match of the selected frame ($m_i \in [0, 1]$).

The availability of a frame describes how strongly it is mentally anchored, and its accessibility represents the degree of mental association between frames and scripts.

In our case, the *as-mode* prevalence of *habitus* criteria will particularly depend on the script's availability, i.e. "how strongly an actor has internalized certain norms or become[s] accustomed to certain routines" (Kroneberg 2006:18). The main point here is that in accordance with the mode of automatic processing, actors do not have the opportunity to select between different *as-mode* scripts deliberately; instead, there is always only one dominant *as-mode* script – whether it approximates more to the ideal type of meritocracy or more to the one of *habitus* correspondence.

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[3] Scholars who stress the distinction between primary and secondary effects of social inequality also assume that social background variables may lead to a twofold discrimination in the educational system. We will discuss this assumption in the following subsection and will try to integrate it in our general theoretical framework.

In sum, the first possible deviance from the *as-mode* meritocracy model would be a more or less pronounced (but still unconscious) shift towards the pole of *habitus* criteria.[4]

Second, however, the degree to which extent teachers' recurrence on *habitus* criteria merely follows an automatic selection may also vary. Following Hedström (2005), the terms in which Bourdieu describes individuals behaving "in habitual ways without consciously reflecting upon what they are doing" are like "mental clouds that mystify rather than clarify" – since it is "unclear why he believes that habitus, whatever it is, operates the way it does" (Hedström 2005:4). Likewise, Elster (1985:69-71, 101-108) criticizes the lack of any causal mechanism between people's dispositions and their actual actions. Yaish and Katz-Gerro (forthcoming) rub salt in the same wound when they maintain that "[Bourdieu's] underlying mechanisms remain unspecified and open for various interpretations in the theoretical sense" (p. 3). Referring to this openness, in line with Elster (1985:70), we could mention a passage in Bourdieu (1986) where the latter explicitly brings intentionality back when he argues that distinguishing strategies of members of a social class that are genuinely intentional "only ensure full efficacy, by intentional reduplication, for the automatic unconscious effects of the dialectic of the rare and the common, the new and the dated, which is inscribed in the objective differentiation of class conditions and dispositions" (p. 246). Likewise, Collet (2009) highlights that although Bourdieu's actors might to a certain degree follow unconscious rules, they cannot be reduced to objects that apply rules automatically in terms of a one-dimensional stimulus-response behavior. Since Yaish and Katz-Gerro (forthcoming) allude that these two different (we would rather say *complementary*) interpretations

[4] There is some more evidence that allows us to conjoin the notion of 'habitus' with theoretical models of situational framing: In a theory originally developed for the analysis of school curricula, Bernstein (1971, 1981) differentiates between the concept of framing that indicates the strength of the boundary of a social situation, and the concept of codes that control the communication between actors. As regards the latter, Bernstein (1971) distinguishes restricted codes that work in situations with a great deal of shared and taken-for-granted knowledge from elaborated codes that better suit situations with no prior or shared understanding or knowledge. Moreover, despite some differences, Bernstein (1990) highlights that "the concept of code bears some relation to Bourdieu's concept of habitus" (p. 3). For a more elaborate discussion about the similarities and differences between Bernstein and Bourdieu see Bourdieu (1991:53), Harker and May (1993) as well as Bernstein's (1995) reply to Harker and May.

of the mechanisms that produce behavior are also echoed in dual process theories (p. 3), we see the possibility to bridge the gap between the notion of habitus at this stage and a more conscious and reflected behavior. To be precise, we argue that in the case of teachers' evaluations, *given* an assessment of students' academic performance that tends to follow the *as-mode* of processing, teachers could find rather *rational* arguments *why* students with certain social backgrounds might be academically more successful than their classmates, because their parents, let's say having an academic background themselves, would be more able to support them. Thus, in that case, the dominant script that follows the *as-mode* framing of the social situation would be a mixture of an *as-mode* assessment of students' academic performance and of a *rc-mode* evaluation of the estimated impact of students' social backgrounds on their potential academic success at university.

Third, supplemental to an *as-mode* assessment of students' academic performance, teachers might refer to additional criteria of students' general academic ability like their (estimated) intelligence or motivation. Apart from the most visible academic performance of the students (usually operationalized by their school grades), teachers could find rational reasons for differences in ability that might affect students' success probabilities but are not reflected in grades. Students with the same grade might differ in cognitive abilities or in the motivation they invested to achieve this grade, and these differences might also lead to differences in their (estimated) probabilities of university success. Our main point here is that in contrast to the *as-mode* assessments of students' academic performance, we assume teachers' additional considerations about students' ability to be the result of rational reasoning (*rc-mode*).

Our theoretical considerations can be summed up as follows: We assume that teachers' evaluations as we find them in our data emerge in a social situation that is framed more or less automatically (*as-mode*) by the teachers. In a second step, teachers' actual decisions will be formed

according to a specific script of action which may vary between an automatic (*as-mode*) and a rational *(rc-mode*) pole of information processing. In the most probable script of action, teachers intuitively ground their evaluations on students' actual academic performance (*meritocrary-as-mode*). However, besides this meritocratic criterion, the dominant script may gradually contain three other types of information: i) an automatic consideration of students' backgrounds (*habitus-as-mode*), ii) a more rational consideration of students' backgrounds (*habitus-rc-mode*), and iii) a rational consideration of additional ability criteria apart from students' actual performance (*meritocracy-rc-mode*). Our main point is that on the individual level there is always one dominant script, but according to our multidimensional *and* gradual explanation of the emergence of teachers' evaluations, the conditions under which these evaluations are shaped may vary.

2.2 Determinants of Teachers' evaluations

2.2.1 Academic Performance

Being perhaps the most visible criterion, the predictive validity of school grades as the most common indicator of students' academic performance is, as several meta-analyses suggest, well-corroborated (Burton and Ramist 2001; Kuncel et al. 2001; Morgan 1989; Robbins et al. 2004). Although in Germany the value of school grades for long-term recommendations has been discussed since the 1920s (e.g. Ingenkamp 1971; Ziegenspeck 1999), the average grades given by different teachers over a longer time span are at least a good predictor for student's future academic success (Trapmann et al. 2007). However, Arnold et al. (2007:283) found that the grades in mathematics and German language together could account for about two thirds of the total variance of teachers' recommendations. But since the relationship as such is well-established and teachers' consideration of students' academic performance can be expected to be

their probably most dominant script of action (*meritocracy-as-mode*), we transfer this relationship onto teachers' evaluations:

H1: The better students' school grades, the higher the probability of obtaining a better evaluation.

2.2.2 Cognitive Ability

According to Ingenkamp (1971), in the field of transition from primary to secondary school, test results have always been used to compensate for the fallibility of teachers' assessments.[5] In terms of predictive validity, also more recent studies highlight that standardized test scores would be more valid indicators than students' school grades (Camara 1998; Camara and Echternacht 2000; Camara et al. 2003). Admittedly, cognitive capabilities can be regarded as the most important predictor of *school achievement*, but a considerable empirical gap between test results and *teachers'* evaluations can be detected notwithstanding: Arnold et al. (2007:281) found in their investigation of German teachers' recommendations about school transitions that students' competences in reading could account for only 31% of the variance of the teachers' recommendations.

Nevertheless, a linear relationship between intelligence and the probability of obtaining a particular teacher's *recommendation* to attend "Gymnasium" still holds - especially for the verbal component of intelligence (Ditton 2007). And there is evidence to assume that apart from students' academic performance, teachers might additionally try to estimate their cognitive ability in order to rationally increase the validity of their forecasts *(meritocracy-rc-mode*) with regard to students' potential academic success at university. Thus we hypothesize:

H2: The higher students' intelligence, the higher the probability of obtaining a better evaluation.

[5] Moede et al. (1919) and Bobertag and Hylla (1926) can be cited as very early references for the attempt of building teacher recommendations about school transition on the ground of standardized test results.

2.2.3 Social Backgrounds

Although the impact of students' social background variables on their school achievement is basically undoubted, both strength and importance of this relationship are still discussed broadly (Becker 2003; Becker and Hecken 2009; Blossfeld and Shavit 1993; Breen and Goldthorpe 1997; Breen and Jonsson 2000; Breen et al. 2009, 2010; Erikson et al. 2005; Goldthorpe 2003; Hillmert and Jacob 2010; Schneider 2008; Schubert and Becker 2010; Stocké 2007; Tolsma et al. 2010). In general, the literature distinguishes between *primary effects* of social inequality which denote the impact of parental socio-economic status (SES) on differences in students' academic abilities, and *secondary effects* of social inequality that capture differences (e.g. in educational aspirations) *apart from* actual differences in academic abilities (Boudon 1974).

As regards primary effects, Arnold et al. (2007:287) could also show that the odds to attend Gymnasium is 2.6 times higher for "higher service class" children compared to "working class" children - even after having controlled for cognitive abilities and reading competences (for similiar results see: Bos et al. 2004; Jürges and Schneider 2006; Pietsch and Stubbe 2007). These results and the mechanisms discussed by the authors mentioned in the last section provide us with good reasons to test for the supposition that parental SES might influence their respective teachers' evaluations:

H3: The higher the socio-economic status (SES) of students' parents, the higher the probability of obtaining a better evaluation.

As regards secondary effects, scholars have passed some critique in terms of "the inadequacy of uni-factorial theories" (Boudon 1974:101). The crucial point of this critique about mere one-factorial theories is that secondary effects of social inequality are still present after having controlled for all primary effects. That is, regardless of differences in cognitive abilities, "working class" children will still do less successfully in school because of lower educational expectations

and aspirations.[6] Our assumption is that students' aspirations not only affect educational transitions but also, previously, the teachers' evaluations that might thoroughly have an influence on the later transition decisions. The claim that this effect takes place independently of academic performance, cognitive abilities and even parental SES implies that students' aspirations somehow affect teachers' internalized norms and habits. We hypothesize that even apart from parental SES, students' aspirations can be subsumed under the general idea of Bourdieu's (1986) *habitus* in terms of an outright affinity towards education that matches the expectations and norms of the teachers (e.g. about the classical humanistic value of education par se).[7] As we have outlined in section 2.1, if teachers have internalized certain norms and habits quite strongly, the latter might automatically enter teachers' dominant script of action (habitus-*as-mode*). But, of course, following Elster's (1985) and Hedström's (2005) interpretation of Bourdieu's notion of *habitus*, teachers could also find rather rational arguments why students with certain social backgrounds in general and certain aspirations in particular might do better (habitus-*rc-mode*). Since there is sufficient evidence that students' habitus might generally be an issue of educational inequality (De Graaf and De Graaf 2002; De Graaf et al. 2000; De Graaf 1986; DiMaggio 1982; Jæger 2009) our hypothesis reads the following:

H4: The higher the students' aspirations, the higher the probability of obtaining a better evaluation.

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[6] Given education as an investment good (Goldthorpe 1996:494), the chief concern for each family will be to achieve some kind of intergenerational stability of class positions. Hence, parents belonging to the service class will be more likely than others to encourage their children to attain higher education of some kind (Breen and Goldthorpe 1997). Reversely, for families in less advantageous positions not only less ambitious and less costly educational options would be adequate for the goal of maintaining class stability - but also each failed attempt in obtaining higher educational levels is likely to be more serious in its consequences (e.g. in terms of further opportunity costs which have to be shouldered). Thus, a higher level of education will be aspired if the educational motivation to continue somehow exceeds the underlying investment risk (see also Esser 1999:265-275).

[7] McClelland (1990), Dumais (2002, 2006) and Andres (2009) are examples for studies that use students' aspirations to measure habitus-related components. Dumais (2006) also used students' habitus to explain a form of teachers' evaluations; however, as she concedes that in her analyses, teachers' evaluations are merely used as a substitute for students' school grades which have not been measured in her data, we regard our contribution to include both students' grades and teachers' evaluations in our model.

At this point, it is necessary to address a very important distinction in analytical sociology, i.e. the one between *substantive* and *empirical* statistical models (Cox 1990), or between scientific models presented in statistical form and statistical models *per se* (Rogosa 1987; Sørensen 1998). The point is that the former "are intended to represent real processes that have causal force (whether or not directly observable)" while the latter "are those which sociologists normally use and are concerned with relations among variables that may be determined through techniques of rather general applicability" (Goldthorpe 2001:14). In our case, although we consider the dominance of *as-mode* or *rc-mode* scripts of actions to be crucially important for the emergence of teachers' evaluations of their students, in the data at hand we have no direct measure to distinguish which script mode is actually prevalent and which additional teacher background variables might be able to explain that. On the other hand, we also did not want to make theoretical concessions due to lack of empirical data. Our aim was to develop a theoretical model as precise as possible, and we will provide practical advice in the conclusion section how empirical analyses might further proceed.

3 Research Design

3.1 Data

All analysis will be based on a dataset which is known as the Cologne High School Panel (CHiSP). The CHiSP consists of an initial survey from 1969 with N=3385 10th-grade high school ("Gymnasium") students in North Rhine-Westphalia and two re-surveys in 1985 (N= 1987) and 1996/97 (N=1596). In the initial survey, students have been asked about issues like their performance, interests and plans in school, about their social origin and their relationship to their parents. Parallel to the initial survey, the students took part in an Intelligence Structure Test (IST) containing four sub-scales as developed by Amthauer (1953). At the same time, also the students' teachers (N=1701) and parents (N=2646) have been surveyed. The main items of the

parent questionnaire covered issues like their social background, their style of raising children and their aspirations for their children.[8]

3.2 Variables

3.2.1 Dependent Variable

In the CHiSP, teachers have been asked to evaluate by a dichotomous decision which students they suppose to be appropriate for academic studies and which of them not. Since this was asked as an open-ended question, teachers could classify students as able, as not able - or not at all.

This data structure causes two problems. First, each student could be evaluated by more than one teacher. An analysis of the intra-class correlations (ICC) revealed a considerable variance of multiple teachers' evaluations for each student (not shown, available upon request). Second, the openness of the question is not without problems, because it has to be clarified whether the 'missing' category really should be treated technically as a missing value – or if we would lose substantial information when proceeding on this assumption.

To overcome the first problem, our analysis will focus on evaluations only of class teachers.[9] To overcome the second problem, as a preliminary analysis we have estimated two logistic regressions of the chance of getting a positive evaluation vs. getting a negative, one or none at all, respectively, on the same independent variables which we will use in structural equation

[8] In the first re-survey in 1985, the at that time approximately 30 year-old former students gave detailed information about their private backgrounds and occupational careers beginning at the age of 15 until the age of 30. In the second re-survey in 1996/97, the period from the age of 30 until the age of 43 was added to the data. Apart from the former students' life courses, common foci of the questionnaires were items about their biographical self-definition and -reflection, causal attribution, centrality of particular areas of life and attitudes towards family, work and politics. For a general overview about the existing literature with the CHiSP data up to now see Birkelbach (1998) and Meulemann et al. (2001).

[9] We expect that the intra-individual variance of teachers' evaluations partially depends on the quality of teacher-student relationships. We assume that class teachers have a more intense relationship to and a better knowledge of their students than 'ordinary' teachers. Thus, regarding only class teacher evaluations will both simplify the data structure and overcome the problem of variance.

modeling. These results are displayed in the appendix (tables B and C). We can note that for the analysis of the chance of getting a positive evaluation vs. getting none at all (table C), the effect sizes of all independent variables are in the same direction, but notably lower than for the analysis of the chance of getting a positive evaluation vs. getting a negative one (table B). Thus, we can conclude that students who are not mentioned at all rank *lower* in the teachers' perceptions than students with a good evaluation, but *higher* than students with a bad evaluation. To get to the point: When teachers do not receive clear evidence for their decision, they will develop only vague expectations for their students. Thus, in the subsequent structural equation models we will treat the "missing" category not as missing but as an implicit middle category between good and bad evaluations of the teachers.

3.2.2 Independent Variables

First, students' *intelligence* was measured by their scores in an Intelligence Structure Test (Amthauer 1953) consisting of four sub-scales (analogy, selection of words, series of numbers, cube test). For the structural equation models we will use the z-transformed scores of these sub-scales as a measure for the latent variable of students' intelligence (reflective indicators, see: Bollen and Lennox 1991; Diamantopoulos and Winklhofer 2001; MacCallum and Browne 1993).

Second, we control for students' *academic performance* in terms of their average grades.[10] Third, *parental socio-economic status* (SES) will be operationalized as the maximum value of both mother's and father's education and occupational prestige. Education was measured in twelve categories reaching from 1 'without graduation' to 12 'university degree'. We categorized the variable into four dimensions. Concerning occupational prestige, the data already contain the respective

[10] Note that according to the German grade system an average grade *below* the median displays relatively *better* marks and an average grade *above* the median relatively *worse* marks. To ensure that a higher variable value denotes better marks, we inverted the variable.

Treiman prestige scores (Treiman 1977).[11] Finally, students' aspirations are measured by their appraisement whether 'Abitur' is necessary to reach their aim in life – if any – (1 'necessary'; 2 'not necessary, but useful'; 3 'not necessary'; 4 'no concrete aim in life'). We dichotomized this variable into 0 'no aim in life / Abitur not necessary'; 1 'Abitur useful or necessary'.[12]

3.3 Preliminary Path Structure and Plan of Analysis

Since we expect that the independent variables will correlate with each other considerably, we intend to model intercorrelations directly in our calculations. We expect, first, that students' intelligence will be able to explain part of the variance of their school grades. Second, our considerations about the primary effect of social inequality imply that parental SES will influence both students' intelligence and their school grades (Boudon 1974). Third, to consider also the secondary effect of social inequality, we assume an impact of parental SES on students' aspirations. Fourth, it seems reasonable that higher grades will foster students' aspirations - and reversely. Therefore, we will allow for a covariance between those two variables. And finally, research about both *Pygmalion* and self-fulfilling prophecies[13] has shown that understanding teachers' evaluations as pure exogenous variables would fall too short. This is why we will model the relationship between school grades and teachers' evaluations and the one between students'

[11] See Ganzeboom and Treiman (1996) for a general overview about classification of occupation. Another possibility of dealing with parental SES would be to model all available information, i.e. all four variables, as formative indicators of a latent variable 'SES' (Bollen and Lennox 1991; Diamantopoulos and Winklhofer 2001; MacCallum and Browne 1993). However, since the initial survey of the KGP took place in 1969, we have to expect that a considerable amount of mothers will be not employed; hence, the variance of this variable would be rather low. Indeed, a simple frequency analysis revealed that an amount of 78% of all mothers had not been in labour when they have been surveyed (not shown). As a consequence, the factor loadings of a confirmatory factor analysis wherein we treated the four SES variables as formative indicators were rather low (not shown). Thus, we conclude that introducing the maximum value of both mothers' and fathers' education and occupational prestige as two single indicators will be a better strategy that leads to more consistent estimates.

[12] Table A (appendix) contains minimum/maximum, mean and standard deviation of all variables.

[13] For the initial study of *Pygmalion in the Classroom* see Rosenthal and Jacobson (1968). For early meta-analyses of existing studies about *Pygmalion* up to that point see Smith (1980) and Raudenbush (1984). For a current summary of implications and open questions in self-fulfilling prophecy research see Jussim and Harber (2005).

aspirations and teachers' evaluations as covariances rather than as regression weights. The preliminary path model is presented in figure 2.

Figure 2 about here

3.4 Statistical Approach: Structural Equation Modeling

In order to take the complex path structure of the independent variables into account, we ran a set of structural equation models.[14] Since our dependent variable is categorical, conventional maximum likelihood estimation based on a usual variance-covariance matrix will be biased (Bollen 1989:433ff). Instead, it has been suggested to use a matrix of polychoric correlations (Aish and Jöreskog 1990; Jöreskog 1994; Muthén 1984; Olsson 1979) as input matrix.[15] The basic idea of polychoric correlations of categorical variables is to compute the thresholds of an assumed underlying continuous variable. To get a comparable metric for all variables, we also categorized the ratio-scaled variables in the dataset.[16] For our model we have dichotomized the IST subscores, students' average grade and parental occupational prestige based on their respective median. The polychoric correlation matrix is displayed in table D (appendix). We used the SEM package in *R* (Fox 2006) for our analyses.

[14] The SEM approach is also known as a LISREL model (Jöreskog 1993; Jöreskog and Sörbom 1989), named after the first statistical package which was able to deal with SEMs. Bollen (1989) is still the classical textbook for structure equation models.

[15] Maximum-Likelihood estimation of SEM models based on polychoric correlations may lead to consistent estimates, but the standard errors, z-values and significance parameters will be biased (Bollen 1989:443). Therefore, we use bootstrapping techniques to correct the latter parameters (Fox 2006; Zhang and Browne 2006).

[16] See Babakus et al. (1987) and Ridgon and Ferguson (1991) for issues of convergence rates and fit statistics of polychoric correlations depending on different types of categorization.

4 Results

4.1 Measurement Part

Following the "Jöreskog tradition" (Byrne 2004) in structural equation modeling, first of all the measurement model for the intelligence subscores had to be fitted (figure 3).[17] The reflective measurement model for the intelligence scores (IST) achieved a good fit with respect to the Adjusted General Fit Index (*AGFI*=.996), the Comparative Fit Index (*CFI*=.992), the Root Mean Square Error of Approximation (*RMSEA*=0.018) and the Standardized Root Mean Square Residual (*SRMR*=0.008).[18] The insignificant χ^2-value of 4.226 (df=2) suggests that there is no significant difference between the variance-covariance matrix of the observed variables and the model we have estimated. Looking at the standardized estimates, we can see that all except one IST subdimensions show factor loadings around .45 – .50. Only the cube test seems to perform a little bit worse in explaining the latent variable "intelligence".

Figure 3 about here

4.2 Structural Part

The structural part will proceed in three subsequent steps that mainly follow the order of our hypotheses in section 2.2: First, teachers' evaluations are regressed on students' average grade. We label this model, which was deduced according to the meritocracy-as-mode of processing, *performance model 1*. Second, this single-arrow model is amended by the latent intelligence variable as it has been estimated in the IST measurement model. This model, which assumes the meritocracy-rc-mode of processing, is labeled *performance model 2*. Third, the SES indicators are

[17] All regression weights and covariances that are displayed in this and the subsequent structural equation figures (figures 3-6) have corresponding z-values that fulfill a significance value of $p < .05$ or lower (two-tailed).
[18] Bollen (1989) defines the following cut-off values for the goodness-of-fit criteria: AGFI > .95, CFI > .90, and both RMSEA and SRMR <.08 (better < 0.05).

introduced to model the *primary* effects of social inequality (*SES model*). And finally, also students' aspirations are included in order to model the *secondary* effects of social inequality (*aspiration model*). According to our theoretical considerations, the indicators for both models may take effect via both modes of information processing.

4.2.1 Performance Models

The *Performance Model 1* simply regresses teachers' evaluations (1 = 'not able'; 2 = 'not mentioned'; 3 = 'able') on students' average grade. The standardized covariance of these two variables is about .30; and since no measurement model is involved at this point, the fit measures of *PERF1* are virtually perfect (table 1). Due to the simplicity of the model we see no need for graphical illustration.

Performance Model 2 extends performance model 1 in adding students' latent intelligence variables as a second independent variable (table 1, model *PERF2a*). In our theoretical section, we expected that we might find stronger or additional causal effects for the verbal part of our intelligence test. And indeed, modification indices (see e.g. Sörbom 1989) suggested to allow for a direct covariance between the analogy subscore and teachers' evaluations. Since it does not make much theoretical sense to assume a *cross-sectional* impact of teachers' evaluations on students' intelligence[19], we allowed only for a one-way relationship in terms of an impact of intelligence on teachers' evaluations (*PERF2b*).[20] From table 1, the reader can see that this step clearly improves the fit of our model.

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[19] In contrast, several studies modeled the Pygmalion effect as a longitudinal impact of teacher evaluations on intelligence (e.g. Rosenthal and Jacobson 1968; the studies analyzed by Smith 1980). Others focused on changes in school grades (e.g. Smith et al. 1999). Although we are not directly testing the self-fulfilling prophecy hypothesis we will yet consider its basic idea in terms of a covariance between teachers' evaluations and school grades.

[20] Jöreskog (1993) strongly recommends only to release parameters which can be interpreted substantively. In this case two arguments seem to make sense. Possibly the competence of a student to draw analogy-based inferences is more applicable (and thus also more visible to teachers) in school lessons than the other subdimensions of

Moreover, first we did not allow for a covariance between intelligence and average grade – although, according to our theoretical considerations, we surely expected it to be there. The fit of the constrained model *PERF2b* was not very satisfactory, and thus we followed our theoretical assumptions and allowed for a one-way coefficient of intelligence on average grade. The fit of this model was a bit better (model *PERF2c*), but could still be improved: Interestingly, modification indices also suggested another *direct* effect of the analogy subscore on students' average grade (which seems to confirm our hypothesis about the particular visibility of this sub-dimension of intelligence at school). This model, *PERF2d*, is presented in figure 4.

Figure 4 about here

The numbers next to the arrows show the standardized path coefficients, the factor loadings and covariances of the model. Similar to our logistic regressions (cf. appendix, tables B and C), the covariance between average grade and teachers' evaluations seems to be much larger than the impact of students' intelligence scores (.40 vs. .20). Controlling also for intelligence now, we note that the relationship between intelligence and teachers' evaluations is mediated by the intervening variable average grade (.15). It also seems noteworthy that the "pure" effect of the analogy subscore on average grade (.10) is again not much smaller than the respective overall regression weight of the latent variable intelligence (.15) - which is due to a dropdown of the latter from .22 in the restricted model *PERF2a* without this arrow (not shown). The fit of this model is convincing (cf. table 1, model *PERF2d*).

Table 1 about here

intelligence. Another explanation would be that teachers rate the competence in drawing analogy-based inferences particularly high with respect to successfully completing academic studies.

4.2.2 SES Model

Now we introduce the maximum value of both highest parental educational degree and occupational prestige as two single indicators in order to model the *primary effects* of social inequality explicitly. The initial fit of this model is already acceptable (see table 2, model *SES1*) and it could be improved slightly when the covariance between the two SES indicators was relaxed (model *SES2*). Another improvement could be achieved when we allowed for the regression weights of the two SES indicators on the latent intelligence variable (model *SES3*) - meaning an operationalization of *primary* effects of social inequality. Though, in contrast to our theoretical model (figure 2), two coefficients in the SES model turned out to lack statistical significance: the coefficient of education on the global intelligence variable and the coefficient of occupational prestige on teachers' evaluations. Therefore, we subsequently dropped these regression weights (models *SES4* and *SES5*). Moreover, modification indices suggested to introduce a direct effect of parental education on the analogy subscore of intelligence. Since we already found direct effects of this dimension on both average grade and teachers' evaluations (see figure 4), which was in line with our theoretical considerations, we allowed for this regression weight (model *SES6*). While models *SES5* and *SES6* still contain occupational prestige as a covariate of education, we finally tested a model that completely passed the former variable (model *SES7*). This model could achieve a better fit than SES6, and, according to Ockham's razor's maxime of parsimoniousness, it is the preferred model up to now (see figure 5).[21]

Figure 5 about here

[21] We tested three additional variants of models SES6 and SES7 (not shown, available on request): one with a regression weight between occupational prestige and average grade (not significant), one with a direct effect of education on the latent IST variable rather than on the analogy subscore (significant, but worse model fit), and one with regression weights of average grade on both the latent IST variable and the analogy subscore (which is significant but suffers from multicollinearity). Because of these drawbacks we still prefer model SES7.

The direct effect of parental education on teachers' evaluations is about .10 – which is, up to now, the second smallest coefficient in the model. Yet we also have to keep in mind the indirect effect in terms of the relationship between education, the IST analogy dimension and teachers' evaluations. The covariance between students' average grade and teachers' evaluations is still the strongest effect in the model (.40), while the direct impact of intelligence on teachers' evaluations comes second (.26). Again, the effect of the latent intelligence variable on teachers' evaluations slightly increases when controlling for direct and indirect effects of education. Apparently, the predictive power of intelligence on teachers' evaluations becomes even stronger among students with the same social background. The model was able to achieve a wholly satisfactory fit (table 3, model *SES7*).

Table 2 about here

4.2.3 Aspiration Model

In order to model also the *secondary effects* of social inequality, we finally include students' aspirations measured by their dummy-coded appraisement if 'Abitur' is necessary to reach their aim in life. The fit of the initial model without allowing any additional covariances or regression weights except the direct effect of students' aspirations on teachers' evaluations (table 3, model *ASP1*) could be improved when we allowed for a regression weight of education on students' aspirations (model *ASP2*). Furthermore, we also assumed a direct effect of intelligence on aspirations – which once more upgraded the fit of our model (model *ASP3*). Next to these additional arrows, we also hypothesized a covariance between students' aspirations and their average grade. However, in the model including this covariance it turned out to lack statistical significance (not shown, available on request). Therefore, *ASP3* is already our final model (figure 6).

Figure 6 about here

The largest effect in our model is still the covariance between average grade and teachers' evaluations (.39), while the regression weight of the latent intelligence variable comes second (.28). The covariance between students' aspirations and teachers' evaluations, however, is far lower (.08). Aspirations themselves are significantly predicted by parental education (.10) and students' intelligence (.14). Given the size of the final model, its fit is very satisfactory (table 3, model *ASP3*).

Table 3 about here

5 Summary and Outlook

In this paper we tried to model the emergence of teachers' evaluations with regard to students' academic abilities as an outcome of a specific social situation in the classroom. In the theoretical section we first proposed an explanation of the emergence of teachers' evaluations which followed Esser's and Kroneberg's enhancement of Kahnemann and Tversky's (1984) general idea of a framing approach (Esser 1996, 2010; Esser and Kroneberg 2010; Kroneberg 2006; Kroneberg et al. 2008; Kroneberg et al. 2010). We assumed that although teachers' definition of the underlying social situation (an anonymous, non-binding assessment of students' prospective academic potential) will surely follow an automatic framing, the subsequent *scripts of action* they will use might vary between an automatic (*as-mode*) and a rational (*rc-mode*) ideal type of information processing. In most cases, teachers will intuitively refer to students' actual performance when evaluating their students (*meritocracy-as-mode*). However, the dominant script of action might be gradually shifted towards three other types of information processing: i) an automatic consideration of students' backgrounds (*habitus-as-mode*), ii) a more rational consideration of students' backgrounds (*habitus-rc-mode*), and iii), a rational consideration of

additional ability criteria apart from students' actual performance (*meritocracy-rc-mode*). The crucial idea of this explanation of teachers' evaluations is that each teacher will ground his or her decision on always one dominant script of action, but the position that this script takes on the *as-mode*- vs. *rc-mode* axis on the one hand and the meritocracy- vs. habitus axis on the other hand may vary.

In a short literature review we then derived four hypotheses, according to which we postulated that teachers' evaluations would be influenced by students' intelligence, average grade, social background and aspirations, respectively. Furthermore, we expected that some of these independent variables would show a path structure in terms of additional regression weights or covariances between them (Figure 2).

This model was tested by use of the Cologne High School Panel (CHiSP, 1969). From logistic regression analyses (tables B and C; appendix) we could already note that students' average grade seems to have the strongest effect on (positive or negative) teachers' evaluations while their aspirations come second. Another result of logistic regression analyses was the fact that receiving no evaluation at all can be regarded as lying somewhere between obtaining a positive evaluation and receiving a negative one. Therefore, for the subsequent structural equation models as our main analyses we modeled the decisions of the teachers with regard to the academic ability of their students as our dependent variable in the following way: 1 'not able'; 2 'not mentioned'; 3 'able'.

In the structural equation models our main hypotheses were corroborated. Even when controlling for additional path structures, all of our (formally) independent variables showed significant effects on teachers' evaluations. Average grade is still the strongest predictor, but in contrast to the preceding logistic regression analyses now students' intelligence comes second and their aspirations come third.

Additionally to our main hypothesis *H2* we already found evidence in the literature that the verbal dimension of intelligence might be more important for teachers' evaluations than the numeric dimension. Indeed we could note independent effects of the analogy subscore of intelligence on both average grade and teachers' evaluations – which might be an evidence that this dimension at least partially reflects either the meritocracy-rc-mode or even the habitus-as-mode of processing.[22] But compared to the initial path model we also had to drop several arrows due to lack of significance: First we could not find a significant regression weight of parental education on the global intelligence variable. However, we could note a significant impact of the former on the analogy subscore of intelligence. Since this variable showed independent effects on both average grade and teachers' evaluations, we conclude that the *primary* effect of social inequality is mainly passed on via this predictor. Second, we could not find any direct effects of parental occupational prestige on students' average grade. Apparently, in our socially selective sample – recall that our observations are (predominantly upper-class) Gymnasium students –, the primary effect of social inequality is exhaustively modeled when we control for the indirect effect of parental SES via intelligence on average grade. The third arrow we had to drop concerned the regression weight of parental occupational prestige on students' aspirations. It appears that by controlling for parental education, all social background effects on students' aspirations are already modeled.

In sum, we can conclude that although indicators for all four types of theoretical concepts showed statistical significance, we saw that the meritocracy explanation – be it based on *rc-mode* or *as-mode* scripts – shows more predictive power than the explanation based on habitus criteria. Yet, both the empirical dominance of students' average grade in our models and the fact that the

[22] Below we discuss why we see arguments for either mode of processing, and we propose a method how to decide which mode of processing may be the actual drive of this arrow.

verbal dimension of intelligence showed cross-loadings on average grade as well as on teachers' evaluations might underline the particular importance of the meritocracy-as-mode.

These results suggest the following implications for further studies: First, the underlying social mechanisms of the emergence of teachers' evaluations have to be further extended. Future studies could try to sharpen the distinction between rc-mode and as-mode processing type explanations as we have transferred on the social situation in the classroom.

Second, this approach clearly needs the consideration of more background variables. On the one hand, the set of student variables in our analyses might be no exhaustive operationalization of the student side of the social situation in the classroom. Thus, it would make sense to include additional information such as students' grades in different subjects or their academic self-concept in order to specify the social situation in the classroom more concretely. Moreover, we already indicated that although at first sight, it appears reasonable to interpret the cross-loadings of the analogy subscore on both students' academic performance and teachers' evaluations in line with the meritocracy-as-mode of processing, at a second glance, these arrows might also emerge by virtue of teachers' and students' habitus: Recapitulating our theoretical considerations strictly in the latent variable framework, only one of our lower-level concepts intelligence, academic performance, parental SES and students aspirations – that were deduced from the higher-level concepts 'meritocracy' and 'habitus', respectively – was actually measured as a latent variable, namely students' intelligence. Thus, both students' academic performance and their habitus were operationalized by single indicators that probably did not provide sufficient controls for measurement error. In other words, students' *objective* academic performance should be understood as a latent variable which is only approximately measured by their average grades. The latter, in turn, are nothing but the result of a specific form of teachers' evaluations which may *themselves* be inflated by habitus criteria that operate additionally to the teachers' meritocracy-

as-mode script of action. We expect that we probably *would* find additional cross-loadings of both the verbal dimension of intelligence and our measure of academic performance on our habitus indicators if we could provide a more detailed operationalization of habitus – e.g. in terms of students' cultural capital, their cultural practices, etc. – than we were able to with our data at hand (see Kingston (2001) and Lareau and Weininger (2003) for a critical assessment of cultural capital usage in educational research). In concrete terms, we demand from further studies to test for a second-order factor model (Chen et al. 2005; Rindskopf and Rose 1988) with students' habitus as the higher-level factor, and parental SES, students' aspirations and their cultural capital as lower-level factors that should be operationalized by appropriate indicators, respectively.[23]

On the other hand, if one would really want to disentangle the conditions under which teachers' scripts of action tend to follow either the more automatic or the more rational information processing mode, it will be inevitable also to control for teacher background variables. Future studies should try to find variables such as teachers' pedagogic concepts, their attitudes towards educational inequality or measures of teachers' success attribution that explain why a particular teacher follows a certain dominant script of action. Furthermore, teachers' backgrounds should ideally also cover indicators of their habitus: Only if both students' and teachers' habitus are measured adequately, a final decision about habitus match or mismatch will be possible. Methodologically, controlling also for teachers' backgrounds would equal a multilevel structural

[23] DiMaggio (1982) and De Graaf (1986) use explanatory factor analysis to measure families' cultural capital, but to the best of our knowledge, a confirmatory factor model of the notion of habitus in a broader sense is still missing. McClelland (1990), Dumais (2002, 2006) and Andres (2009) measured habitus by students' aspirations, but as Dumais (2002:51) herself acknowledges, single-indicator measures for habitus are far from perfect (also see Reay 2004:440f). Andres (2009) makes use of a path model to test the interrelations between social backgrounds, different forms of capital and dispositions, but although claimed in his theoretical section, no analytical operationalization of habitus is given in his measurement part. In this attempt, further studies may also refer to the theoretical concepts as used by social psychology which offers a whole bunch of literature about the prediction of behavior by attitudes (for meta-analyses see Glasman and Albarracín 2006; Kim and Hunter 1993a, b; Kraus 1995; Wallace et al. 2005). However, although Acock and Scott (1980) already modeled attitudes as being affected by social class, more recent psychological studies apparently neglected this endogeneity.

equation model (Bauer 2003; Heck 2001; Muthén 1994; Rabe-Hesketh et al. 2004; Rabe-Hesketh et al. 2007) where students (and their evaluations) are nested in teacher contexts.

Figures and tables (main text)

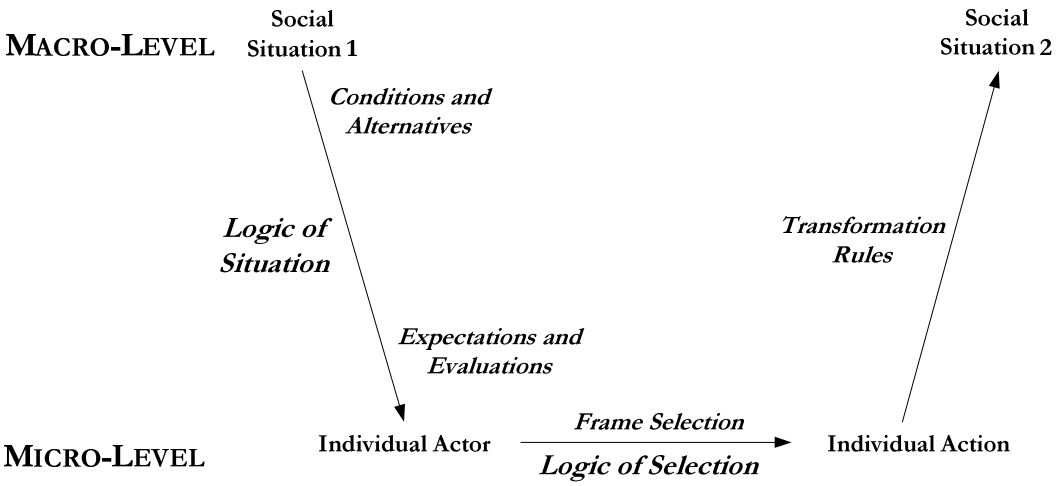

Figure 1: General model of sociological explanations. Source: Esser (1993)

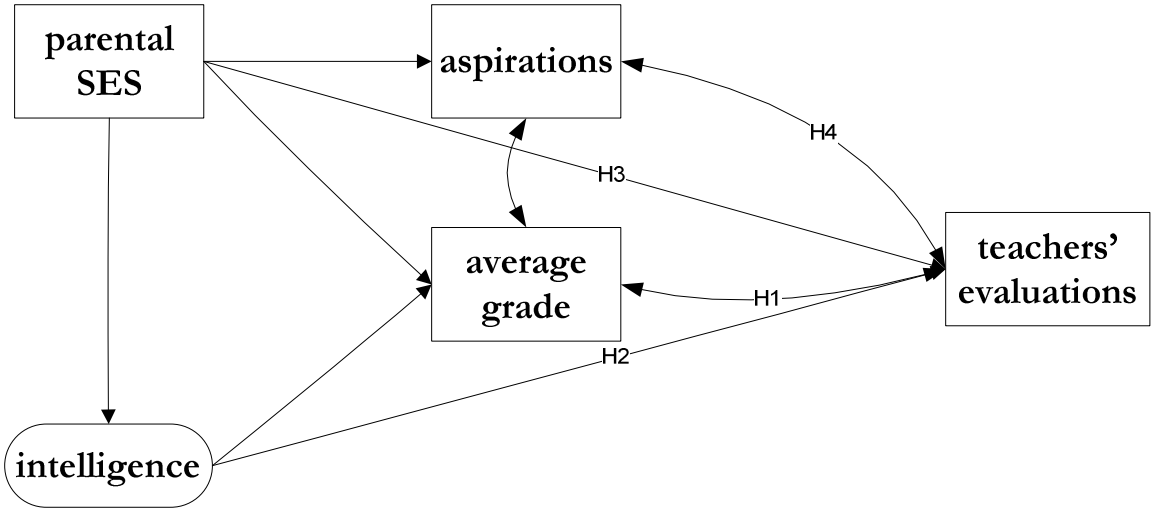

Figure 2: Preliminary path model

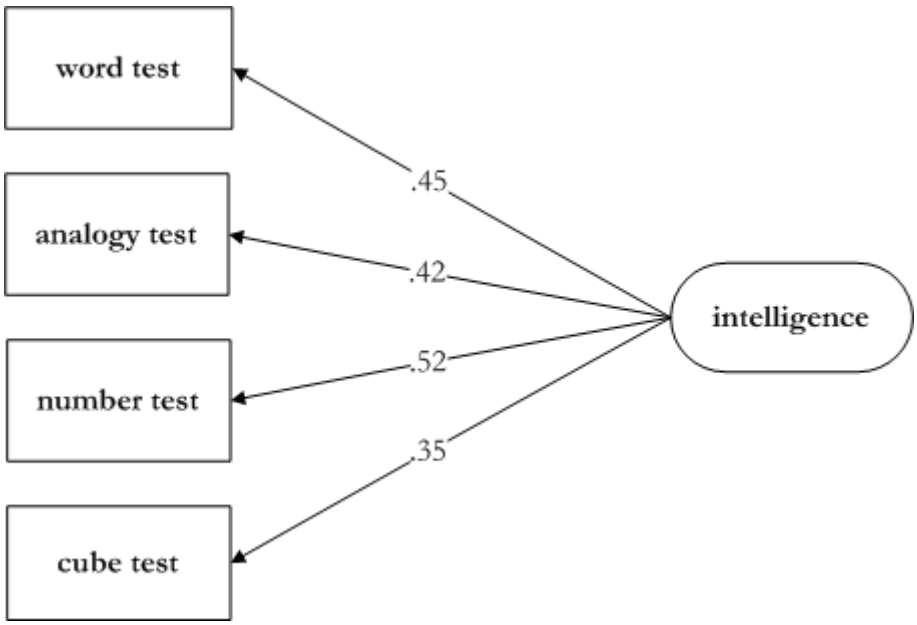

Figure 3: IST Measurement Model

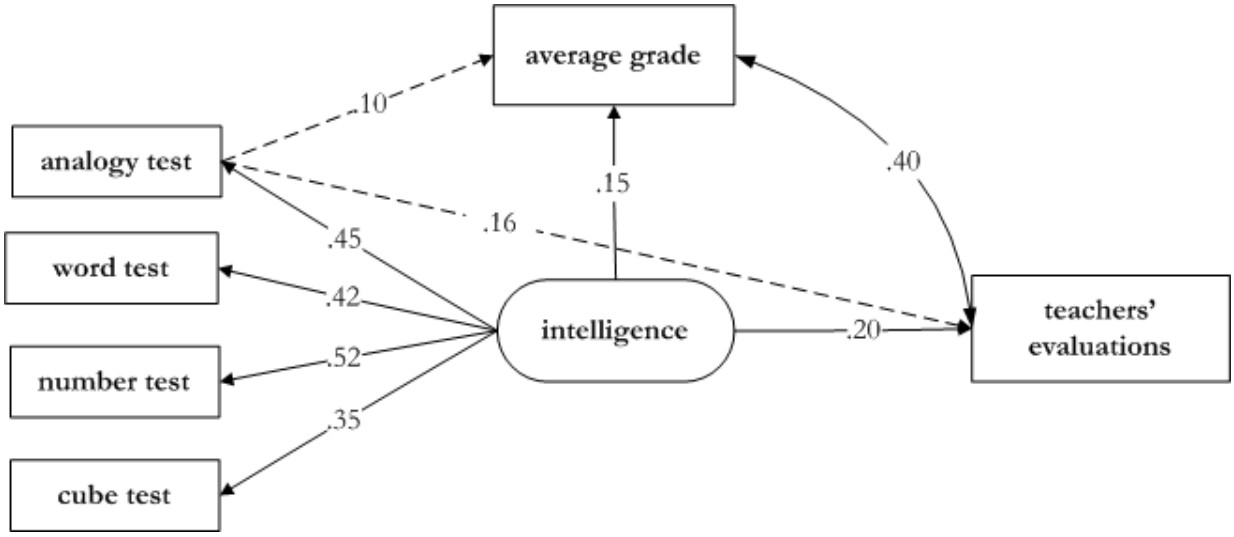

Figure 4: Performance Model

Table 1: Performance Models: Fit Measures

	PERF1	PERF2a	PERF2b	PERF2c	PERF2d
χ^2	*<.001*	*172.03*	*138.02*	*28.015*	*8.85*
DF	*1*	*10*	*9*	*7*	*6*
$p(>\chi^2)$	*1*	*<.001*	*<.001*	*<.001*	*0.182*
AGFI	*1*	*0.967*	*0.970*	*0.992*	*0.997*
RMSEA	*0*	*0.069*	*0.065*	*0.03*	*0.012*
CFI	*1*	*0.912*	*0.930*	*0.989*	*0.998*
SRMR	*0*	*0.061*	*0.058*	*0.018*	*0.009*

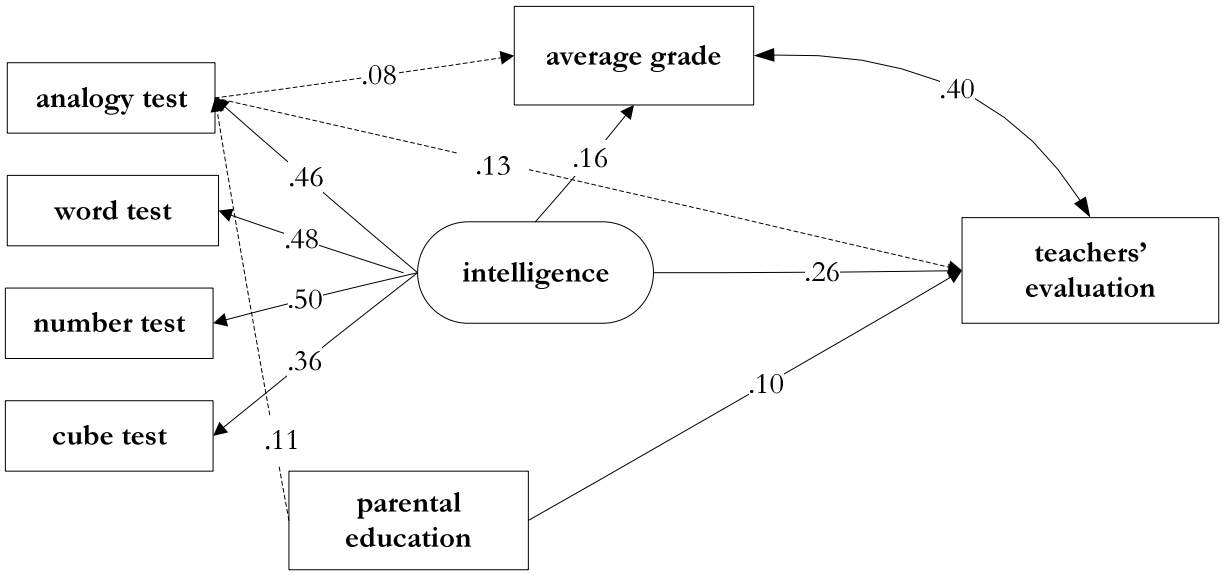

Figure 5: SES Model

Table 2: SES Models: Fit Measures

	SES1	SES2	SES3	SES4	SES5	SES6	SES7
χ^2	1563.1	78.17	69.152	69.394	75.486	38.477	22.746
DF	19	18	16	17	18	17	11
$p(>\chi^2)$	<.001	<.001	<.001	<.001	<.001	0.002	0.019
AGFI	0.835	0.989	0.989	0.989	0.989	0.994	0.995
RMSEA	0.155	0.031	0.031	0.030	0.031	0.019	0.018
CFI	0.556	0.983	0.985	0.985	0.983	0.994	0.994
SRMR	0.103	0.026	0.022	0.022	0.023	0.015	0.013

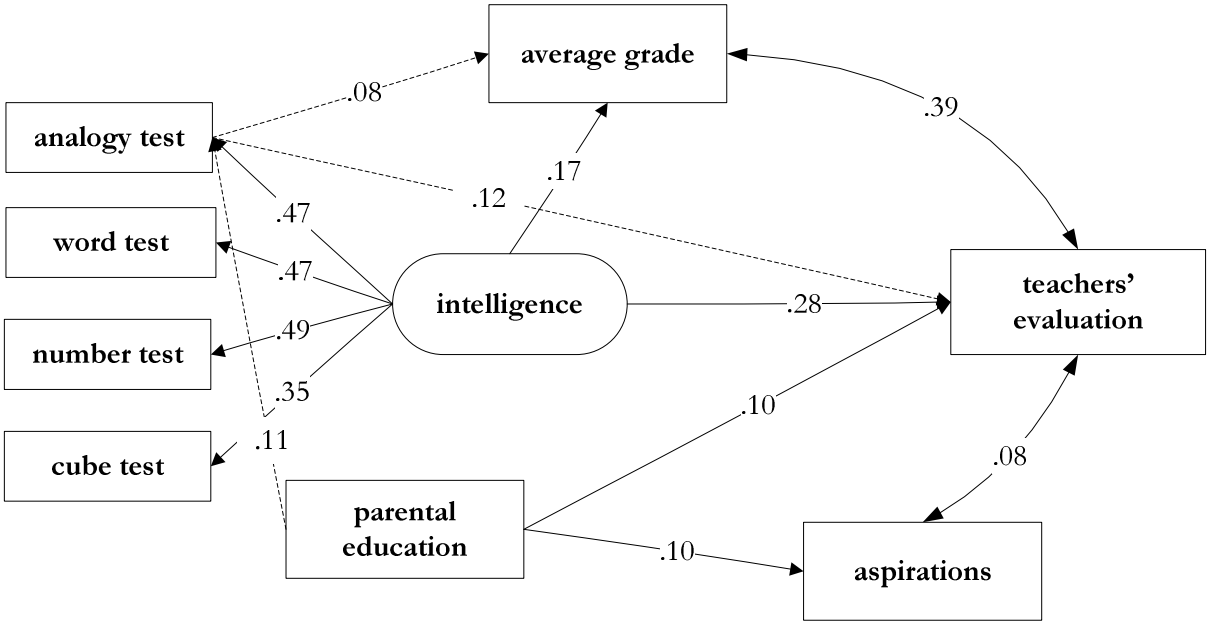

Figure 6: Aspiration Model

Table 3: Aspiration Models: Fit Measures

	ASP1	ASP2	ASP3
χ^2	102.11	70,197	33,417
DF	28	28	28
$p(>\chi^2)$	<.001	<.001	0.007
AGFI	0,985	0,989	0,995
RMSEA	0,037	0,030	0,018
CFI	0,959	0,974	0,992
SRMR	0,033	0,028	0,016

Tables and Figures (Appendix)

Table A: Descriptive Results

	valid	mean	stdev	min	max
Teachers' evaluations 1 'not able' 2 'not mentioned 3 'able'	2427	2.06	0.75	1	3
Sex 1 'male' 2 'female'	3385	1.47	0.5	1	2
Intelligence scores (global index)	3230	110.45	11.35	76	151
Analogy Test	3230	111.66	11.66	77	152
Analogy test (dichotomized) 0 'below median' 1 'above median'	3230	0.5	0.5	0	1
Word test	3230	106.39	10.53	70	138
Word test (dichotomized) 0 'below median' 1 'above median'	3230	0.48	0.5	0	1
Number test	3230	106.82	10.93	80	147
Number test (dichotomized) 0 'below median' 1 'above median'	3230	0.45	0.5	0	1
Cube test	3230	103.21	10.76	73	140
Cube test (dichotomized) 0 'below median' 1 'above median'	3230	0.47	0.5	0	1
Average grade	3227	499.98	69.22	221	703
Average grade (dichotomized) 0 'above median' 1 'below median'	3227	0.5	0.5	0	1
Parental education (highest) 1 'lower' 2 'middle; 3' Abitur' 4 'degree'	3374	2.14	1.23	1	4
Occ. prestige (highest)	2687	49.37	12.63	18	78
Occ. prestige (highest, dichotomized) 0 'below median' 1 'above median'	2687	0.47	0.5	0	1
Aspirations 0 'no aim in life / Abitur not necessary' 1 'Abitur useful or necessary'	3225	2.92	1.18	1	4

Table B: Logistic Regression: able vs. not able

	Performance Model 1	Performance Model 2	SES Model	Aspiration Model
	Exp(b/z)	Exp(b/z)	Exp(b/z)	Exp(b/z)
Constant	1.06	0.57*	0.30***	0.19***
	(0.29)	(-2.41)	(-4.08)	(-5.18)
Sex	0.77*	0.53***	0.54***	0.58***
	(-2.21)	(-4.51)	(-3.79)	(-3.31)
Intelligence	3.04***	2.33***	2.84***	2.79***
	(9.52)	(6.13)	(6.60)	(6.43)
Average grade		12.35***	13.20***	12.93***
		(17.75)	(15.82)	(15.55)
Parental education			1.19*	1.16
			(2.29)	(1.93)
Parental occ. prestige			1.56*	1.59*
			(2.44)	(2.52)
Aspirations				1.90***
				(3.78)
Nagelkerke's R^2	0.1	0.42	0.46	0.47
N	1314	1309	1067	1063

Note: All coefficients are standardized odds ratios. Significance values: * ($p < .05$); ** ($p < .01$); *** ($p < .001$).

Table C: Logistic Regression: able vs. not mentioned

	Performance Model 1	Performance Model 2	SES Model	Aspiration Model
	Exp(b/z)	Exp(b/z)	Exp(b/z)	Exp(b/z)
Constant	0.58***	0.28***	0.15***	0.12***
	(-3.30)	(-6.83)	(-8.15)	(-8.20)
Sex	0.95	0.84	1	1.02
	(-0.56)	(-1.60)	(-0.02)	(0.16)
Intelligence	1.77***	1.56***	1.79***	1.76***
	(5.71)	(4.17)	(4.93)	(4.73)
Average grade		4.56***	4.72***	4.63***
		(13.41)	(12.27)	(12.10)
Parental education			1.15*	1.13*
			(2.41)	(2.19)
Parental occ. prestige			1.07	1.08
			(0.46)	(0.54)
Aspirations				1.27
				(1.79)
Nagelkerke's R^2	0.03	0.17	0.19	0.19
N	1720	1716	1412	1406

Note: All coefficients are standardized odds ratios. Significance values: * ($p < .05$); ** ($p < .01$); *** ($p < .001$).

Table D: Polychoric Correlation Matrix

	teachers' evaluations	intelligence: word test	intelligence: analogy test	intelligence: number test	intelligence: cube test	average grade	max (education)	max (occ. prestige)	aspirations
teachers' evaluations	1	0.15	0.26	0.17	0.1	0.48	0.12	0.11	0.16
intelligence: analogy test	0.15	1	0.24	0.23	0.15	0.1	-0.02	0.03	0.07
intelligence: word test	0.26	0.24	1	0.21	0.16	0.16	0.1	0.07	0.1
intelligence: number test	0.17	0.23	0.21	1	0.2	0.09	-0.04	0	0.06
intelligence: cube test	0.1	0.15	0.16	0.2	1	0.07	0.02	0.02	0.03
average grade	0.48	0.1	0.16	0.09	0.07	1	0.03	0.02	0.07
max(education)	0.12	-0.02	0.1	-0.04	0.02	0.03	1	0.6	0.1
max(occ. prestige)	0.11	0.03	0.07	0	0.02	0.02	0.6	1	0.09
aspirations	0.16	0.07	0.1	0.06	0.03	0.07	0.1	0.09	1

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