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Teacher Expectations: Self-Fulfilling Prophecies, Perceptual Biases, and Accuracy

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Students' performance may confirm teachers' expectations because teacher expectations create self-fulfilling prophecies, create perceptual biases, or accurately predict, without influencing, student performance. Longitudinal data obtained from 27 teachers and 429 students in 6th-grade math classes assessed the extent of self-fulfilling prophecies, perceptual biases, and accuracy. Results revealed modest self-fulfilling-prophecy effects on student achievement and motivation, modest biasing effects on the grades teachers assigned students, and that teacher expectations predicted student performance more because they were accurate than because they caused student performance. These results provide more support for perspectives emphasizing limitations on expectancy effects than for perspectives emphasizing the power of expectancies to create social reality. They also provide more evidence of accuracy in social perception than of error and bias.

Teachers develop clear expectations for the performance of their students early in the year (Brophy, 1983; Brophy & Good, 1974; Rist, 1970). Most students confirm these expectations: Students believed to be high achievers often perform at higher levels than students believed to be low achievers (Brophy & Good, 1974; Crano & Mellon, 1978, Humphreys & Stubbs, 1977; Williams, 1976). In this article, I compare three explanations for why students confirm teachers' expectations: self-fulfilling prophecies, perceptual biases, and accuracy.

Three Sources of Expectancy Confirmation

Teachers' expectations sometimes produce self-fulfilling prophecies: Even when their expectations are initially erroneous, teachers may evoke from students performance levels consistent with those expectations (Brophy & Good, 1974; Jussim, 1986; Rosenthal & Jacobson, 1968). Second, teachers' expectations may lead to perceptual biases: the tendency to interpret, perceive, remember, or explain students' actions in ways consistent with their expectations. This type of expectancy confirmation exists in the teacher's mind rather than in the students' performance (Darley & Fazio, 1980; Miller & Turnbull, 1986). Third, teachers' expectations may accurately predict students' achievement (Brophy, 1983; Hoge, 1984). Accuracy refers to successfully predicting achievement without influencing it.

Although any combination of these three expectancy phenomena may characterize social interaction, social psychological research has focused on self-fulfilling prophecies and perceptual biases. Consequently, theoretical approaches to expectancies emphasize their power to create reality and have almost completely ignored accuracy (Darley & Fazio, 1980; E. E. Jones, 1986; R. A. Jones, 1977; Miller & Turnbull, 1986; Snyder, 1984). Social psychological theorizing has generally emphasized error and bias in person perception and social judgment processes (e.g., Crocker, 1981; Kahneman & Tversky, 1973; Markus & Zajonc, 1985; Nisbett & Ross, 1980), although some theorists have suggested that accuracy characterizes much natural social perception (Funder, 1987; Hogarth, 1981; McArthur & Baron, 1983). In contrast, most educational researchers emphasize the accuracy of naturally occurring teacher expectations rather than their ability to create self-fulfilling prophecies, but ignore perceptual biases (Brophy, 1983; Cooper, 1979; Dusek, 1975; Meyer, 1985; West & Anderson, 1976).

Previous research has generally investigated only one of these sources of expectancy confirmation at a time (e.g., Darley & Gross, 1983; Funder, 1987; Kelley, 1950; Kenny & Albright, 1987; Rosenthal & Jacobson, 1968; Snyder, Tanke, & Berscheid, 1977). Consequently, the extant evidence does not identify which source of expectancy confirmation typically dominates social interaction. This study addresses this limitation by assessing the extent to which naturally occurring teacher expectations create self-fulfilling prophecies, create perceptual biases, or accurately predict student achievement.

Identifying Self-Fulfilling Prophecies

Teachers' expectations must change students' performance in order to interpret expectancy–behavior associations as evidence

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for self-fulfilling prophecies. This is not a problem when expectations are experimentally manipulated. Experiments generally show that if teachers (or other perceivers) develop erroneous expectations, self-fulfilling prophecies may result (e.g., Eden & Shani, 1982; Rosenthal & Jacobson, 1968; Snyder et al., 1977). However, accurate expectations do not create self-fulfilling prophecies. Therefore, experimental studies that involve induction of erroneous expectations provide little information regarding the extent to which natural expectations create reality.

These concerns have led to investigations of natural teacher-expectation effects, using a variety of correlational techniques (e.g., Brattesani, Weinstein, & Marshall, 1984; Crano & Mellon, 1978; Humphreys & Stubbs, 1977; Parsons, Kaczala, & Meece, 1982; West & Anderson, 1976; Williams, 1976). Unfortunately, it is difficult to identify causality by using correlational data so that many naturalistic findings interpreted as self-fulfilling prophecy may often be reinterpreted as accuracy (Brophy, 1983). For example, two studies finding that teacher expectations predicted student achievement, even after controlling for prior achievement (Brattesani et al., 1984; Williams, 1976), assessed teacher expectations late in the school year. When teachers have had several months to observe students, they may clearly perceive just how students' current achievement differs from past achievement. Thus, such findings may represent accuracy rather than self-fulfilling prophecy.

Three conditions are necessary for identifying naturally occurring self-fulfilling prophecies: (a) Teachers' expectations must be positively associated with student achievement, (b) such associations must not result from accuracy, and (c) teachers must not be responsible for judging students' behavior. Researchers have often assessed relations between teacher expectations and student achievement, controlling for students' previous achievement test scores (e.g., Brattesani et al., 1984; Crano & Mellon, 1978; Humphreys & Stubbs, 1977; West & Anderson, 1976). However, even predicting changes in student performance may represent accuracy rather than self-fulfilling prophecy (see Accuracy section). Therefore, the accuracy explanation must be eliminated.

A final condition for identifying self-fulfilling prophecies is that the sole measure of student performance cannot be grades. Teacher expectations may predict grades even when controlling for past achievement because they lead to biased evaluations of students' performance, not because they have influenced how much students have accomplished (Darley & Fazio, 1980; Darley & Gross, 1983; Finn, 1972; Jussim, 1986; Miller & Turnbull, 1986).

Identifying Perceptual Biases

Expectations may lead to cognitive biases that serve to maintain those expectations in the absence of supporting evidence. However, there is currently little evidence regarding the extent of perceptual biases in the classroom. Identifying perceptual biases under natural conditions involves difficulties similar to those involved in assessing self-fulfilling prophecies. Correlations between teachers' expectations and their judgments of students are uninformative; they may represent perceptual biases, but they may also represent self-fulfilling prophecy or accuracy.

Perceptual biases can be identified in naturalistic situations if certain conditions are met. The occurrence of a perceptual bias means that teachers view students as performing more consistently with their expectations than is warranted on the basis of students' achievement. Therefore, teachers' expectations should correlate more strongly with their own judgments of students' performance (e.g., grades) than with independent assessments (e.g., standardized test scores). This would represent a perceptual bias if this stronger association between expectation and judgment does not result from teachers being more accurate at predicting in-class performance than performance on the independently assessed criterion.

Identifying Accuracy

Students may also confirm teachers' expectations because those expectations were accurate. Even findings often interpreted as self-fulfilling prophecy, such as teacher expectations predicting changes in student performance (e.g., Brattesani et al., 1984; Crano & Mellon, 1978; West & Anderson, 1976; Williams, 1976), may instead represent accuracy. The baseline measure in many of these studies is a single standardized test. Standardized achievement tests constitute samples of student achievement and therefore are subject to sampling errors; they are also subject to measurement error (Brophy, 1983). Consequently, students' true competence levels may often be different than is indicated by a single standardized achievement test.

Similar interpretation ambiguities occur in studies measuring teacher expectations late in the year (e.g., Brattesani et al., 1984; Williams, 1976). After teachers have had an extended period to observe students, they may predict changes in achievement (from the previous year) not because they created those changes, but because they astutely observed discrepancies between current and past performance.

Another way in which teachers might accurately predict changes in student achievement is by incorporating student motivation into their expectancies. The relations between teachers' expectations and students' motivation and performance that have been found in some studies (e.g., Brattesani et al., 1984; Parsons et al., 1982) may be spurious, reflecting the influence of prior student motivation on both factors. Therefore, at least part of the association of teacher expectations with student achievement may often represent accuracy.

Distinguishing accuracy from self-fulfilling prophecy involves two conceptually different aspects of accuracy. The first concerns the bases of teachers' expectations. Expectations based on more valid information can be considered more accurate than those based on less valid information. Teacher expectations based on previous grades are more accurate than those based on, for example, shoe size, physical attractiveness, or erroneous test scores. However, even expectations based on valid indicators of past behavior often inaccurately predict future behavior (Kahneman & Tversky, 1973). Consequently, the second aspect of accuracy involves determining to what extent expectations predict students' performance without causing it.

Hypotheses and Overview

Self-fulfilling prophecies, perceptual biases, and accuracy may all characterize the relations between teachers' expecta-

tions and students' achievement. Because this study uses naturalistic data and correlational methods, hypotheses are phrased in terms of some variables "predicting" rather than "causing" other variables. The self-fulfilling prophecy hypothesis suggests that teachers' expectations predict students' future achievement, even after controlling for students' prior achievement. The perceptual bias hypothesis suggests that teachers' expectations predict their own judgments of students' achievement (i.e., grades) more than they predict independent assessments of students' achievement (standardized test scores). There are two sets of accuracy hypotheses: (a) students' prior achievement and motivation predict teachers' expectations, and (b) teachers' expectations correlate with students' future achievement at least partially because they are based on valid predictors of student achievement; controlling for those valid predictors substantially reduces the correlation of teacher expectations with student achievement.

I tested these hypotheses by using longitudinal data obtained from teachers and students in sixth-grade math classes. Several steps were taken to separate and identify self-fulfilling prophecies, perceptual biases, and accuracy. First, previous performance was controlled through both standardized test scores and grades, thereby providing a better estimate of past achievement. Second, teacher expectations were assessed early in the year, rendering teachers less likely to predict student achievement on the basis of accurate identification of discrepancies from past performance. Third, several motivational variables were assessed and controlled: self-concept of ability, effort, time on homework, and intrinsic and extrinsic value placed on math. Fourth, both grades and standardized test scores served as measures of subsequent performance, allowing comparisons between teachers' judgment and an objective assessment of students' performance.

Figure 1 presents the conceptual model underlying this study. This model asserts that (a) teachers' expectations early in the year are based on students' previous achievement and motivation, (b) teachers' expectations and students' motivation early in the year influence students' motivation late in the year, and (c) teachers' expectations, students' motivation, and students' previous achievement influence students' subsequent achievement.

Method

Sample

This study was conducted with a sample of students and teachers in sixth-grade math classes in a public school district in southeastern Michigan. This sample included all 27 sixth-grade math teachers in this district and 91.5% of the 634 sixth-grade students (N = 580). This district was largely composed of middle- and upper-middle-class households, and more than 90% of the sixth graders sampled were White. Although 580 sixth graders were sampled, only 429 had valid data on all variables used in the main analyses. Much of this attrition occurred because some students were not in this school district prior to sixth grade or had left the district by seventh grade. This accounted for 151 of the 181 students not included in the main analyses. Preliminary analyses revealed few differences between included and excluded students.

Questionnaires

Early in the year, teachers evaluated each student in their class on a variety of dimensions. Included in the current study were teachers' assessments of each students' talent, effort, and performance in math, the three teacher expectation variables used in this research.[1] Questionnaires also assessed students' beliefs, perceptions, and feelings in a variety of domains. Included in the current study were questions on students' self-concept of ability in math, their effort in math, the time they spend on math homework, and the value they place on math. Eccles (Parsons), Adler, and Meece (1984, Table 1), Jussim (1987), and Parsons (1980) provide more detailed information regarding these measures.

Measures of Student Achievement

Two measures of students' prior math achievement were obtained: final marks in fifth-grade math classes and scores on the math section of a standardized achievement test taken in the first week of sixth grade (the California Achievement Test, or CAT). This is a highly reliable standardized test, and it has been widely used in various forms for about 50 years. There were also two measures of final achievement: final marks in sixth-grade math classes and scores on the math section of the Michigan Educational Assessment Program (MEAP). The MEAP has been widely used in Michigan since the early 1970s and is administered in October to all seventh-grade classes in Michigan public schools. These measures are presented in Table 1.

Results

Initial Analyses

Path analytic techniques assessed relations among teacher expectations, student achievement, and student motivation. I performed all path analyses by using LISREL VI (Joreskog & Sorbom, 1983). All path coefficients reported in this article may be interpreted identically to standardized betas from a regression equation.

Although the three teacher expectation variables were conceptualized as separate aspects of teacher expectations (i.e., perceptions of performance, perceptions of talent, and perceptions of effort), models assessing alternative conceptualizations of the teacher expectation variables were also estimated. One such model assumed that the three teacher expectation variables represented observed indicators of an underlying teacher expectation factor. Another proposed that teacher perceptions of performance, talent, and effort caused an unobserved teacher expectation factor. In addition to having serious theoretical weaknesses (see Jussim, 1987), these alternative conceptualizations of the teacher expectation variables never fit the data well (all χ^2s were significant below .05) and were therefore abandoned.

Initial analyses also revealed that neither extrinsic nor intrinsic value placed on math was involved in the teacher expectation process in any way. Consequently, these variables are not discussed further.

Self-concept of ability was the only remaining variable with two indicators: Students indicated how good they felt they were at math and how they ranked themselves in comparison to other students in their math class. Because the other variables have only single indicators, measurement error is estimated and re-

[1] Because there are many students in each class, teacher expectations are not independent of one another. However, analyses controlling for between-teachers differences (by creating dummy variables for each teacher) did not substantially alter the findings presented in the results.

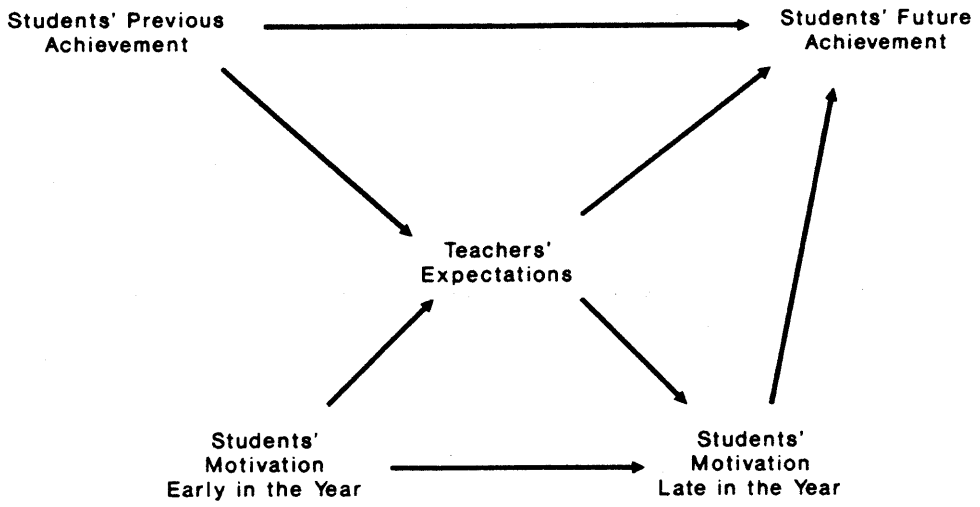

Figure 1. Conceptual model of relations among teacher expectations, student motivation, and student achievement.

moved only for self-concept of ability. The obtained path coefficients are similar to those obtained through multiple regression. The use of single items for most variables represents an important limitation to this research: the extent to which measurement error influenced results is unknown.

Initial analyses allowed (a) all variables that temporally preceded each dependent variable to predict that dependent variable,[2] and (b) correlations among the residuals of all dependent variables in each model. Results for all models were obtained after dropping nonsignificant relations. Nonetheless, the coefficients and the R^2s presented in the next section were nearly identical to those obtained in models including nonsignificant paths (see Jussim, 1987, for more detail regarding the models and the means, standard deviations, and intercorrelations among the variables).

Table 1
Conceptual Variables and Operational Measures

Past performance	Motivation	Teachers' expectations	Future achievement
CAT math scores[a]	Self-concept of math ability[b,c]	Perceptions of math performance[d]	MEAP math scores[e]
Final math marks in fifth grade	Effort in math[c]	Perceptions of math talent[d]	Final math marks in sixth grade
	Time spent on math homework[c]	Perceptions of effort in math[d]	
	Intrinsic and extrinsic value of math[c]		

[a] The CAT (California Achievement Test) is a standardized achievement test taken in the first week of sixth grade.
[b] Self-concept of ability was conceptualized as a latent variable with two indicators: how good students think they are at math and how good they think they are in comparison to other students (see Jussim, 1987, for more detail about the measurement model).
[c] The motivational variables were assessed twice: once in October and again in late March or early April.
[d] All teacher expectation variables were assessed in October, within a few days after the assessment of student motivation.
[e] The MEAP (Michigan Educational Assessment Program) is a standardized test taken in October of seventh grade.

Self-Fulfilling Prophecies

Effects of Teacher Expectations on Student Achievement

The first analyses identified the extent to which teacher expectations predicted student achievement after controlling for students' previous levels of achievement and their motivation. Figure 2 depicts all significant predictors of students' marks and MEAP scores.[3] Consistent with the self-fulfilling prophecy hypothesis, teacher perceptions of talent predicted both final grades ($\beta = 0.12$, $p < .01$) and MEAP scores ($\beta = 0.17$, $p < .0001$). Even when their previous achievement (as indicated by fifth-grade marks and CAT scores) and their motivation were similar (in terms of self-concept of ability, effort, time on homework, and value placed on math), high-expectancy students re-

[2] There was one exception: Final sixth-grade marks were not allowed to predict MEAP scores. Both variables are outcome measures, so that the question addressed in these models is "how much do teacher expectations predict changes in future grades and standardized test scores?" Thus, fifth-grade final marks and sixth-grade CAT scores are used as controls for both sixth-grade marks and seventh-grade MEAP scores.

[3] Causal relations among the predictor variables are not presented in Figures 2, 3, and 4 because (a) they are irrelevant with respect to identifying the effects of those predictors on the dependent variables (see, e.g., Pedhazur, 1982), and (b) they would needlessly complicate and duplicate presentation of the results. Nonetheless, the results of the path analyses presented in Figures 2, 3, and 4 are virtually identical to those obtained when all causal paths in all three models were simultaneously estimated.

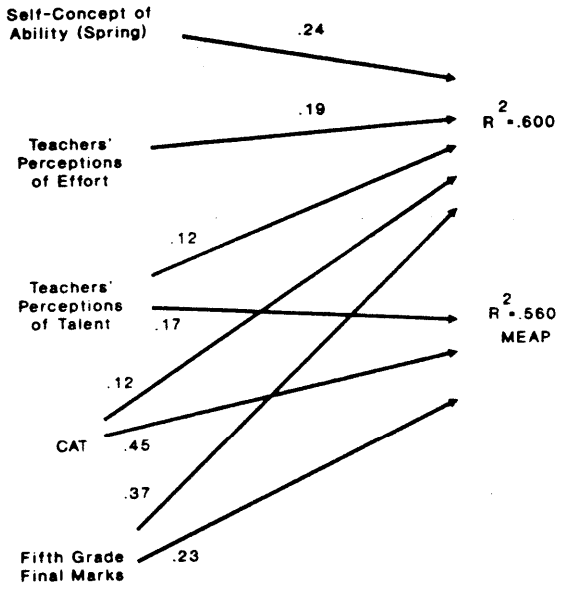

Figure 2. Influences of teacher expectations on student achievement. (All coefficients are standardized and significant below .05. CAT and MEAP refer to scores on the math sections of the California Achievement Test and Michigan Educational Assessment Program, respectively.)

ceived higher grades and standardized test scores than did low-expectancy students. Of course, as with all path analytic studies, this support for the self-fulfilling prophecy hypothesis must be interpreted cautiously: Although many plausible predictors were controlled for in this study, it is impossible to be certain all relevant variables were controlled for.

Effects of Teacher Expectations on Student Motivation

The next set of analyses assessed the hypothesis that teacher expectations have self-fulfilling effects on student motivation. Addressing this question involved determining whether teacher expectations predicted changes in student motivation. Figure 3 depicts the specific results. Four variables—teacher perceptions of talent and effort and student effort and time on homework—were included in the analysis, but are not presented in Figure 3 because they were not involved in any meaningful relations.

The only evidence of self-fulfilling effects of teacher expectations on student motivation was an effect of teacher perceptions of student performance on students' self-concept of ability (β = 0.11, $p < .05$). Students perceived as performing highly early in the year increased their self-concepts of math ability by the end of the year.

Student Motivational Mediation of Self-Fulfilling Prophecies

Although these results provided support for the self-fulfilling effects of teacher expectations on student motivation and performance, they provided little evidence that student motivation mediated self-fulfilling prophecies. There were no significant effects on performance of any of the student motivational variables, with the exception of an effect of student self-concept of ability on grades. Because the self-fulfilling effect of teacher perceptions of performance on student self-concept of ability was only .11, the indirect effect of teacher perceptions of performance was only .03.[4]

Perceptual Biases

I also hypothesized that teachers' expectations would influence their judgments of students' performance. Such biases would affect the grades teachers assign without influencing students' scores on objective standardized tests such as the MEAP. The results presented in Figure 2 are consistent with the occurrence of biased grading for teacher perceptions of effort, which predicted final marks (β = 0.19, $p < .0001$), but not MEAP scores ($\beta = -0.005$). The difference between the two coefficients is significant ($Z = 2.15$, $p < .04$). In comparison to students whom teachers believed to be lazy, those whom teachers believed to try hard received higher grades, but not higher standardized test scores. Results provided no evidence that teachers' perceptions of students' performance or talent biased students' grades.

This pattern, however, does not necessarily mean that teachers' perceptions of students' effort biased their evaluation of students' performance. Perhaps teachers intentionally used grades as a way of rewarding hard-working students or as a way of punishing lazy students. To assess this alternative, it is necessary to identify the bases of teachers' expectations.

Accuracy

Bases of Teachers' Expectations

Teachers' expectations may be based on students' previous achievement and motivation. The model depicted in Figure 4 also assumes causal relations among the three teacher expectation variables. Because they are usually difficult to observe directly, one person's judgments of another's effort and ability must usually depend on observable behaviors believed to be related to effort and ability. Performance is one such directly observable behavior (e.g., Heider, 1958; Nicholls, 1979; Weiner, 1979), so that teachers' perceptions of students' talent and effort were assumed to be based, in part, on their own perceptions of students' performance. Models assuming opposite relations (i.e., perceptions of performance depending on perceptions of

[4] Variables can have direct effects or indirect effects on each other. Direct effects refer to unmediated causal impact of one variable on another and are represented by path coefficients. Sometimes, however, all or part of one variable's causal impact on a second variable is mediated by a third variable. Teachers' perceptions of performance had a direct effect on students' self-concept of ability (β = 0.11; see Figure 3), and self-concept of ability had a direct effect on grades (β = 0.24; see Figure 2). The indirect effect of teachers' perceptions of performance on grades, as mediated by students' self-concept of ability, is the product of the two direct effects (.11 times .24 = .03). The total effect of a variable is the sum of its direct and indirect effects (this is used more extensively in later sections). For a more detailed discussion of direct, indirect, and total effects, see, for example, Alwin and Hauser (1975), Duncan (1975), or Pedhazur (1982).

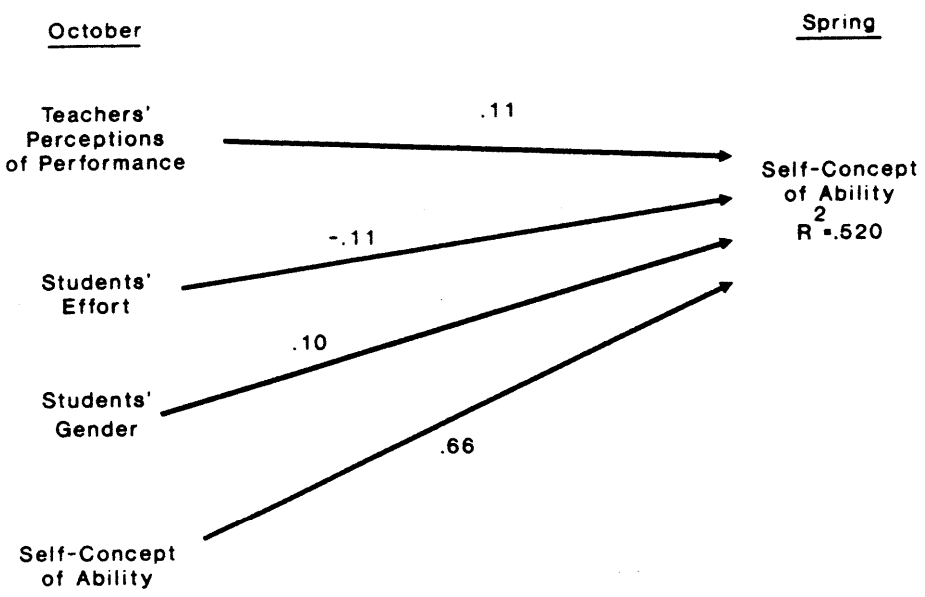

Figure 3. Effects on students' self-concept of ability. (All paths are standardized and significant below .05. Students' effort is self-reported.)

effort and talent) and reciprocal relations failed to fit the data, or revealed that the influence of perceptions of talent and effort on perceptions of performance were not statistically significant.

Teacher perceptions of effort. These analyses can contribute to understanding the nature of the effect of teacher perceptions of effort on grades. If teacher perceptions of student effort were accurate, they would be based on the effort students exerted. In contrast, if teacher perceptions of student effort were inaccurate, their effect on grades would represent clear evidence of bias.

Results indicated that the largest influence on perceptions of effort was teachers' own perceptions of students' performance ($\beta = 0.59, p < .0001$). The next strongest effect was for students' gender: Teachers assumed girls tried harder than boys ($\beta = -0.15, p < .0001$; girls were coded as *1* and boys as *2*). Teachers also used final marks from fifth grade as a basis for inferring students' effort ($\beta = 0.11, p < .01$).

There were weak relations between the two student-effort variables and teacher perceptions of effort. Although students' effort levels significantly predicted teachers' perceptions of effort, this effect was quite small ($\beta = 0.08, p < .05$). Moreover, the amount of time students spent on homework was slightly but significantly negatively related to teachers' perceptions of effort ($\beta = -0.08, p < .05$): The more time students claimed to spend on homework, the less effort teachers believed they exerted. Internal analyses found no evidence that these small relations resulted from lack of variability, unreliability, or invalidity among the effort variables (see Jussim, 1987, for more detail).

Teacher perceptions of performance and talent. The accuracy of the bases of teachers' perceptions of students' performance and talent was also examined. To be accurate, teacher perceptions of student performance should be largely based on valid indicators of student performance (this includes previous performance and self-concept of ability). Consistent with the accuracy hypothesis, teachers' perceptions of students' performance were predicted by CAT scores ($\beta = 0.24, p < .0001$), final marks in fifth grade ($\beta = 0.20, p < .0001$), and students' self-concept of ability ($\beta = 0.30, p < .0001$). Teachers also perceived girls as performing slightly higher than boys ($\beta = -0.07, p < .1$).

Because talent is not directly observable, it must be inferred on the basis of related observable behaviors. Performance in a wide variety of situations provides one such observable basis. Therefore, accurate perceptions of student talent should be largely based on a variety of students' previous performances (in the current study, this would include teachers' perceptions of students' performance in their classes, CAT scores, and previous grades). Consistent with the accuracy hypothesis, perceptions of talent were based on teachers' own perceptions of students' performance ($\beta = 0.56, p < .0001$) and CAT scores ($\beta = 0.29, p < .0001$). The effect of previous grades was marginal ($\beta = 0.08, p < .10$). There was also a slight tendency for teachers to perceive students who tried harder as being less talented ($\beta = -0.06, p < .1$).

Teacher Expectations as Predictions for Future Achievement

The second aspect of accuracy concerns teacher expectations predicting without influencing student achievement. The extent to which the zero-order correlations between teacher expectations and future student achievement are reduced when the factors predicting both are controlled represents this second aspect of accuracy. Correlations of the teacher expectation variables with the measures of student achievement ranged from about .3 to .6, and the multiple correlations obtained when all three teacher expectation variables are used together are both around .6 (see Table 2).

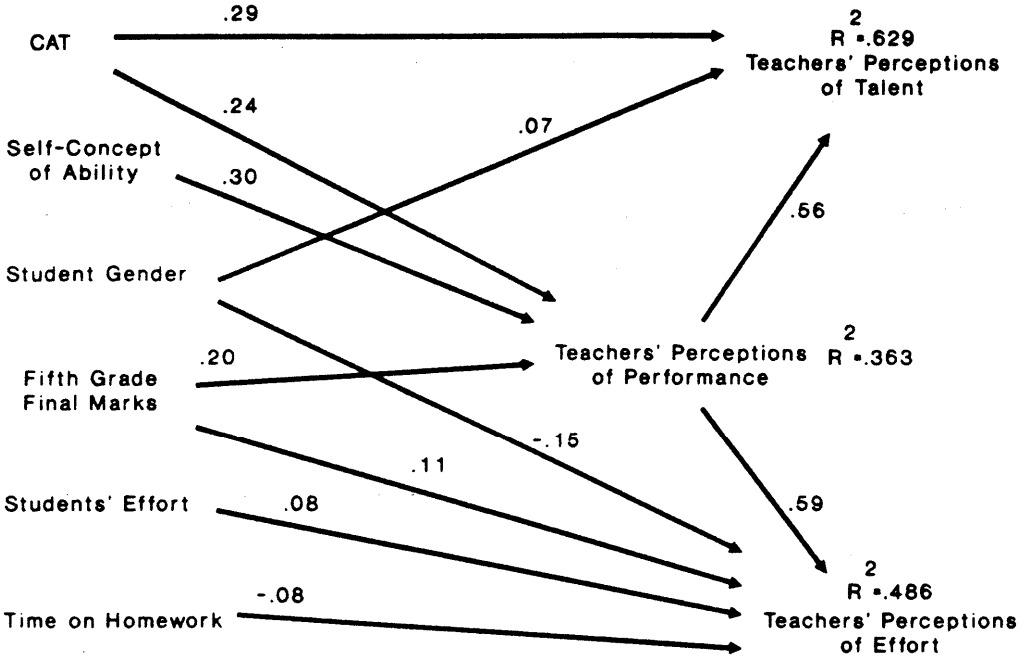

Figure 4. Bases of teachers' expectations. (All paths are standardized and significant below .05. The three student-motivation variables—self-concept of ability, effort, and time on homework—were assessed in October, shortly before the assessment of the three teacher-expectation variables. CAT refers to math scores on the California Achievement Test. Students' effort and time on homework are self-reports.)

Distinguishing accuracy from influence involves subtracting the total effects of expectancies from their overall predictive validities. Thus, the relation between teacher perceptions of talent and grades was reduced from .57 to .12, the relation between teacher perceptions of talent and MEAP scores was reduced from .57 to .17, the relation between teacher perceptions of effort and grades was reduced from .50 to .19, and the relation between teacher perceptions of effort and MEAP scores was reduced from .34 to 0 (compare the correlations in Table 2 with the path coefficients in Figure 2).

Teacher perceptions of performance had no direct effects on achievement, but they did have indirect effects mediated by students' self-concept of ability and teacher perceptions of effort and talent (see Figures 2 and 3). The indirect effect was .21 on grades and .10 on MEAP scores. Thus, the relation between teacher perceptions of performance and grades was reduced from .54 to .21, and the relation between teacher perceptions of performance and MEAP scores was reduced from .46 to .10.

Semipartial correlations (Pedhazur, 1982) were used to assess the multiple correlation of teacher expectations with student achievement, after removing effects of previous achievement and motivation. This analysis showed that the multiple correlations between teacher expectations and student achievement were reduced from .63 to .21 for grades and from .57 to .13 for MEAP scores. These reductions from the zero-order correlations represent strong support for the accuracy hypothesis.

Table 2
Correlations Among Teacher Expectations and Student Achievement

Student achievement	Teachers' perceptions of performance	Teachers' perceptions of talent	Teachers' perceptions of effort	*R*
MEAP	.46	.57	.34	.57
Sixth grade final marks	.54	.57	.50	.63

MEAP = Michigan Educational Assessment Program.
Note. All correlations are significant below .0001.

Discussion

This research provides a more comprehensive picture of the relations between teachers' expectations and students' motivation and achievement. Results were consistent with the occurrence of modest-sized self-fulfilling prophecies and perceptual biases and also demonstrated both accuracy and inaccuracy in teachers' impressions of students. These findings and their implications for understanding expectancy effects and social perception are discussed in the following section.

Self-Fulfilling Prophecies

Performance

What accounts for results indicating that teachers' perceptions of talent had the only direct self-fulfilling effects on student achievement? People often consider ability (analogous to talent)

to be quite stable (Dweck & Elliot, 1984; Eccles & Wigfield, 1985; Weiner, 1979). Furthermore, expectations based on stable factors may be less likely to change when confronted with some disconfirming evidence and, therefore, may be more likely to evoke consistent differential treatment of highs and lows (Jussim, 1986). Thus, inferences regarding talent may lead to expectations likely to produce self-fulfilling prophecies.

This perspective may help explain why teacher perceptions of performance had only an indirect self-fulfilling effect mediated by perceptions of talent. Past performance has little predictive value except to the extent that it is based on stable factors (e.g., Dweck & Elliott, 1984; Weiner, 1979). Perceptions of performance will influence expectations for future performance primarily to the extent that teachers believe the factors affecting past performance will remain constant in the future. Because it is viewed as being stable, talent has clear implications for predictions of future performance. Therefore, perceptions of performance would have minimal self-fulfilling effects on achievement, except as mediated by their effects on inferences of talent.

Motivation

This research provided two main findings regarding teacher expectations and student motivation: (a) teachers' perceptions of performance had a self-fulfilling effect on students' self-concept of ability, and (b) motivation did not mediate effects of teachers' expectations on students' performance. These findings are consistent with previous research showing that teacher expectations predict both future performance and motivation, even when controlling for past performance (e.g., Brattesani et al., 1984; Parsons et al., 1982). They fail to support, however, perspectives proposing that student motivation mediates self-fulfilling prophecies (Brattesani et al., 1984; Eccles & Wigfield, 1985; Jussim, 1986).

What explains the pattern of relations among teacher expectations and student motivation? Why was perception of performance the only teacher-expectation variable to influence students' self-concept of ability? Of the three teacher-expectation variables, perceptions of performance seem most likely to be directly communicated to students. Although teachers may occasionally comment on students' talent or effort, they frequently present students with performance evaluations through grades and written and verbal comments.

Consistent with this perspective, teachers provide more positive and less negative feedback to high-expectancy students, even controlling for their objective performance (e.g., Brophy & Good, 1970; Cooper, 1977; Finn, 1972; Rosenthal, 1974). Furthermore, feedback may be most likely to influence motivation (Braun, 1976; Cooper, 1979; Weinstein, 1985). Therefore, it seems likely that teachers' perceptions of students' performance affect the feedback they provide, which in turn affects students' self-concept of ability.

Nonmotivational Explanation

There is a nonmotivational explanation for teacher-expectation effects. Perhaps teacher perceptions of talent affected how much students learned without affecting their motivation (Jussim, 1986). The factors Rosenthal (1974) referred to as *input* and *climate* may be most likely to lead to nonmotivationally mediated self-fulfilling prophecies. Teachers provide more emotional support to, lavish more time and attention on, and teach more material to high-expectancy students (Brophy & Good, 1974; Harris & Rosenthal, 1985; Jussim, 1986; Rosenthal, 1974). Students who receive more support and are taught more may simply learn more, thereby leading to higher achievement. The input and climate factors are generally the most powerful mediators of teacher expectation effects (Harris & Rosenthal, 1985), but whether such effects occur as a result of changes in student motivation or by directly affecting learning remains an important question for future research.

Qualifications and Limitations

Several important limitations qualify the insights this study provides into self-fulfilling prophecies. First, the correlational nature of the study leaves open alternative explanations. Although a reverse causal direction is not plausible—for example, final marks in sixth grade did not cause teacher expectations at the beginning of sixth grade—accuracy cannot be eliminated conclusively as an alternative to the self-fulfilling prophecy interpretation.

The accuracy explanation is the current study's version of the methodological difficulty characterizing nearly all research using path analytic techniques: The direct effects of one variable on another (e.g., of teacher expectations on student performance) represent causal influences only if one can assume that there are no other variables causing them both. Perhaps teachers used some type(s) of information not included in this study that enabled them to predict student performance beyond levels accounted for by students' prior grades, standardized test scores, self-concept of ability, time on spent on homework, effort, and intrinsic and extrinsic value placed on math.

Correlational designs never completely eliminate accuracy as an alternative to self-fulfilling prophecy effects, because no matter how many control variables are included, they always might exclude some important one(s). However, several factors argue against an accuracy interpretation of the findings supporting self-fulfilling prophecy. First, the current study has included more complete controls than have been used in previous research on natural teacher expectations. Few studies have used both past grades and standardized test scores as controls, few have used student motivation as a control, none have assessed changes in student motivation, and none have included as broad a variety of student motivational factors as included here. Therefore, the current study provides some of the clearest evidence to date that naturally occurring teacher expectations lead to self-fulfilling prophecies.

Second, these findings complement a long history of experimental demonstrations of self-fulfilling prophecies (e.g., Eden & Shani, 1982; Rosenthal & Jacobson, 1968; Snyder et al., 1977; Word, Zanna, & Cooper, 1974; see reviews by Eden, 1986; E. E. Jones, 1986; Miller & Turnbull, 1986; Rosenthal, 1974; Snyder, 1984). Because similar causal relations have been found through both field observations and experimental laboratory procedures, one may be more confident that teachers' expectations do affect students' performance and motivation.

Another limitation to this study involves the measurement of

teachers' expectations. Teachers did not directly predict students' grades or MEAP scores. Nonetheless, these types of variables have often been used as measures of teachers' expectations (see Cooper, 1985; Hoge, 1984, for reviews), rendering the current study comparable to much previous research. Furthermore, the utility of assessing these separable aspects of teachers' expectations is attested to by their differing relations to student motivation and performance. These fine discriminations would be lost if only a global measure of expectations were used.

Perceptual Biases

Teachers not only excessively inferred effort on the basis of performance, but this bias influenced the grades they assigned. What explains the observed pattern of expectancy-biased grading? Even this question actually has two components: Why were teacher perceptions of effort biased, and why did they affect grades?

Several factors may underly an effort-based explanatory bias. If effort is difficult to observe directly, it may be necessary for teachers to infer effort on the basis of some observable behavior. Performance is one directly observable behavior that seems especially likely to influence teachers' perceptions of students' effort. People often assume that effort strongly influences performance (Covington & Omelich, 1979; Heider, 1958; Schuman, Walsh, Olson, & Etheridge, 1985; Weiner, 1979), perhaps because believing in the American work ethic (see, e.g., Schuman et al., 1985) or in a just world (Lerner, 1980) often leads people to assume that hard work pays off. According to this naive theory, it is reasonable to infer that high achievement generally reflects strong effort.

As with many naive theories, the work ethic may contain at least a grain of truth: Although effort often has little effect on grades, extraordinary levels of effort do lead to higher grades (Schuman et al., 1985). Nonetheless, the available evidence (from the current study and from many studies reported in and reviewed by Schuman et al., 1985) suggests that effort influences performance to a much smaller extent than many people, including teachers, currently believe.

This does not explain why perceptions of effort influenced grades. Perhaps teachers intentionally assigned grades on the basis of students' (perceived) effort. Teachers may believe that learning the importance of effort is so valuable that they reward students whom they believe try hard by giving them higher grades than are warranted by their marks. Similarly, some teachers may wish to punish students whom they perceive as being lazy by giving them lower grades than are warranted by their marks. Because teachers' inferences of effort were primarily based on performance, however, the primary beneficiaries of such policies would be students already achieving highly, and the primary victims would be those already performing poorly.

There are, however, alternative explanations for these findings. The lack of correlation between teacher perceptions of effort and students' self-perceptions represents clear evidence of a lack of agreement regarding students' level of effort. It represents inaccuracy on the part of teachers only if students' self-reports of effort were accurate. Many factors, such as self-handicapping, impression management, self-esteem protection, and so forth may have rendered students' self-reports inaccurate.

Additional analyses, however, provided some support for the validity of students' self-reported effort. The correlations of student effort with self-concept of ability were .25 in the fall and .31 in the spring. This is precisely the type of relation one would expect if, as many theorists propose, high self-concept of ability enhances effort (e.g., Bandura, 1977; Dweck & Elliot, 1984; Eccles & Wigfield, 1985).

Furthermore, there was at least some evidence of inaccuracy on the part of teachers. Teachers assumed performance reflects effort as much as ability, an assumption clearly *inconsistent* with evidence suggesting that scholastic performance is generally determined far more by ability than by motivation (e.g., Anastasi, 1982; Schuman et al., 1985; Uguroglu & Walberg, 1979). Furthermore, I know of no evidence in the more general literature on attributions and person perception to suggest that observers are generally better judges of effort than are actors. Both theory and evidence suggest that actors often generate more accurate attributions for their behavior than do observers (Monson & Snyder, 1977). Finally, previous research has demonstrated that teachers' beliefs in strong associations between effort and intelligence are largely illusory (e.g., Barnard, Zimbardo, & Sarason, 1968; see Brophy & Good, 1974, for a review). Thus, it seems unlikely that teachers' perceptions of effort were more accurate than students' own perceptions. However, the safest interpretation of the data is simply that teachers and students disagreed regarding student effort, suggesting a need for more research on the accuracy of their respective viewpoints.

Accuracy

Results supporting accuracy indicated that teacher perceptions of performance were based on previous performance and motivation, and that teacher perceptions of talent were based largely on perceptions of performance and CAT scores. In contrast, there was little evidence of accuracy in teacher perceptions of effort. Results also indicated that teachers' expectations early in the year predicted students' later performance primarily because they were accurate.

These findings are consistent with perspectives suggesting that teacher expectations predict student achievement more because they are accurate than because they lead to self-fulfilling prophecies (e.g., Brophy, 1983; Cooper, 1979; Dusek, 1975; Meyer, 1985; West & Anderson, 1976). There were, however, several sources of error in teachers' impressions of students. Teachers were virtually oblivious to students' effort and also erroneously assumed that girls tried harder than boys, despite no differences in the amount of effort boys and girls exerted. Although stereotypes are often assumed to be erroneous, the validity of stereotypes has rarely been tested empirically (see reviews by Allport, 1954; Ashmore & Del Boca, 1981; Brigham, 1971; McCauley, Stitt, & Segal, 1980). Thus, this finding represents both a source of inaccuracy in the development of naturally occurring teacher expectations and one of the few empirical demonstrations of an erroneous stereotype.

Findings regarding perceptions of effort represent one of the first demonstrations that teachers may develop grossly erroneous impressions of students. Because these perceptions influenced students' grades, they are clearly of some practical impor-

tance. Decisions to place students in high or low tracks are often at least partially based on grades, and once placed, students rarely change tracks (Brophy & Good, 1974). If similar biases occur in high school, students' acceptance into college will be partially a function of teachers' illusions and misconceptions.

Even these perceptions of effort were inaccurate mainly in that they were based on factors other than students' effort. Teachers' perceptions of effort, despite (or because of) their flawed foundation, correlated .3–.5 with achievement. Furthermore, teachers' perceptions of effort affected achievement less than they predicted, without influencing achievement. There was no evidence that teachers' perceptions of effort affected students' actual performance, and even their influence on grades was relatively small.

There are, however, some qualifications to the results regarding accuracy. The first concerns the measurement of teacher expectations. Teacher perceptions of performance, talent, and effort may be best viewed as social perception components of expectations. If more specific expectancy questions were asked (e.g., "What final grade do you think this student will receive?" "How well will this student perform on the MEAP?"), teachers may have appeared more accurate than is indicated by the results. Such specific expectancies may have been more strongly based on previous grades and standardized test scores than were the three teacher-expectation variables actually used. Similarly, such specific expectations might have more strongly predicted final grades and MEAP scores than the three expectancy variables actually used.

Even if specific expectancies would have higher predictive validities, this could mean that they were more accurate, evoked more perceptual biases, or led to stronger self-fulfilling prophecies. This does not undermine the results of the current study; it simply highlights the fact that they are most safely interpreted as representing the role of teachers' judgments of performance, talent, and effort, rather than more specific expectancies, in student achievement.

Conclusion: Relations Among Expectations and Social Reality

This study represents the first empirical demonstration of self-fulfilling prophecies, perceptual biases, and accuracy concomitantly characterizing teacher–student relationships. Students confirmed teachers' expectations primarily because of the accuracy of those expectations. Nonetheless, because of the many controls used, the current study also provided some of the clearest evidence of naturally occurring teacher expectations creating self-fulfilling prophecies and biases in teachers' evaluations of students. However, the effects of teacher expectations in the current study were quite limited (path coefficients below .2). This pattern supports the consensus emerging from educational research that teachers' expectations generally predict students' performance more because they are accurate than because they create self-fulfilling prophecies (e.g., Brophy, 1983; Cooper, 1979; Dusek, 1975; Meyer, 1985; West & Anderson, 1976).

This research also has relevance for issues in person perception and social interaction. Results from this study were more consistent with perspectives emphasizing accuracy in social perception (e.g., Funder, 1987; Hogarth, 1981; Kenny & Albright, 1987; McArthur & Baron, 1983) than with those emphasizing the prevalence of errors and biases and the power of expectancies to create reality (e.g., E. E. Jones, 1986; Kahneman, Slovic, & Tversky, 1982; Nisbett & Ross, 1980; Snyder, 1984). This is not meant to suggest, however, that expectancies are always accurate or never have large self-fulfilling or biasing effects. Attributes with less objective criteria than math achievement, such as attitudes and personality dispositions, may be perceived less accurately (e.g., Cronbach, 1955; Funder, 1987; Jussim & Osgood, 1989). It would be inappropriate to generalize from this study to different grade levels or to different types of social interaction (e.g., between friends). Nonetheless, the results of the current study were consistent with the effect sizes of between .1 and .3 obtained in virtually all path analytic and meta-analytic studies of expectancy effects (Cooper & Hazelrigg, 1988; Harris & Rosenthal, 1985; Raudenbush, 1984; Rosenthal & Rubin, 1978; Smith, 1980; West & Anderson, 1976; Williams, 1976).

Even small effects may lead to large differences if they accumulate over a sufficiently long period of time. Whether such effects accumulate, however, is currently pure speculation; identifying naturalistic conditions conducive to powerful expectancy effects remains a challenge for future research. Experimental research has identified a host of errors and biases in social judgment and perception and has convincingly shown that, if erroneous, expectations sometimes create self-fulfilling prophecies. It is at least possible, however, that accuracy characterizes naturally occurring social perception to a greater extent than once believed.

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