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SCHOLASTIC ACHIEVEMENT AND CONFORMITY

Regular Article

Scholastic Achievement Levels and Conformity of Junior High School Students in the Asch Experiment

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Abstract

We examined the influence of scholastic achievement levels on conformity behavior in the modified Asch experiment without using confederates (Mori & Arai, 2010). Four hundred and sixteen Japanese junior high school students (12-14 years old) were classified into three groups based on their scholastic achievement: high, middle, and low. We then created 22 same-sex groups (half male, half female). Each group included one high or low achievement "minority" student and three "majority" students who were all high or all low achievement students. The results showed that low achievement students in the minority role tended to conform more frequently than high achievement minority students—especially when amongst a high achievement majority. In addition, low achievement females showed more frequent conformity than low achievement males. (123 words)

Keywords: Asch experiments, conformity, scholastic achievement, junior high school students

Scholastic Achievement Levels and Conformity of Junior High School Students in the Asch Experiment

Solomon Asch's classic experiments showed that a person's opinion frequently conforms to the majority opinion, even when blatantly wrong (Asch, 1951, 1955, 1956). In Asch's experiments, subjects reported which line from a set of 3 they believed matched the length of a target line. The key finding was that subjects frequently reported the same incorrect answer given by other people who were secretly acting as confederates (Asch, 1956). Because the task was easy, and because subjects virtually always gave the correct answer when they could report it privately, Asch's findings have typically been interpreted as demonstrating *normative* social influence—that is, conformity for acceptance—rather than *informational* social influence—or conformity in an effort to behave correctly (Stangor, 2012).

Asch's results have been replicated for more than half a century across a variety of independent variables, including culture, sex, and response conditions (see Bond & Smith, 1996, and Jetten & Hornsey, 2012, for reviews). But one important limitation is that the standard paradigm requires confederates. To be effective, these confederates must attempt to act naturally, without evoking suspicion. Research shows, unfortunately, that these attempts frequently fail: Many subjects suspect the purpose for group conformity, and when they do so, are less susceptible to its influence (Stricker, Messick, & Jackson, 1967).

Another important and related limitation when using confederates is that it is difficult to examine the contribution of interpersonal variables. Specifically, in the standard paradigm participants are not acquainted with the confederates. But in the real world, people seldom

experience a situation in which they form opinions amidst total strangers. Instead, opinions are frequently formed amidst some form of peer group, like family, friends, or colleagues. We might reasonably expect conformity to vary according to these complex relationships. But examining those relationships experimentally is no easy task, because of the difficulty in finding convincing confederates who have a pre-existing relationship with naïve participants.

One way to circumvent these problems is to use participants themselves as unwitting confederates. In fact, that is what we did in a previous study examining conformity in students (Mori & Arai, 2010). We used a visual presentation trick to present two different stimuli to viewers, without the viewers realizing they are seeing different things (see Mori, 2007, for further details). Critically, the lines from Asch's task appeared differently depending on the type of polarizing glasses participants wore. One participant in each of our participant-groups wore one type of polarizing glasses, while the remaining participants wore the other type. Thus, one participant saw lines that were of different lengths to the lines seen by the other participants, and this single participant therefore faced a situation in which other people appeared to answer incorrectly (See, Fig. 1). Using this procedure, we replicated Asch's paradigm, but with "natural" confederates. Overall, we found that female students conformed frequently, but male students conformed seldomly (Mori & Arai, 2010).

Although we established a paradigm that avoids some key problems with confederates, several questions remain unanswered. One important question, for example, concerns the influence of scholastic aptitude on the degree to which students conform. More specifically, we wonder whether low-achieving and high-achieving students would differ in the degree to which they conform.

The literature provides at least two reasons to anticipate differences according to scholastic aptitude. The first reason is that—in accord with multiple theories, including self-presentation (Arkin, 1981), locus of control (Rotter, 1966), and self-efficacy (Bandura, 1986)—children with high social confidence report being less likely to conform than children with low social confidence (Kosten, Scheier, & Grenard, 2013). Based on that finding, we hypothesize that high-achieving students are respected by their classmates and are therefore more likely to have high social confidence. If this hypothesis is correct, we would predict that low-achieving students would conform more often than their high-achieving counterparts—and especially so when the majority is comprised of high-achievers.

The second reason stems from the phenomenon of "Middle-Status Conformity," wherein conformity is high in the middle, yet low at the top and bottom of a status hierarchy (Phillips & Zuckerman, 2001). Researchers have proposed that high- and low-status individuals conform less than middle-status individuals for differing reasons: High-status individuals can break from convention because they feel confident about their social acceptance; Low-status individuals can break from convention because nothing they do leads to social acceptance (Phillips & Zuckerman, 2001). In the middle are individuals who are part of the group, but feel somewhat insecure about their membership. Thus, they are most susceptible to social influence. These same researchers found support for this explanation in an examination of law firms and securities analysts, both of which demonstrated the greatest degree of conformity in their practices at the middle-status level (Phillips & Zuckerman, 2001). Based on those findings, we hypothesize that high-achieving students have high status, while low-achieving students have low status. If this hypothesis is correct, we would

predict that middle-achieving students conform more often than low- or high-achieving students.

A secondary motivation for the current study—driven by our prior findings—is to examine how sex interacts with scholastic aptitude in conformity (Mori & Arai, 2010). One review of the literature on sex differences in conformity proposes that such differences are likely to be small, and limited to responses that are made publicly (Stangor, 2012, p.402). Unfortunately, some research has confounded sex with additional variables, including task differences, social status, and sex role expectations. Thus, an alternative explanation for some observed sex differences could simply be that people tend to hold to their opinions when they feel confident. Other research supports this idea, showing that people are more likely to defer to others when a topic is unfamiliar than when it is one they are knowledgeable about (Eagly & Chravala, 1986). Nonetheless, a meta-analysis of conformity studies published in and prior to 1990 found a robust sex difference, with females showing higher levels of conformity than males (Bond & Smith, 1996). Based on these findings, we hypothesize that female students could feel less confident in their opinions than male students—perhaps especially so when they are low-achieving students. If this hypothesis is correct, we would predict female students conform more than male students, and that this sex difference will be most pronounced for low-achieving students.

Method

Design

For the primary study, we used a 2 (role: match, mismatch) × 2 (achievement: low, high) × 2 (sex: male, female) between-subjects factorial design. A meta-analysis of

conformity studies suggested that a majority comprised of three people reliably elicits conformity (Bond, 2005). We therefore formed same-sex groups of four participants, comprised of one student who was assigned to the critical minority role, and three who formed the majority. In line with our prior work, students in each group were assigned a number between one and four that determined the order in which they reported their answers; minority participants were always assigned to the third position (Mori & Arai, 2010). Our primary dependent variable was the frequency of errors in the 12 critical line-judgement tasks for each minority participant.

For the supplementary study on middle-achieving students, we used a between-subjects design (sex: male, female). This supplementary study served two purposes that were largely incidental, but provided data that we think are worth presenting. First, the data address the middle-status conformity hypothesis. Second, the data provide a comparison of rates of conformity to the low- and high-achieving groups.

Participants

A total of 416 junior high school students (211 males and 205 females between 12 to 14 years old) participated. All students had normal or corrected-to-normal vision. The school was a municipal school in Nagano, Japan. The socioeconomic status of the students' families varied within a narrow middle-class range. All students were Japanese natives.

We first classified students into three scholastic achievement categories (low, middle, high), based on a recent term examination summary score. This standardized summary score was calculated from the combined raw scores of five major school subjects: Japanese language, social studies, mathematics, natural sciences, and English. Low students were in

the 0-33 percentile range (*n* = 139), middle students were in the 34-66 percentile range (*n* = 139), and high students were in the 67-99 percentile range (*n* = 138).

Within each of these three achievement categories, we randomly selected 44 male and 44 female students to form our groups of four same-sex participants. Within each group, we randomly assigned one student to the critical minority role, while the remainder were assigned to the majority role. We also ensured that for the low- and high-achieving minority role students, half were assigned to a group that matched their scholastic level, while the remaining half were placed in a group that did not match their scholastic level. Ultimately, this process led to a total of 264 participants (132 male and 132 female); the remaining 152 students took part but were not assigned to any specific conditions or roles, in an effort to eliminate suspicion regarding the experimental hypotheses. The numbers of participants in the experimental groups are summarized in Table 1.

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Insert Table 1 about here

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One of the difficulties in administering the Mori and Arai procedure is gathering a sufficient sample for statistical analyses. For each critical minority role participant, the procedure requires an additional three genuine participants to form the majority. Therefore, we needed to have four times more participants than the standard conformity paradigm that relies on confederates. Considering this practical difficulty, we prioritized feasibility of administration. We therefore planned the study such that the same procedures were repeated over two consecutive years, using all of the same grade-cohort of students that agreed to participate. It took approximately one month each year to run the study on around 50 groups

of students, including extraneous groups to ensure that all students were treated equally. Some of these additional groups consisted of three students or fewer, dependent on the number of students per class. We pre-planned to discard the data obtained from these extraneous students.

Stimuli

We used our previously created stimuli (Mori & Arai, 2010). These stimuli were constructed to be equivalent to the nine stimulus sets that Asch (1956) used. Specifically, six of the nine sets were made for critical trials, during which the minority participant would see the lines differently from the majority, so that the correct answer for the minority participants would differ from the majority. The remaining three sets were made for neutral trials, during which all participants saw the same lines.

Apparatus

We presented stimuli on PowerPoint slides using an Apple iBook, projected by an LCD projector (EPSON ELP-730) onto a rear screen. This rear screen was made of a pane of ground glass measuring 80 cm (height) × 80 cm (width) × 0.5 cm (thickness). The rear screen was set approximately one meter away from the projector. Four chairs numbered 1 to 4 were placed in a row approximately one meter apart on the other side of the screen. A pair of polarizing sunglasses was placed on each chair before participants entered the room. The minority participant's sunglasses were placed on the third chair (see Fig. 1).

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Insert Fig. 1 about here

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Procedure

We followed our previously established procedure, except for the following modification (Mori & Arai, 2010). Instead of letting participants answer during the presentation of stimuli, we asked them to answer after each presentation. This modification served two purposes. First, it was an attempt to elicit more conforming responses. Second, it was an attempt to reduce the likelihood that participants would closely examine the stimuli and detect the presentation trick.

Participants entered the experiment room in a predetermined order. They were asked to take the chair with their designated number and to pick up the sunglasses. As a cover story, we told participants that the sunglasses were to help protect their eyes from glare. Next, the experimenter asked participants #1 and #4 to move and stand behind participants #2 and #3, respectively, so that everyone could see the screen in a central position. In approximately half of the experimental sessions the experimenter was a male, and in the remainder the experimenter was a female. Next, the experimenter gave the following instructions, which were also presented on the screen:

> "This is a task involving the discrimination of lengths of lines. In front of you is a screen. On the left of the screen, there will be one line, and on the right, there will be three lines differing in length; they are numbered 1, 2, and 3, in order. One of the three lines at the right is equal to the standard line at the left. You will decide which is the equal length line in each task. You will state your judgment regarding the number of the line. There will be 18 comparisons in all. As the number of comparisons is few and the group small, I will call upon each of you in turn to announce your judgments, which I

will record here on a prepared form. Since your seat order was determined, you will give your answer in the seating order, from number 1 to number 4."

Next, the experimenter asked participants to pay special attention to the following points: 1) Be as accurate as possible; no need to answer in haste. 2) Make the judgment by yourself. 3) Do not talk or react to the other students and stay quiet except when it is your turn to answer.

Following these instructions, the line judgment trials began in a predetermined order. As in the Asch (1956) study, the trials comprised a series of nine tasks (6 critical and 3 neutral), repeated twice. Each trial took approximately 15 seconds.

We debriefed participants approximately one month after the experimental sessions. We prepared printed material explaining the objectives of the research and the presentation trick. We also expressed our thanks to the students for their contribution.

Results

Preliminary Analyses

Due to the nature of the paradigm and the emphasis on feasibility of administration in the school environment, we ultimately gathered a sample size that is insufficiently large for standard statistical analyses. We therefore turn to non-parametric tests in the following analyses.

In conformity experiments using confederates, all minority participants' errors are classified as conforming responses, because the majority gives predetermined responses. But in our study, majority participants' responses are prone to some variability due to perceptual errors. It might therefore be misleading to classify all minority participants' errors as conforming responses. One way to control for these perceptual errors is to use the average

error frequency of the majority participants as an estimate for the minority participants (see, e.g., Hanayama & Mori, 2011). Another option is to simply treat the errors as they are, but assume they reflect the tendency to conform. If there are more errors in the minority than the majority, it is evidence that some of these responses reflect conformity.

Taking the latter option, we first examined the distribution of errors in terms of participant response order; these data appear in Figure 2. As the figure shows, the distribution of the third responders—the minority participants—was different in a number of ways. First, and critically, there were only three minority participants who made no errors, while at least 20 majority participants made no errors in each of the remaining three response order positions; $X^2_{(3)} = 24.90$, $p < .01$, Cramer's $V = .307$. Second, there were 23 minority participants who made greater than seven errors, but only between 1 and 6 majority participants in the remaining three response order positions; $X^2_{(3)} = 37.52$, $p < .01$, Cramer's $V = .376$.

We found similar results using a median test. The median number of errors across the entire sample ($N = 264$) was one. Seventy-two participants made no errors, 62 made one, and 130 made two or more. Amongst minority participants, only three made no errors, 13 made one, and 50 made two or more. Importantly, of all participants who made errors, minority participants represented the statistically largest group; $X^2_{(3)} = 30.57$, $p < .01$, Cramer's $V = .389$.

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Insert Fig. 2 about here

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These data suggest, in line with our earlier work using the same procedure, that the experimental manipulation successfully elicited conforming behavior (Mori & Arai, 2010; Hanayama & Mori, 2011). Minority participants made statistically more errors than our unwitting "confederates." These errors were most plausibly the product of social conformity. In the analyses that follow, we treat the number of errors as an index of conformity, but with the caveat that we cannot distinguish errors that are due to conformity from errors that are due to perception, or some other social factors to be addressed in the discussion below.

Sex Differences

Figure 3 shows the distributions of male and female minority participants' errors. As the figure shows, there were no clear differences. The median number of errors for minority participants was four. Almost precisely half of the participants of each sex made fewer than four errors (15 males, 16 females), while the remaining half of each sex made four or more (18 males, 17 females). Thus, we found no overall sex differences in conformity, and in the remaining analyses we collapsed across sex, $X^2_{(1)} = .000$, n.s., *Phi* = .000).

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Insert Fig. 3 about here

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Scholastic Achievement and Conformity

Figure 4 shows the distributions of errors for the high- and low-achievement minority participants. For each of the three scholastic achievement categories, we counted the numbers of participants who made more and fewer errors than the median of four; these data

appear in Table 2. Analysis of these data revealed that the middle-achievement participants were equally distributed above and below this median ($n_{\text{fewer}} = 11$, $n_{\text{greater}} = 10$). But the remaining participants were not. High-achievement participants were more likely to make fewer than the median number of errors than greater ($n_{\text{fewer}} = 15$, $n_{\text{greater}} = 6$), and for the low-achievement participants this pattern reversed ($n_{\text{fewer}} = 5$, $n_{\text{greater}} = 15$); $X^2_{(2)} = 8.905$, $p < .05$, Cramer's $V = .379$.

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Insert Fig. 4 about here

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Insert Table 2 about here

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Conformity and Scholastic Achievement of the Majority

The findings above fit with our hypothesis that low-achievement students would conform more often than high-achievement students. But recall that we further hypothesized that low-achievement students would be especially likely to conform when amongst a high-achievement majority. To test this hypothesis, we examined the error distributions of low-achievement participants when they were amongst a low-achievement majority and when they were amongst a high-achievement majority; these data appear in the upper panel of Figure 5. As the figure shows, low-achievement participants peaked at eight errors when amongst a high-achievement majority, but no such peak was evident when they were amongst a low-achievement majority. We also similarly examined the error distributions of high-achievement participants; these data appear in the lower panel of Figure 5. As the figure shows, we found an unanticipated result: High-achievement participants made more

errors when amongst a low-achievement majority than when they were amongst a high-achievement majority.

Put another way, the median number of errors among all 44 of these participants was four. Across the four experimental groups, we counted the numbers of participants who made more and fewer errors than this median; these data appear in Table 3. Analysis of these data revealed a statistically significant overall distribution difference, $X^2_{(3)} = 14.809$, $p < .01$, Cramer's $V = .601$. Residual analyses showed that low-achievement participants were more likely to make greater errors than the median —but only when amongst a high-achievement majority. High-achievement participants, on the other hand, were more likely to make fewer errors than the median—but only when amongst a high-achievement majority. When amongst a low-achievement majority, both high- and low-achievement participants distributed equally above and below the median.

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Insert Fig. 5 about here

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Insert Table 3 about here

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Discussion

Conformity Responses and Scholastic Levels in the New Experimental Procedure

Our primary research question sought to determine the extent to which scholastic achievement influences conformity. Using a paradigm that eliminates the need for confederates, we successfully induced conformity in students. In general, we found that minority participants—relative to the majority—produced error distributions that were

shifted toward a greater number of errors. In addition, we found that most participants who made more than seven errors were low-achievement students whereas most participants who made fewer than four errors were high-achievement students. We also found that low-achievement participants were especially prone to conform when amongst a high-achievement majority. These findings are consistent with our hypotheses and our earlier work (Mori & Arai, 2010).

Relatedly, we also sought to address the role of sex in conformity. But in contrast to what we anticipated, male and female students did not differ significantly in their overall rates of conformity. We suspect that this finding may be due to differences in the extent to which males and females conform as they age. Specifically, we have previously found that males tend to conform a great deal at a very young age, but seldomly conform once they approach adulthood. We found that females, on the other hand, tend to conform similarly regardless of age (see Mori, Ito-Koyama, Arai, & Hanayama, 2014). It might simply be the case, then, that the age group we examined here represents the point at which both sexes conform to a similar extent. We state this explanation cautiously, because an alternative explanation is that there are indeed small but meaningful sex differences we failed to detect.

Recall that we also sought to test the middle-status conformity hypothesis, predicting that students at the middle level of scholastic achievement would show greater levels of conformity than either the high- or low-achievement students (Phillips & Zuckerman, 2001). But our data do not support that hypothesis. Instead, we found that low-achievement students were most prone to conformity, high-achievement students were least prone, and middle-achievement students fell in-between.

Considered as a whole, these findings suggest that scholastic achievement helps students act independently in the face of social pressure. But we acknowledge that there are certain limitations to what we can reasonably conclude. Perhaps most importantly, we were surprised to find the majority participants making errors: 65% made one or more. Any error rate above zero in the majority means that there were trials in which the majority were not unanimous. It is intriguing, then, that minority participants made substantially more errors: 53% made four or more. That finding suggests that participants conformed even when the majority had a disagreement. Nonetheless, these unexpected errors in the majority students make it difficult to interpret the errors of the minority participants.

How do we explain the majority participants' errors? We had initially suspected that these errors were simple perceptual mistakes. But closer examination of the data suggests otherwise. Majority participants who answered first in a trial had lower average error rates than the other majority participants ($1^{st} = 0.12$, $2^{nd} = 0.19$, $4^{th} = 0.17$). If errors were perceptual, we would expect similar rates across response orders. In addition, if the task were perceptually difficult, then error rates should theoretically distribute normally around the average rate ($M = 0.16$). But as Figure 2 shows, error rates are clearly skewed. Together, these data lead us to suspect that majority errors were socially driven. More specifically, that 'mistakes' made by the minority participant likely caused some awkwardness—especially because the students interact frequently and know one another. Perhaps the only way to diffuse this awkwardness, given that the students could not talk to each other, was for the majority participants to occasionally give deliberately incorrect responses. This explanation—although speculative—would fit with research that suggests participants in conformity experiments often try to acknowledge others' opinions, even when they disagree

(Hodges & Geyer, 2006). It also consistent with research showing that a majority will sometimes conform to a minority (Moscovici, Lage, & Naffrechoux, 1969). Future studies might consider asking minority participants to respond last, in an effort to ameliorate these socially-induced errors in majority participants.

One of the main strengths of our procedure is its ecological validity, because it eliminates the artificiality of using confederate actors as the majority. Seldomly do we encounter experiences in everyday life where we form opinions whilst surrounded by strangers. Instead, we do so amidst friends, family, and colleagues. Another strength, then, is that we can examine the behavior of these 'majority' participants. Additionally, we can do so using tasks that are more ecologically valid than line judgment, like the memory distortion research showing that co-witnesses tend to conform to each other's opinions (Garry, French, Kinzett, & Mori, 2008). Mori and Mori (2008) even found that an isolated co-witness tended to conform to two other co-witnesses who shared their opinion in a triad co-witness condition.

Another merit of the present procedure is that it provides us a tool to examine inter-personal variables. In the current study, we looked at the influence of scholastic aptitude amongst high-schoolers. But future research could investigate, for example, the social relationships amongst participants to see how these relationships affect the likelihood of conformity. We can even study the effects of a variety of characteristics on conformity among social groups of various ages, ethnics, or cultures.

On the other hand, there is at least one disadvantage to our approach: The procedure requires many times more participants than a traditional confederate-based procedure. In the current study, resource and logistical limitations meant that we could examine only 66

minority participants total across multiple groups. That target therefore required a minimum of at least 264 participants, or—as in our case—even more, because we wanted to avoid participants becoming overly suspicious and communicating across groups. This sample size problem will become increasingly impractical to deal with if researchers require large numbers of people to form the majority—like the group size of 7 confederates in Asch's original work.

Considered as a whole, our findings show that scholastic achievement moderates the rate of conformity amongst high-school students, and that these rates of conformity are similar across males and females. For high-achievers, these results might be considered good news, in that they appear to be most confident and independent in their opinions. But on the other hand, the results are perhaps worrying for low-achievers, who seem most prone to social influence. These students in particular—and possibly the adults they will become—might therefore stand to benefit the most from interventions aimed at increasing their social confidence.

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Table 1

The Number of Participants in the Experimental Groups of the Present Study

Conditions[a)]	Boys		Girls		Total
Main Study	Majority+Minority	Total	Majority+Minority	Total	
HHLH	18+ 6	24	18+ 6	24	48
HHHH	15+ 5	20	15+ 5	20	40
LLHL	18+ 6	24	18+ 6	24	48
LLLL	15+ 5	20	15+ 5	20	40
Sub Total	66+22	88	66+22	88	176
Supplemental Study					
MMMM	33+11	44	33+11	44	88
Grand Total	99+33	132	99+33	132	264

a) The capital letters (H/M/L) denote the scholastic levels; high, middle, and low, respectively. The positions of the capital letters showed the answering orders; HHLH means a low-level student (L) responding in the third order among three high-level students (HH_H).

Table 2

The Number of Participants Who Made More and Less than Median Error Responses in the Three Scholastic Levels

Scholastic Levels	0-3 Errors	4 Errors[1)]	5-12 Errors	Total
High-Level	**15**[2)]	1	**6**[2)]	22
Middle-Level	11	1	10	22
Low-Level	**5**[3)]	2	**15**[3)]	22
Total	31	4	31	66

1) The median of the numbers of errors made by the 66 participants was four.

2) The residual analysis after the $X^2_{(2)}$ test showed a significant bias at the $p < .05$ level.

3) The residual analysis after the $X^2_{(2)}$ test showed a significant bias at the $p < .01$ level.

Table 3

The Number of Participants Who Made More and Less than Median Error Responses in the Four Experimental Conditions

Conditions	0-3 Errors	4 Errors[1)]	5-12 Errors	Total
HHLH	**1**[2)]	0	**11**[2)]	12
HHHH	**9**[2)]	0	**1**[2)]	10
LLHL	6	1	5	12
LLLL	4	2	4	10
Total	20	3	21	44

1) The median of the numbers of errors made by the 44 participants was four.

2) The residual analysis after the $X^2_{(3)}$ test showed significant biases at the $p < .01$ level.

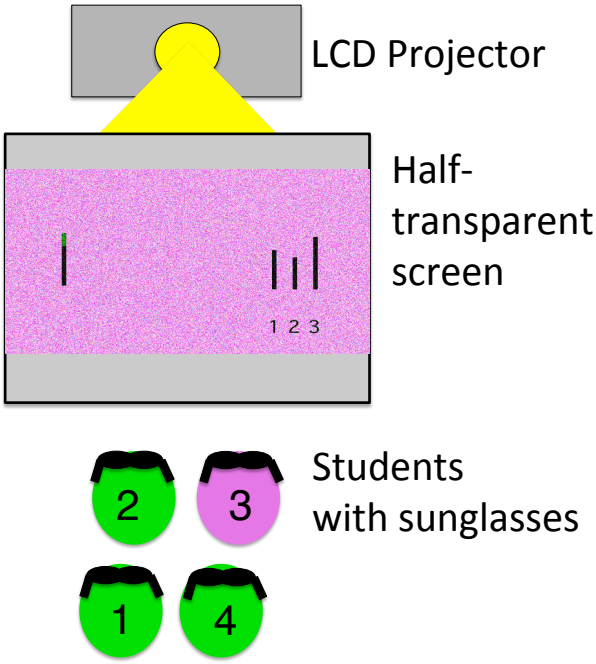


Fig. 1. Diagram of the experimental setting. The top green part of the standard line appears in black with the green-blocking sunglasses while disappears with the magenta-blocking sunglasses. The numbers denote the responding orders. The third responder wore a different type of polarizing sunglasses to observe the line differently than the other three.

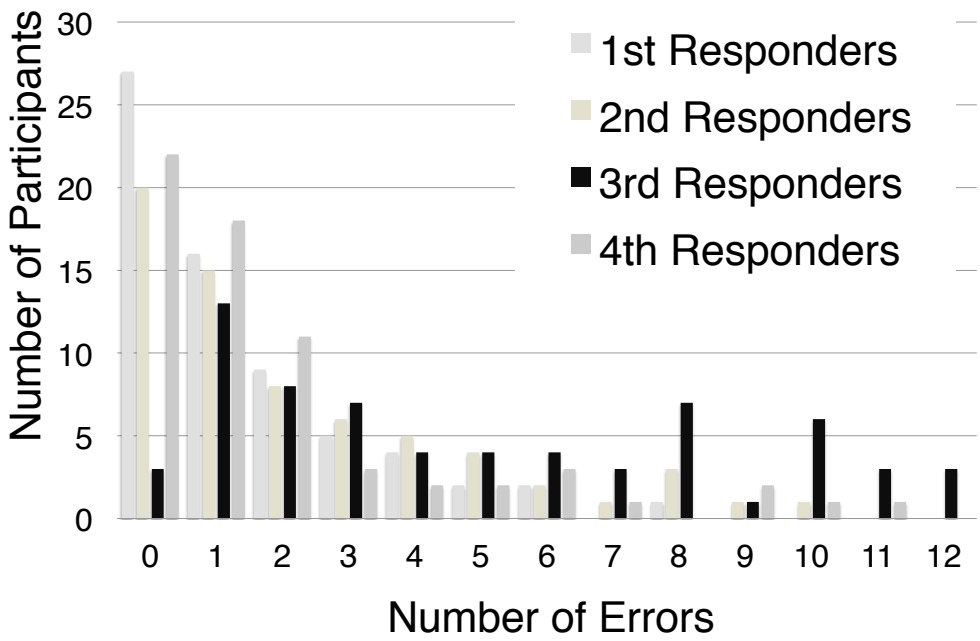


Fig. 2. Distributions of participants sorted with their number of errors for the four responding orders. The third responders were the minority participants (black bars). The distributions of the majority responders are shown in gray bars.

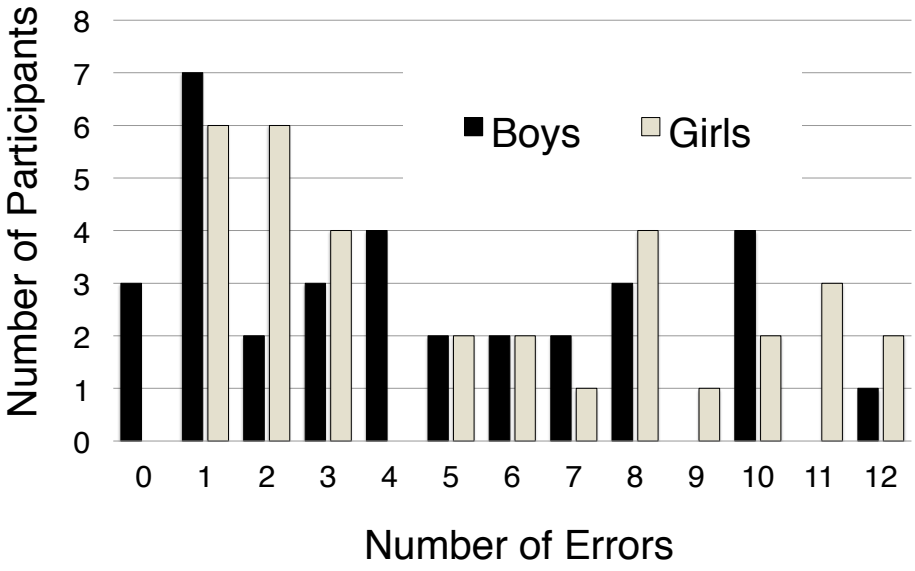
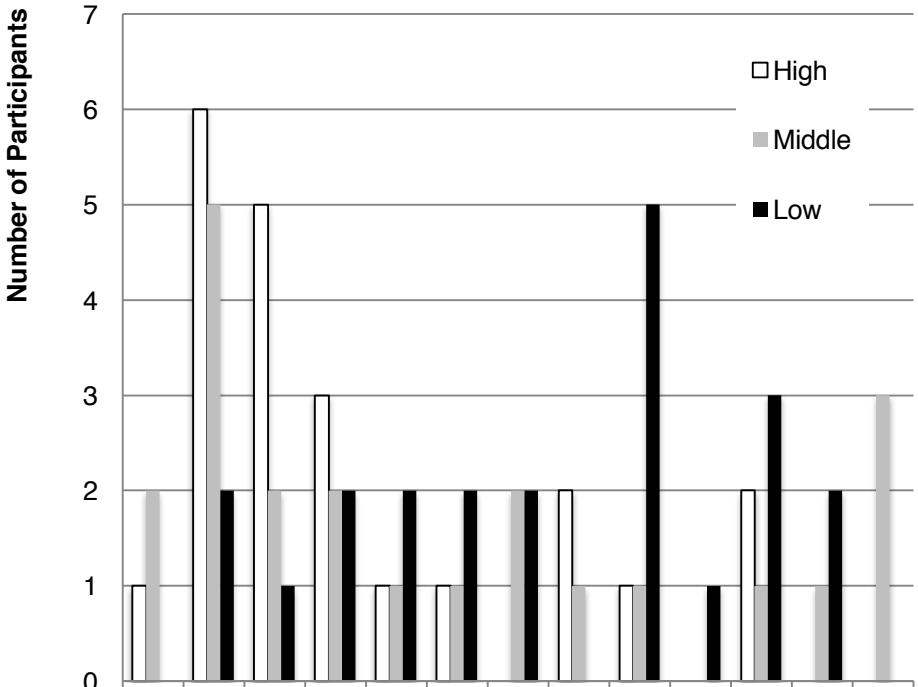


Fig. 3. Distributions of boys (black bars) and girls (gray bars) in the minority condition sorted with their number of errors.



	0	1	2	3	4	5	6	7	8	9	10	11	12
High	1	6	5	3	1	1	0	2	1	0	2	0	0
Middle	2	5	2	2	1	1	2	1	1	0	1	1	3
Low	0	2	1	2	2	2	2	0	5	1	3	2	0

Fig. 4. Distributions of low- (black bars), middle- (gray bars), and high-achievement (white bars) students in the minority condition sorted with their number of errors.

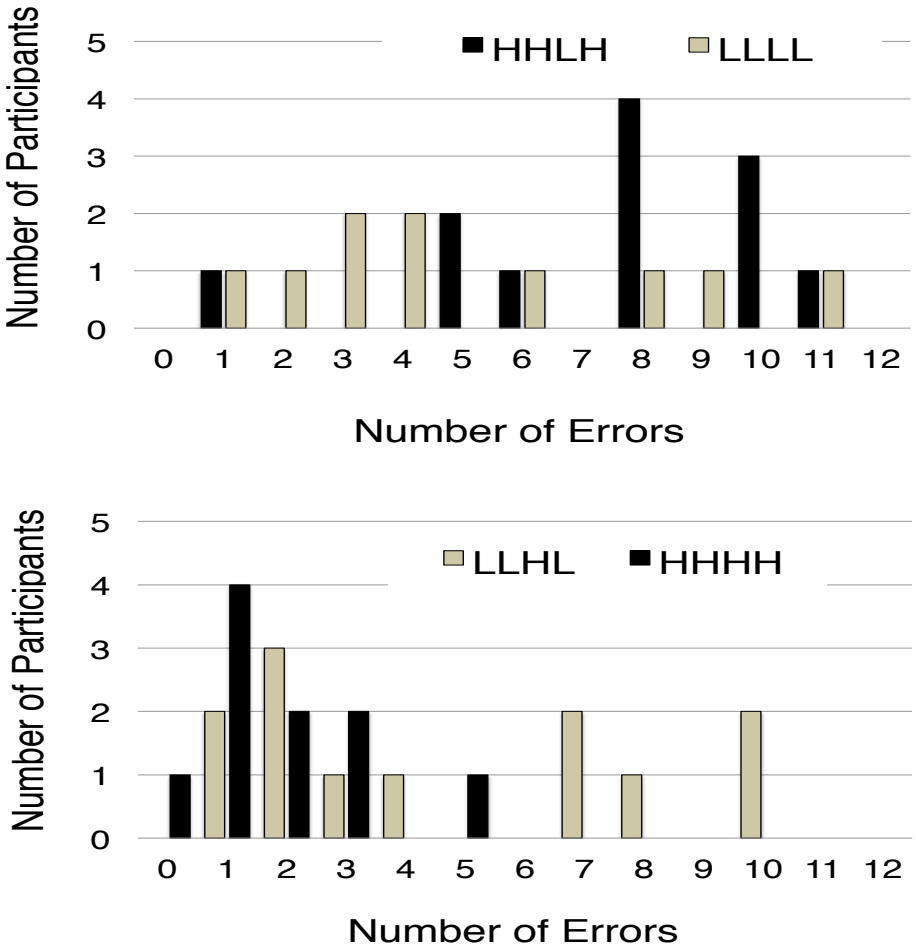


Fig. 5. Distributions of low- and high-achievement minority students sorted with their number of errors. Upper panel shows the distributions of low-achievement minority students among the high-achievement majority (HHLH: black bars) and the low-achievement majority (LLLL: gray bars). Lower panel shows for the high-achievement minority among the low-achievement majority (LLHL: gray bars) and the high-achievement majority (HHHH: black bars).