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<https://doi.org/10.7275/7676093>

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STEREOTYPE THREAT AND ACHIEVEMENT MOTIVATION: A MEDIATIONAL
ANALYSIS

A Thesis Presented

by

DAVID R FELLNER, JR.

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

MASTER OF ARTS

September 2000

Department of Psychology

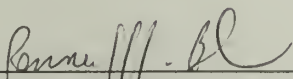
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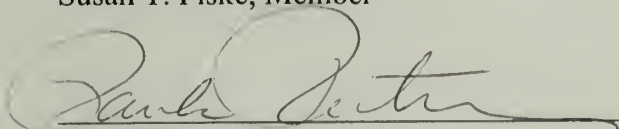
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ABSTRACT

STEREOTYPE THREAT AND ACHIEVEMENT MOTIVATION: A MEDIATIONAL
ANALYSIS

SEPTEMBER 2000

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Stereotype threat is a fairly new phenomenon that attempts to account for group differences in standardized and other test scores. In particular, poorer performance by stereotyped groups is attributed to perceived threat by group members, rather than to dispositional or biological differences. The theory, as it stands now, does not provide a compelling explanation of how stereotype threat works. In addition, current methods to reduce the effects of stereotype threat are sometimes cumbersome when used in applied settings. Achievement motivation theory may provide an answer to this dilemma. The present research attempted to replicate previous findings, explored how stereotype threat works and furnished a theoretical model to account for these effects. Although most of the findings were inconclusive, there was some support for competence expectancy as a predictor of test scores.

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CHAPTER 1

INTRODUCTION

What happens when a woman takes a standardized test of her mathematical ability, or when an African-American takes a standardized test of verbal ability? Often that person knows others may expect that she or he is likely to score lower than a male or a white person taking the same test. Why does this happen? Some say it is due to the cultural bias of the test, and others argue that genetic differences explain this discrepancy. While these issues continue to be debated, another line of research has come up with a construct that can explain these results and provide methods for attenuating these differences.

Stereotype Threat

Claude Steele and Joshua Aronson (1995) have proposed that stereotype threat can account for the underperformance of the African-American and woman noted above. It is defined as “being at risk of confirming, as self-characteristic, a negative stereotype about one’s group (Steele & Aronson, 1995).” Because of this threat, a person’s test score may be impaired on a test that is presumed to be diagnostic of an ability on which one’s group is negatively stereotyped. The person does not even have to endorse or internalize this stereotype, but only be aware of its existence in order for it to have an effect on ability score (Aronson, et al, 1999; Aronson, Quinn, Spencer, 1998).

Although it is not always a necessary component of stereotype threat, identification with the ability domain has important consequences for members of stereotyped groups (Steele, 1997). To be identified, or invested, in a domain is to hold one’s self-worth as dependent on one’s performance in that domain (Aronson, et al.,

1999). People who are highly identified in the area in which they are to be tested may be the least likely to accept or internalize the stereotypes about their group (Aronson, et al., 1998). It is interesting to note that those people with the greatest investment in the topic in which they are being tested are the most susceptible to stereotype threat (Aronson, et al., 1998; Steele, 1997). There is one caveat about identification; it may be that identification is only necessary under laboratory conditions (Aronson, et al., 1999). In the laboratory, as opposed to a “real world” setting, people may not be affected by stereotype threat unless they are identified with the ability domain.

The first studies in this area focused on African-Americans and tests of verbal ability (Steele & Aronson, 1995). In a series of experiments, Steele and his colleagues found that when told a test was diagnostic of their verbal ability, Blacks performed worse on these tests than did Whites in the same condition. However, when the test was described as non-diagnostic of that ability, the scores of both groups were approximately equal. Furthermore, the researchers narrowed the cause of this discrepancy in scores to stereotype threat by confirming that the ability-diagnostic condition activated the negative stereotype in their subjects; in addition, they found that performance could be adversely affected by making the stereotype salient.

This threat is by no means limited to African-Americans, however. In addition to confirming Steele’s original hypothesis, other researchers have found similar results with other groups and in different areas of ability. Women performed worse than men in tests of math performance, both when they were told that the test was diagnostic of their ability and when the tests were very difficult (Spencer, Steele & Quinn, 1997). The researchers hypothesized that the difficulty of the test made the stereotype of women’s

poor performance on math tests salient. In France, low socioeconomic status students performed worse compared to students of high socioeconomic status on tests of verbal ability (Croizet & Claire, 1998). In addition, when the stereotype of the elderly and memory was made salient, older participants did worse on tests of short-term memory than when the stereotype wasn't made salient (Levy, 1996). In all three cases, a negative stereotype existed about the target group's ability in the area measured.

Stereotype threat affects minorities and low status groups, however. More recent research has shown that in certain situations, white men can be affected by stereotype threat as well. When told that they would be participating in a test of athletic ability, white men who were highly sports-identified performed worse than white men who were only moderately identified with sports, or those men who thought they were taking tests of sports intelligence (Stone, Lynch, Sjomeling, & Darley, 1999). Interestingly, the reverse effect occurred in African-American males in the same conditions; they performed worse when the test was framed as measuring sports intelligence as opposed to sports ability.

White men can also be made to perform more poorly on tests of math ability; when a comparison between whites and Asians was made salient, white males' test scores were negatively affected (Aronson, et al., 1999). In this case, white males were the indirect targets of a negative stereotype. Indirect targets of stereotypes may only be affected when a comparison is made to a group of people who are direct targets of stereotypes (Aronson, et al., 1999).

Stereotype threat does not always impair test scores. In the United States, performance on diagnostic math tests was improved in Asian women when their ethnicity

was primed, but impaired when their gender was primed (Shih, Pittinsky, & Ambady, 1999). When the same research was done in Canada, however, the ethnicity prime had no effect on test scores. The researchers attributed this to the lack of a “positive” stereotype of Asian math abilities in Canada.

What are the processes by which performance is hampered by stereotype threat? At first, a few possibilities were put forth, such as distraction, effort withdrawal, anxiety, self-consciousness, etc. (Steele & Aronson, 1995). Steele and Aronson (1995) went on to say that stereotype threat caused lowered performance by impairing the participants’ efficiency as evidenced by the finding that the affected people were taking longer to do fewer problems more poorly. Later, Aronson, Quinn & Spencer (1998) offered a more theoretical explanation for performance impairment. These authors posit that the interaction of three elements cause this lowered performance. These factors are: “the self-threatening nature of negative stereotypes, the effect of self-threat on intellectual performance, and the tendency to disidentify with chronically threatened minorities.”

Current methods of reducing the effects of stereotype threat include giving people the impression that their performance on a pre-test shows that their scores are improving (Josephs & Schroeder, 1997); introducing a test as a test of flexible intelligence (Aronson, Tichy, & Croteau, 1997, as cited in Aronson, et al., 1998); Aronson & Fried, 1997, as cited in Aronson, et al., 1998); and getting people to adopt the belief that their intelligence is very malleable and therefore able to be improved upon (Aronson & Fried, 1997). While these methods seem to work relatively well, some of them would be difficult to implement during a formal test-taking situation, such as the Graduate Record Exam (GRE). However, a different theoretical perspective might be able to account for

all of these effects and provide a better means to counter the consequences of stereotype threat.

Achievement Motivation

Recent work on achievement goals has led to the resurgence of a theory of three forms of motivation: mastery goals, performance-approach goals, and performance-avoid goals (Elliot & Harackiewicz, 1996). Mastery goals are focused on positive possible outcomes, the mastery of a task, and competence on that task. Performance-approach goals are also focused on positive possible outcomes, but are concentrated on achieving favorable judgments of competence by others. Finally, performance-avoid goals are focused on negative possible outcomes and avoiding negative judgments of competence (Elliot & Church, 1997).

There are two main factors that determine which goal orientation a person will adopt. These factors are the person's orientation at the outset of the task (Elliot & Harackiewicz, 1996; Elliot & Church, 1997) and competence expectancies (how well the person expects to perform) on the task (Elliot & Church, 1997; Elliot & Sheldon, 1997). If a person has no fear of failure in an achievement setting, that person will adopt a mastery orientation and competence expectancy will not affect performance (Elliot & Harackiewicz, 1996). However, if that person does fear failure in this task, one of the two performance goals will be adopted, depending on the person's competence expectancy. People with low competence expectancy will adopt performance-avoid goal motivations, while those with high competence expectancy will adopt performance-approach goal motivations (Elliot & Church, 1997).

These goal orientations affect how people view the achievement setting and their behavior towards that setting (Elliot & Harackiewicz, 1996; Elliot & Church, 1997). In the mastery goal orientation, people show a preference for moderately challenging tasks. They view the task as a challenge, feel excitement, show persistence in the face of failure and are absorbed in the task. This orientation also orients the individual to success-relevant information (Elliot & Church, 1996; Elliot & Harackiewicz, 1997). In both the performance-approach and performance-avoidance goal orientations, people prefer either easy or difficult tasks and may respond with a variety of "helpless" behaviors (Elliot & Harackiewicz, 1997). These behaviors include self-protective withdrawal of effort in the face of failure and feelings of anxiety. However, in the performance-approach goal orientation, people view the task as a challenge and their actions are similar to those in the mastery goal orientation (Elliot & Harackiewicz, 1997). In the performance-avoidance orientation, people view the task as a threat and are likely to be oriented towards failure-relevant information. Both their concentration and task involvement will be disrupted, and they will engage in other self-handicapping behaviors (Elliot & Church, 1996).

All of these goals affect achievement-related behavior outcomes directly (Elliot & Church, 1997). The main effect of mastery goals is to facilitate intrinsic motivation in the task, although this orientation does not affect graded performance (Elliot & Church, 1996). While performance-approach goals do not have an effect on a person's intrinsic motivation, they can cause an increase in that person's graded performance. Performance-avoid orientation negatively affects both intrinsic motivation and graded

performance (Elliot & Church, 1996; Elliot & Harackiewicz, 1997; Elliot & Sheldon, 1997).

Stereotype Threat and Achievement Motivation

Achievement goal theory seems to account for many of the effects seen in stereotype threat research. An argument can be made that the diagnostic situation in stereotype threat causes a fear of failure in the participants. In addition, when a person is in the threat condition, the negative stereotype either causes a low expectancy of competence or something very much like it. Some support for this comes from research showing that when stereotypes are activated, participants' expectations for test performance are lowered (Stangor, Carr, & Kiang, 1998). When combined, these two factors may explain the lower test scores for people in the diagnostic threat condition. In the diagnostic non-threat condition people would have the fear of failure, but would not have a low expectancy of competency and should adopt performance-approach goals. Those people who are in both non-diagnostic conditions should have no fear of failure and be likely to adopt mastery goals regardless of their competence expectancies.

How does the use of achievement goals provide a method for lessening the effects of stereotype threat? In research done by Harackiewicz and Elliot (1993), it was found that tasks might be framed in such a way as to encourage the adoption of certain goal orientations. If this is possible to replicate with standardized tests, then it is possible that people in stereotypically threatening conditions could be given instructions framed in such a way as to allow them to adopt performance-approach or mastery orientations rather than performance-avoidance orientations.

In this experiment gender and mathematics ability were used to test our hypotheses. This paradigm has been used in previous research and was proven to be effective (Spencer, Steele & Quinn, 1997). The participants were told that they were either taking a test that measures their ability in math, or their problem solving methods were being observed.

In addition to the math test, achievement goals of all participants were measured using a scale derived from one created by Elliot and Sheldon (1997). Also included on this page was a measure of competence expectancy asking women how well they anticipated doing on the test.

In terms of specific hypotheses, it was expected that women taking the diagnostic test would have math test scores (i.e., total score, number attempted, and percentage correct) significantly lower than women taking the non-diagnostic test. These women would also have higher performance-avoidance goal scores than their counterparts, as well as lower performance-approach and mastery goal scores.

These differences were also expected to appear in the measure of competence expectancy. Women in the non-diagnostic conditions should have higher scores on this measure than the women taking the diagnostic test. Further, achievement goals should account for a high percentage of variance in the regression analyses of the test scores.

CHAPTER 2

METHODS

Participants

One hundred and seven women participated in this study. Participants were students from introductory psychology classes who received extra credit for participation in experiments.

Materials

Participants received a packet of material from the experimenter, which included an introduction that contained the experimental manipulation, a performance goal questionnaire, and a math test. After the test was completed a post-test questionnaire with a measure of competence, a stereotype threat scale, a manipulation check measure, and a demographic questionnaire that included questions for the participant's SAT scores was distributed.

Introduction

The manipulation was contained in the introduction, in which the participants were told that they were either taking a test measuring their math ability or that their problem-solving methods were being examined.

Performance Goal Questionnaire

This questionnaire consisted of 15 questions adapted from a measure developed by Elliot and Sheldon (1997). Five statements rated by the participant on a 9-point Likert scale (0-not at all to 9-perfectly) measured each performance goal. Examples of the mastery goal statements were "To perform well" and "To concentrate on the task at hand." Statements of performance-approach included "To outperform my peers" and "To

do better than others.” “To avoid getting a bad score” and “To avoid making mistakes I can’t fix” are examples of the performance-avoid goal measure. Also on this page was a two-question measure of competence expectancy on the math test. The questions were “How well do you expect to do on this test?” and, “How well do you expect to do compared to others?” Each question was rated on a 9-point Likert scale (0-very poorly to 9-very well).

Math Test

The math test consisted of 25 multiple-choice questions drawn from an SAT IIc math guide. These questions included material from Algebra I and Geometry.

Post-test Questionnaire

In the questionnaire, the participants were asked to rate both how well they felt they did on the test and how well they felt they did compared to others on a 9-point Likert scale (0-very poorly to 9-very well). After these questions, participants were asked to rate their level of stereotype threat based on five statements designed to measure this level (0-strongly disagree to 9-strongly agree). “Some people feel I have less math ability because of my gender” and “In math classes people of my gender often face biased evaluations” are examples of these questions. This was followed by a short demographic survey that asked for the participant’s GPA, SAT scores, and race/ethnicity. Finally, as a manipulation check, participants were asked how much they felt they were being measured on math ability and problem-solving; they were also asked to rate how difficult they felt the math questions were.

Procedure

Participants were given the questionnaire packet when they entered the room. After the first page was read, the experimenter asked them to look through the math test before filling out the goal questionnaire. When this questionnaire was completed, the participants were told they had 25 minutes to complete as many questions as possible on the math test. After 25 minutes, the experimenter called time and handed out the final questionnaire. When everyone was done, the participants were debriefed and thanked for their participation.

CHAPTER 3

RESULTS¹

Manipulation Check

Math Ability and Problem Solving

Independent sample t-tests performed on participants' responses to postexperimental questions about the purpose of the study revealed some support for the effectiveness of the manipulation. When asked about how much they felt they were being evaluated on their math ability, participants in the diagnostic condition ($M = 5.75$) reported feeling more evaluated than those in the non-diagnostic condition ($M = 4.89$), $t(105) = -2.083$, $p < .05$. In addition, when asked how much they felt they were being evaluated on problem solving, participants in the diagnostic condition again felt they were being more highly evaluated than non-diagnostic condition participants (diagnostic mean = 5.84, non-diagnostic mean = 4.79), $t(105) = -2.757$, $p < .01$.

Stereotype Threat

Two questions, "Some people feel I have less math ability because of my gender" and "In math classes people of my gender often face biased evaluations," were used to create an index of stereotype threat for each participant ($\alpha = .8$). Although the participants in the diagnostic condition agreed with the statements more ($M = 7.22$) than participants in the non-diagnostic condition ($M = 5.94$), the difference only approached significance, $t(105) = -1.512$, $p = .133$.

¹ Because of a lack of male participants in the participant pool, men were dropped from the experiment.

Achievement Motivation

Competence Expectancy

The two questions measuring participants' competence expectancy were averaged before analysis. An ANCOVA, using self-reported math SAT as a covariate, showed that although the participants in the diagnostic condition reported lower competence expectancy (diagnostic mean = 4.61, non-diagnostic mean = 4.82), the difference was not significant, $F < 1$.

Approach Motivation

The approach motivation scale was made up of items that measured approach with respect to both self and others. Therefore an ANCOVA, with SAT math scores as a covariate, was used to analyze both the approach-self and approach-other scales and in the combined form. No difference was found between the diagnostic condition and the non-diagnostic condition in the three scales (self, other, combined) (all $F_s < 1$).

Avoidance Motivation

As with the approach motivation scale, the avoidance motivation scale was made up of the questions that related to motivation towards the self and towards others. An ANCOVA revealed that there was again no difference between the two groups across avoid-self, avoid-other and overall avoid (all $F_s < 1$).

Test of Math Ability

Test Performance

An ANCOVA on the total number of correct responses, with SAT math scores as a covariate, found that the effect of diagnosticity did not reach significance (diagnostic mean = 10.14, non-diagnostic mean = 10.93), $F < 1$.

Accuracy

The ANCOVA on accuracy (the number correct divided by the number answered) with SAT math scores as a covariate, revealed means in the right direction, but no significant difference between the diagnostic condition ($M = 59\%$) and the non-diagnostic condition ($M = 66\%$), $F(1, 104) = 2.25$, $p = .14$.

Number of Items Attempted

The total number of problems attempted was also analyzed using an ANCOVA with SAT math scores as a covariate. The results showed that the two groups attempted almost exactly the same number of problems (diagnostic mean = 19.04, non-diagnostic mean = 19.33), $F < 1$.

Regression Analyses

Avoidance Scale

A regression of the Avoidance scale with self-reported SAT-math scores, diagnosticity, and competence expectancy as regressors was not significant $R^2 = .036$, $F < 1$ (see Table 1). None of the predictors were significant, although competence expectancy (after controlling for SAT-math scores) was marginally significant, $B = 1.795$, $t(103) = 1.694$, $p = .093$.

Table 1: Summary of Regression Statistics for Avoidance Motivation

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
(Constant)	53.085	11.510		4.612	.000
Diagnosticity	2.073	3.194	0.063	0.649	.518
SAT-Math	-0.023	0.021	-0.109	-1.089	.279
Competence Expectancy	1.755	1.036	0.169	1.694	.093

Approach Scale

A regression of the Approach scale with self-reported SAT scores, diagnosticity, and competence expectancy as regressors was significant $R^2 = .174$, $F(3, 103) = 7.25$, $p < .001$ (see Table 2). Controlling for the other variables, competence expectancy was the only significant predictor of approach motivation $B = 3.197$, $t(103) = 4.613$, $p < .001$.

Table 2: Summary of Regression Statistics for Approach Motivation

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
(Constant)	40.480	7.699		5.258	.000
SAT-Math	-0.024	0.014	-0.164	-1.761	.081
Diagnosticity	0.438	2.137	0.018	0.205	.838
Competence Expectancy	3.197	0.693	0.426	4.613	.000

Test of Mathematical Ability

A regression of the total number correct with self-reported SAT scores, diagnosticity, competence expectancy, and Approach/Avoidance scale scores as regressors was significant $R^2 = .303$, $F(5, 101) = 8.77$, $p < .001$ (see Table 3). Only SAT-Math scores significantly predicted math scores, $B = .022$, $t(103) = 5.37$, $p < .000$, although competence expectancy approached significance as a predictor, $B = .408$, $t(103) = 1.761$, $p = .081$.

Table 3: Summary of Regression Statistics for Number Correct

Variables (with all regressors)	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
(Correct)	-2.666	2.533		-1.053	.295
SAT-Math	-0.022	0.004	0.470	5.370	.000
Diagnosticity	-0.252	0.625	-0.034	-0.403	.688
Competence Expectancy	0.408	0.232	0.173	1.761	.081
Approach Motivation	0.005	0.048	0.017	0.109	.913
Avoidance Motivation	-0.015	0.032	-0.065	-0.464	.644
Variables (Only SAT-Math)					
(Constant)	-2.662	2.136		-1.246	.215
SAT-Math	-0.024	0.004	0.521	6.252	.000

Stereotype Threat Scale

A regression of stereotype threat with SAT scores, diagnosticity, and competence expectancy was significant $R^2 = .087$, $F(3, 103) = 3.27$, $p < .05$ (see Table 4). The only significant predictor for stereotype threat was math ability as measured by SAT-Math scores, $B = -0.014$, $t(103) = -2.71$, $p < .01$.

Table 4: Summary of Regression Statistics for Stereotype Threat

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
(Constant)	12.718	2.931		4.339	0.000
Diagnosticity	1.027	0.813	0.120	1.263	0.210
SAT-Math	-0.014	0.005	-0.265	-2.710	0.008
Competence Expectancy	0.231	0.264	0.085	0.877	0.383

Other Findings

In addition to the above tests, correlational analyses were run to further explore the data (see Table 5). Perhaps the most important correlation is the one between the participants' SAT math scores and the number answered correctly on the test, $r(107) = .52$, $p < .001$. As also indicated in the regression analyses, it seems that math ability, not achievement motivation, accounts for the level of the variance in the test scores.

Table 5: Intercorrelations of Motivation Scales and Expectancies, Abilities and Scores (n = 107)

Scales	1	2	3	4	5	6	7	8	9
1 Competence Expectancy	--								
2 Number Correct	.29**	--							
3 SAT Math	.25*	.52**	--						
4 Approach-Self	.30**	-.09	.00	--					
5 Approach-Other	.35**	.06	-.05	.32**	--				
6 Avoid-Self	.39**	.00	-.06	.55**	.96**	--			
7 Avoid-Other	.09	-.13	-.06	.47**	.53**	.62**	--		
8 Avoid-Self	.22*	.00	-.08	.30**	.87**	.85**	.71**	--	
9 Avoid-Other	.14	-.07	-.08	.39**	.76**	.79**	.89**	.94**	--

* significant at the .01 level

** significant at the .001 level

CHAPTER 4

DISCUSSION

The purpose of this experiment was to determine if achievement motivation is a mediator for stereotype threat. In this experiment, women and a test of math ability were used to replicate previous findings of stereotype threat. In addition, achievement motivation was measured using a scale adapted from earlier research.

Unfortunately, this experiment failed to meet expectations on several counts. One, we were unable to reproduce findings of stereotype threat; both groups of women had almost exactly the same scores on the test. Two, both groups scored almost equally on all parts of the achievement motivation scales.

Regression analyses revealed that the variance in test scores was due mainly to participants' math ability, as measured by SAT math scores, and not to the experimental manipulation. In addition, there were no significant correlations between participants' test scores and any measure of achievement motivation.

However, there was still some support for the use of achievement motivation as a mediator of stereotype threat. Although test scores were primarily predicted by math ability, competence expectancy approached significance as a predictor. In addition, competence expectancy was also a significant predictor of both avoidance motivation and approach motivation.

There are some possible factors that could have led to this lack of significance. In Steele's previous research on stereotype threat, he used participants who identified with the area in which they were measured. In that research on women and math, math majors were recruited as participants. In this experiment, however, only students from introductory psychology classes were used.

Also, participants only read the instructions of the experiment. The experimental manipulation, which was whether the purpose of the experiment was to measure the math ability of the participant or to pilot possible test questions for a future experiment, was contained in these instructions. It is possible that participants did not carefully read the instructions and therefore were not affected by them. A possible confirmation of this is that participants in the diagnostic condition were more likely to say that they were both being evaluated on their math ability and that their problem solving than participants in the non-diagnostic condition.

Finally, since this paper was proposed, a personality trait related to stereotype threat has been proposed. Stigma consciousness (Pincus, 1999) is the extent to which people expect that they will be the targets of stereotyping by others. It may be that people who are high in stigma consciousness are more susceptible to stereotype threat. If this is the case, then participants in future studies should have their level of stigma consciousness measured to see if it mediates the level of stereotype threat.

In the future, participants should be recruited from a pool of math majors to ensure that they are identified with the subject. Also, the participants should both read and have read to them the instructions that contain the experimental manipulation. In addition, further pilot testing of the math questions should be done to make certain that no floor or ceiling effects will occur.

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