Risky prospects and risk aversion tendencies: Does competition in the classroom depend on grading practices and knowledge of peer-status?

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Abstract

When students are faced with the decision of whether to assist a peer, they should be sensitive to the potential risks associated with doing so. Two factors associated with risky helping behaviour in the classroom are: 1) the grading practices that are used, and 2) knowledge of a peer's relative status. Normative ("curved") grading creates a situation in which peer-interactions are potentially competitive, but it is only those interactions with peers of a similar status that carry the potential for assistance to be costly to oneself. In two studies, we created hypothetical scenarios in which the grading practices (normative or absolute) and peer-status proximity (proximate, distant, or unknown) were manipulated, and asked participants to report their willingness to cooperate with a peer by sharing their notes from an important lecture. We found that when normative grading was used, individuals were less willing to assist a peer when they knew that the peer's status was proximate to their own. There was also less cooperation when peer status was *unknown*, under normative grading, which is consistent with a risk-aversion tendency.

Keywords: status, uncertainty, risk aversion, heuristics and biases, cooperation, competition

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1. Introduction

An educator's choice of instructional practices has a powerful influence on the motivations, cognitions, and behaviors of students in the classroom (Ames, 1992; Church et al., 2001; Meece et al., 2006; Midgley et al., 2001; Poortvliet and Darnon, 2010; Urdan and Schoenfelder, 2006). In particular, the choice of which grading practices to use will define for students what it means to be successful and how to achieve success. When educators choose a *normative* ("curved") grading method, they will assign grades to students by assessing each student's performance relative to every other student in the class. In effect, this creates a situation where success is defined as being better than one's peers; where a student can only succeed when their peers are less successful than themselves. By contrast, an *absolute* grading method involves assigning grades by assessing each student's performance using predetermined standards of quality. This creates a situation where success is defined as one's mastery of the task at hand, where each student is responsible for their own success or failure independent of every other student.

Decades of social-cognitive research has found that individuals will adapt to the "goal structure" of the classroom and therefore tend to adopt a goal orientation that mirrors how success is defined (Meece et al., 2006). Namely, when normative grading is used, students will tend to adopt a *performance* goal orientation, which leads to a focus on out-performing their peers and a reliance on social comparison information to gauge one's ability; when absolute grading is used, students will tend to adopt a *mastery* goal orientation, which leads to a focus on learning, self-improvement, and mastering the task at hand. A majority of the research on goal

orientations has focused on their association with outcomes related to learning (e.g., Meece et al., 2006; Midgley et al., 2001). Much less attention has been paid to how goal orientations shape the interactions between peers (Poortvliet and Darnon, 2010). The present research contributes to this area by investigating the role of grading practices and peer-status proximity on peer-assistance.

1.1. Normative Grading and Proximate Peer-Status Create a Risky Prospect

Recent studies have begun to examine the association between achievement goals and peer cooperation tendencies (Levy et al., 2004; Porter, 2005; Poortvliet et al., 2007, 2009a, 2009b). Levy et al. (2004) observed that performance-oriented students were generally concerned with their social status and that they evaluated cooperation in terms of how it might affect their status; whereas mastery-oriented students had little concern for status and evaluated cooperation in terms of how it might contribute to learning and friendship. Porter (2005) found that mastery goals were associated with the provision of resources to help a failing teammate. Poortvliet et al. (2007, 2009a) found that performance-oriented individuals were less willing to share information with a peer who was completing the same task, compared to mastery-oriented individuals, and that the information that they did share was perceived to be of lower quality. Thus, performance goals are generally associated with a reduced inclination towards peer-assistance.

Although much of the experimental research on classroom goal structures has tended to view them in general terms of the performance and mastery goal orientations (and some recent research has also added the dimensions of *approach* and *avoidance*, see Meece et al., 2006), it is important to recognize that normative grading does not create a strictly competitive situation. Rather, normative grading creates a situation with "mixed-motive interdependence" (Deutsch,

1949, 2006), wherein some student-peer interactions are zero-sum (Von Neumann and Morgenstern, 1944), in the sense that one student's gain would be another's loss, and other interactions are nonzero-sum, in the sense that one student can gain irrespective of other students. Thus, whether a student will choose to cooperate with a peer in a normatively graded classroom should depend on their assessment of the potential risk or reward of doing so, which in turn should depend on certain factors associated with risk.

Although some previous research has investigated the interaction between performance goals and statuses or ranks (Poortvliet et al., 2009a, 2009b), none to our knowledge have explicitly examined the effect of relative status or *status proximity*, which we argue should be a critical determinant of peer-assistance in a classroom that uses normative grading. When normative grading is used, the likelihood that one student's gain will negatively affect another depends on where each student stands in the class hierarchy relative to each other. When two students belong to different but proximate grade categories, then the lower-status student is likely to gain at the expense of their higher-status peer. For example, if A's are reserved for three students in a class of 30, and two students are ranked #3 and #4, then the higher-ranked student might lose their A-level position by cooperating with their lower-ranked peer. But when students belong to relatively distant grade categories, then it is considerably less likely that the higher-status student will suffer a loss by cooperating with their lower-status peer.

Research suggests that humans generally display a strong tendency for loss aversion when faced with risky prospects (Kahneman and Tversky, 1984), and Burleigh and Meegan (2013) have argued that student decisions should tend to be guided by an aversion to status-loss. In their field study, students were presented with a program for pseudo-randomly allocating bonus points, and framing was used to highlight how the program might cause a peer to "get

ahead" of (or "catch-up" to) them in status. They found that the program received considerably less support when it was framed in terms of how a peer might get ahead, and that students of higher status were more frequently opposed to the program (presumably because they were at greater risk), suggesting that students were uncomfortable with the possibility that their status might decrease. Students might therefore be less willing to offer a peer assistance if that peer is proximate in status to themselves, as this would be an effective strategy to avoid losing one's own status.

1.2. Normative Grading and Unknown Peer-Status Might Prompt Risk-Aversion

Another consideration is how students would behave in a classroom where there is uncertainty about the goal structure or the status of a peer with whom they might cooperate. Research suggests that when humans are faced with uncertainty, decision-making is guided unconsciously by heuristics that are informed by past experiences with similar or analogous situations (Kahneman and Frederick, 2002, 2005). Meegan (2010) found that when students were faced with uncertainty about the grading practices used in a hypothetical classroom, they were biased towards assuming it was normative, despite the fact that participants were themselves students at a university where absolute grading is mandated by policy. Meegan speculated that this bias might be a cognitive adaptation that evolved to facilitate competition for limited resources, leading individuals to err on the safe side. In a similar manner, normative grading creates the possibility that peer-interactions might be zero-sum, but knowledge of peer-status is needed in order to determine the likelihood of zero-sum interaction. If humans have a tendency towards avoiding situations that carry a potential risk, the safe bet would be to assume, in a normative-graded classroom, that assisting a peer of unknown status could potentially backfire, and thus avoid assistance altogether.

1.3. Present Research

In the present article, we aimed to examine these two outstanding questions. First, we examined the role of status proximity in students' decision of whether to assist a peer, when either normative or absolute grading was used. Second, we examined the influence of peer-status uncertainty on students' decision of whether to assist a peer. We generated two hypotheses. First, the *risky-prospect* hypothesis states that students should be unwilling to assist a peer when the goal structure and the peer's relative status combine to make peer-assistance a risky prospect. Second, the *risk-aversion* hypothesis states that when a peer's status is unknown and normative grading is used, students will behave *as if* peer assistance is a risky prospect.

2. Study 1

In Study 1 we tested the risky-prospect hypothesis. Participants were presented with one of several classroom vignettes in which the grading procedures (normative or absolute) and peer-status proximity (proximate or distant) were experimentally manipulated. After reading the vignette, participants were asked to report their willingness to cooperate with a peer by sharing their lecture notes from an important pre-exam lecture that the peer had missed but which they had attended.

The risky-prospect hypothesis posits that students should be unwilling to assist a peer when the goal structure and the peer's relative status combine to make peer-assistance a risky prospect. Thus, we predicted an interaction between grading procedures and peer-status proximity. Under absolute grading, students should be generally willing to assist a peer regardless of that peer's status; whereas under normative grading, students should be unwilling to assist a peer when that peer's status is proximate to their own.

2.1. Method

2.1.1. Participants

In all, 234 individuals from the United States were recruited from Amazon's Mechanical Turk (www.mturk.com) during August 2015.[1] The sample was relatively well-educated and relatively equally represented by women and men (97 women, 137 men; M_{age} = 35.66, SD_{age} = 11.90; 130 had completed post- secondary education, 102 had completed high-school or a GED equivalent, and 2 did not answer the education question). Participants were compensated with $0.75 USD. All participants consented to participate, and the study was approved by the University of Guelph Research Ethics Board (#15OC014).

2.1.2. Materials and Procedure

Participants were assigned to read a vignette that described a classroom scenario. They were asked to imagine being a university student, that they were motivated to get a scholarship, and that in order to receive a scholarship they would need to score 90% or better on their next exam. The first experimental manipulation was the grading procedure that the professor used in the course (normative or absolute). The following text was used:

> **Normative grading vignette.** "In this course, the instructor uses curved grading. Grades are assigned by ranking each student relative to their peers, which means the grade that one student receives can affect the grades that other students receive. In this class of 100 students, only 10 will receive a grade of 90% or better (the students who are ranked #1 to #10); the majority of students (70) will receive a grade in the B or C ranges (70 to 89%); and the remaining students (20) will receive a grade in the D or F ranges (0 to 69%). In

[1] Qualifications were used to ensure high-quality data; individuals could not participate unless they had completed at least 100 MTurk tasks with an approval rate of at least 95%.

other words, this course is a competition among students for a limited number of high grades."

Absolute grading vignette. "In this course, the instructor does not use curved grading. Instead grades are determined based on student performance, which means the grade that one student receives cannot affect the grades that other students receive. All students who answer 100% of the questions correctly on the exams receive a grade of 100%; students who get 90% correct receive a grade of 90%; etc... In other words, this course is not a competition among students for a limited number of high grades."

The scenario informed participants that they were preparing to take the final exam for their last course of the semester, which would determine whether or not they received a scholarship. In this course, the professor provided a special lecture to help students prepare for the final exam, which students in the past had reported to be beneficial. But, as the final exam drew near, a flu outbreak occurred on campus and many students missed the pre-exam lecture due to sickness. Participants learned that they attended this lecture, and that they were an excellent note-taker. However, one student in the class missed the pre-exam lecture and was interested in borrowing their notes. The second experimental manipulation was status proximity (proximate or distant). The following text was used:

Proximate status vignette. "One student who missed the pre-exam lecture wants to know if they can borrow your notes for studying. This student has been performing well in the course so far. On the mid-term, they did slightly better than you did (NORMATIVE GRADING: they are ranked #11, whereas you are ranked #12 // ABSOLUTE GRADING: they received an 89%, whereas you received an 88%). If this

student had your notes to help them study for the final exam, they might get a higher grade than you."

Distant status vignette. "One student who missed the pre-exam lecture wants to know if they can borrow your notes for studying. This student has been struggling with the course so far. On the mid-term, they did much worse than you did (NORMATIVE GRADING: they are ranked #57, whereas you are ranked #12 // ABSOLUTE GRADING: they received a 53%, whereas you received an 88%). If this student had your notes to help them study for the final exam, they might not fail the course."

The dependent variable was participants' self-reported willingness to cooperate with that peer by sharing their notes. Specifically, participants were asked "How willing are you to share your notes with this student?" and provided a 7-point interval rating scale that ranged from "Not at all willing" to "Extremely willing".

2.2. Results

To determine if cooperative tendencies differed between the conditions, a univariate Analysis of Variance (ANOVA) was performed, in which grading procedures (Normative or Absolute) and peer-status proximity (Proximate or Distant) were entered as predictors of willingness to cooperate. Where omnibus tests were statistically significant, t-tests were performed to examine the nature of the effects. Partial eta-squared and Cohen's d were calculated to estimate effect sizes for any statistically significant effects.

The ANOVA revealed an interaction between Grading and Peer-Status ($F(1, 230) = 16.56$, $p < .001$, $\eta^2 = .07$), and a main effect of Grading ($F(1, 230) = 60.53$, $p < .001$, $\eta^2 = .20$). Cooperativeness was lower in Normative-Proximate than Normative-Distant ($t(114.47) = -3.92$, $p < .001$, $d = 0.73$), and did not differ between the Absolute-Proximate and Absolute-Distant

conditions ($t(105.90) = 1.57$, $p = .121$). See Table 1 for a summary of sample sizes, means, and standard deviations.

[Table 1 here]

2.3. Discussion

This experiment was designed to test the risky-prospect hypothesis, which states that individuals should be less willing to assist a peer when the goal structure and the peer's relative status combine to make peer-assistance a risky prospect. Consistent with this hypothesis, we found that participants adjusted their willingness to cooperate based on the risk that peer-assistance might be costly to themselves. Choosing not to assist when normative grading was used and the peer's status was proximate to their own, and generally cooperating otherwise.

3. Study 2

In Study 2 we tested the *risk-aversion* hypothesis, and provided a second test of the *risky-prospect* hypothesis. The methods used in this experiment were similar to Study 1, except for the addition of an *uncertain* peer-status condition. The risk-aversion hypothesis states that when a peer's status is unknown and normative grading is used, students will behave *as if* peer assistance is a risky prospect. Thus, we predicted an interaction between grading procedures and peer-status proximity. Under absolute grading, students should be generally willing to assist a peer regardless of that peer's status; whereas under normative grading, students should be generally unwilling to assist a peer when that peer's status is proximate to their own *or when that peer's status is unknown*.

We had competing predictions about how, under normative grading, willingness to cooperate would compare between the uncertain and proximate status conditions. A strong risk-aversion would be evidenced by similar (low) levels of cooperation between the conditions,

whereas a weaker risk-aversion bias would be evidenced by an intermediate level of cooperation in the uncertain status condition, reflecting the presence of two opposing response tendencies—i.e., some individuals who are risk-averse others who are not.

3.1. Method

3.1.1. Participants

In all, 180 individuals from the United States were recruited from Amazon's Mechanical Turk (www.mturk.com) during January 2016.[2] The sample was relatively well-educated and relatively equally represented by women and men (92 women, 88 men; M_{age} = 34.24, SD_{age} = 11.01; 118 had completed post-secondary education, 61 had completed high-school or a GED equivalent, and 1 did not answer the education question). Participants were compensated with $0.50 USD, and this study was estimated to take approximately 5 minutes. All participants consented to participate, and the study was approved by the University of Guelph Research Ethics Board (#15OC014).

3.1.2. Materials and Procedure

Participants were randomly assigned to read a vignette that described a classroom scenario. The scenario and conditions from Study 1 were used, with the addition of a new unknown peer-status condition. The text for this unknown-status condition was as follows:

> **Unknown status vignette. "**One student who missed the pre-exam lecture wants to know if they can borrow your notes for studying. You don't know how well this student has been performing in the course so far, but you are doing pretty well yourself — almost well enough to receive a scholarship (NORMATIVE GRADING: you are currently

[2] Qualifications were used to ensure high-quality data; individuals could not participate unless they had completed at least 100 MTurk tasks with an approval rate of at least 95%. A script was also used to ensure that none of the participants had previously participated in Study 1.

ranked #12 in the class // ABSOLUTE GRADING: on the mid-term you received an 88%). However, you do know that if this student had your notes to help them study for the final exam, they would certainly perform much better than if they didn't have your notes."

Thus, there were a total of six (2 grading procedure * 3 peer-status) experimental conditions. As before, the dependent variable was participants' self-reported willingness to cooperate with that peer by sharing their notes. Specifically, participants were asked "How willing are you to share your notes with this student?" and provided a 7-point interval rating scale that ranged from "Not at all willing" (1) to "Extremely willing" (7).

3.2. Results

To determine if cooperative tendencies differed between the conditions, a univariate Analysis of Variance (ANOVA) was performed, in which grading procedures (Normative or Absolute) and status-proximity (Proximate, Distant, or Uncertain) were entered as predictors of willingness to cooperate. Where omnibus tests were statistically significant, simple main effects tests and t-tests were performed to drill down the effects. Partial eta-squared and Cohen's d were calculated to estimate effect sizes for any statistically significant effects.

The ANOVA test revealed an interaction between Grading and Peer-Status ($F(2, 174) = 12.35$, $p < .001$, $\eta^2 = .11$), as well as main effects of Grading ($F(1, 174) = 34.07$, $p < .001$, $\eta^2 = .16$) and Peer-Status ($F(2, 174) = 6.40$, $p = .002$, $\eta^2 = .10$). Next, we performed a simple main effects test to compare the Status conditions within each of the Grading conditions. Within the Normative grading conditions the simple main effect of Status was significant ($F(2, 87) = 17.17$, $p < .001$, $\eta^2 = .25$). Within the Absolute grading conditions the simple main effect of Status was not significant ($F(2, 87) = 1.57$, $p = .213$).

To follow-up on the significant simple main effect of Status within the Normative grading conditions, we performed t-tests to examine our a priori predictions that: 1) Normative-Proximate would elicit the lowest level of cooperativeness, 2) Normative-Distant would elicit the highest level of cooperativeness, and 3) Normative-Uncertain would elicit an intermediate level of cooperativeness (or a similar level of cooperativeness to Normative-Distant). In other words, we expected to find:

$$N_{Proximate} < N_{Uncertain} \leq N_{Distant}$$

As expected, cooperativeness was lower in Normative-Proximate than Normative-Distant ($t(56.07) = -5.86$, $p < .001$ (one-tailed), $d = 1.51$), lower in Normative-Proximate than Normative-Uncertain ($t(57.06) = -2.05$, $p = .045$ (two-tailed), $d = .53$), and lower in Normative-Uncertain than Normative-Distant ($t(53.02) = -3.21$, $p = .001$ (one-tailed), $d = .83$). See Table 2 for a summary of mean ratings and standard deviations.

[Table 2 here]

Given this finding of intermediateness with ratings in the Normative-Unknown grading condition, we were interested in determining whether the underlying distribution of responses reflected a unimodal distribution centered around an intermediate level of cooperativeness, or a bimodal distribution indicating the presence of both high and low ratings of cooperativeness. To answer this question, we generated a histogram of the responses. A visual assessment of this histogram, displayed in Figure 1, suggests the presence of two modes at the extremes of the response scale, with relatively few ratings near the mid-point of the scale. Thus, the finding of intermediateness reflected two opposing response tendencies.

[Figure 1 here]

3.3. Discussion

Study 2 was designed to test the *risk-aversion* hypothesis, which states that when a peer's status is unknown and normative grading is used, students will behave *as if* peer assistance is a risky prospect. This study also provided a second test of the *risky-prospect* hypothesis. Consistent with the risky-prospect hypothesis, we found that participants generally chose not to assist the peer when doing so might be costly to themselves, due to normative grading and peer-status proximity). Consistent with the risk-aversion hypothesis, we also found a reduced tendency to cooperate when normative grading was used and peer-status was uncertain. However, the overall level of cooperativeness with normative grading and uncertain status was not equal to normative grading with proximate status, and thus was consistent with a weak risk-aversion bias. Further, in this condition, we observed the presence of two opposing response tendencies, suggesting that some individuals were risk-averse and others were not.

4. General Discussion

In this article, we demonstrated that normative grading practices and peer-status knowledge are both determinants of competitive behaviour in the classroom. When students are faced with the decision of whether to assist a peer, they are sensitive to the prospect that doing so might be costly to themselves. Because normative grading creates a situation in which students are assigned grades based on how their performance compares to the performance of their peers, this means that students will benefit from being selective with whom they decide to cooperate. In Study 1, we found that when normative grading was used, individuals were less willing to assist a peer when they knew that the peer's status was proximate to their own. In Study 2, we found that when normative grading was used there was a reduced tendency to assist a peer even when that peer's status was unknown. These findings are consistent with past research on the effect of

status-proximity on student decision-making (Burleigh and Meegan, 2013), as well as the effect of performance goals on status concerns and cooperation (Levy et al., 2004; Porter, 2005; Poortvliet et al., 2007), and more general assumptions about performance goals and goal structures (e.g., Meece et al., 2006).

The results of Study 1 suggest that peer-status knowledge acts as a moderator of the performance-orienting influence that normative grading has on peer interactions. In terms of creating a more collaborative environment, knowledge that a peer is lower-ranked than oneself might increase a performance-oriented student's inclination to provide that peer with assistance. However, insofar as students, for reasons of privacy and anonymity, are typically not aware of how their peers are doing, most classroom situations should resemble our unknown peer-status condition in Study 2. Therefore, in practice, normative grading is likely to create an environment in which peer-interactions are treated as competitive by default.

4.1. Limitations and Future Directions

One aspect that was held constant in our studies was participants' proximity to a meaningful standard, which past research has shown increases the level of competitiveness (Garcia and Tor, 2007; Garcia et al., 2006). For example, if being ranked #1 is a meaningful standard, then individuals ranked 3 and 4 tend to behave more competitively toward one another than individuals ranked 73 and 74. In the present scenario, the participant was informed that they were at the boundary of receiving a grade of 90%, which was a meaningful standard since it was what they needed to receive a scholarship. Therefore, it would be useful for future research to pursue a more complex experimental design in which status proximity and proximity to a meaningful standard are both manipulated, in order to assess the boundary conditions of status proximity's influence.

Although we have focused mainly on situational and motivational factors in the present article, it is also worth considering the role of cognitive processes. One process that seems promising in the present context is *zero-sum thinking*—loosely defined as the perception that "your gain would be my loss". Zero-sum thinking has been examined mainly in the context of economic reasoning (Rubin, 2003) and negotiations (Carnevale and Pruitt, 1992) where resources are assumed to be scarce, but also more recently in the context of romantic relationships with perceptions of love (Burleigh, Rubel, and Meegan, 2017). Because grading potentially involves the allocation of a scarce resource (grades), there is a potential for individuals to think about grading outcomes as if they were zero-sum, even when faced with uncertainty, as Meegan (2010) has observed. Thus, zero-sum thinking may be one of the cognitive processes that explains the effects observed in the present studies.

5. Conclusions

We believe the practical significance of these studies is straightforward. Classrooms that use normative grading practices may lead to fewer cooperative interactions between students who occupy similar levels of status. This may be detrimental for reasons that are both obvious and not so obvious. To the extent that peer cooperation produces better learning outcomes (e.g., via increased information exchange; see Poortvliet et al., 2007), normative grading may reduce the amount of knowledge gained by students in those classrooms. To the extent that cooperative interactions are opportunities for students to develop the social and emotional skills that allow them to be healthier and more resilient individuals (Zins and Elias, 2006), normative grading practices may produce students who are less skilled with positive social interaction and by extension less resilient to life stressors. In the short-term, students may form fewer positive peer relationships, leading to a reduced sense of belonging and disengagement from school. In the

long-term, as many students will graduate into professional lives where they will work on or manage teams, experiences with competitive classrooms may leave them ill equipped to do so. Teachers and educators should be aware of how grading practices influence school culture and what the effects of classroom goal structure may have both on students' mastery of course material as well as their development as social beings.

These findings may also be relevant to other social contexts where some form of performance evaluation is used to allocate rewards, and where cooperation and information exchange would be desirable. For example, in organizations where individuals may receive promotions or salary increases for good performance, it may be important to consider carefully how performance is operationalized. If rewards are allocated on the basis of one's relative output, then this will hinder cooperative tendencies; but if rewards are allocated on the basis of outcomes that are attained independent of (or interdependent with) others, then this will instead promote cooperative tendencies. Thus, managers should also be aware of how performance evaluation systems may influence organizational culture, cooperative tendencies, and improve or hinder collective performance.

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Figure 1

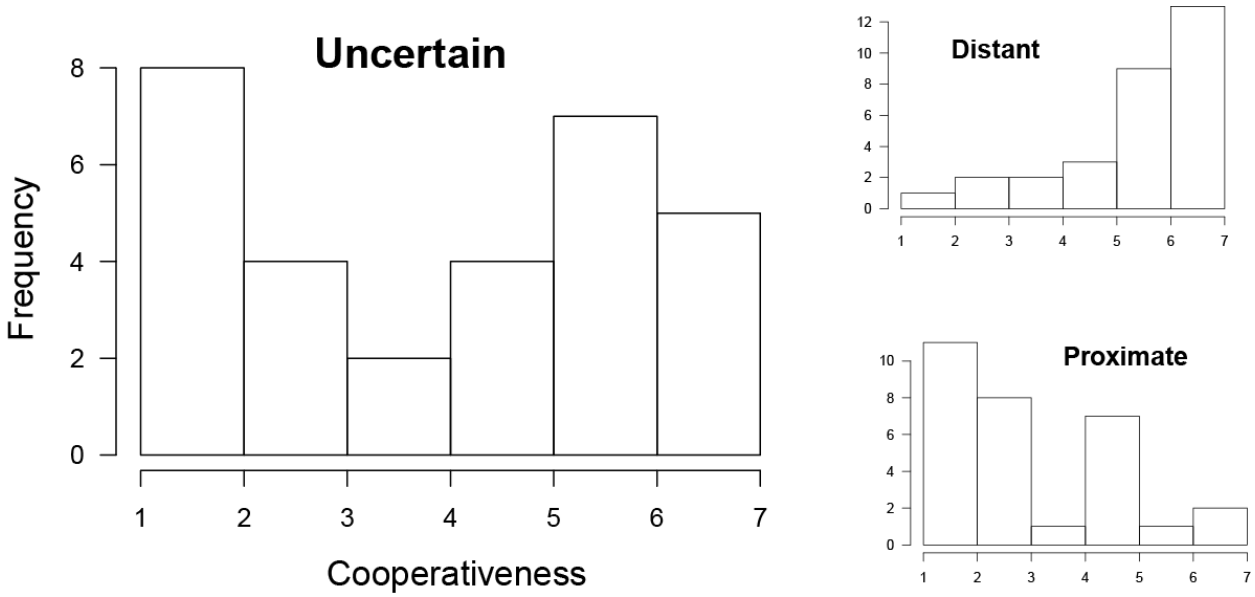

Figure 1. Histograms of responses in the Normative grading conditions, indicating the presence of a bimodal distribution in the Uncertain condition, and unimodal distributions in the Distant and Proximate conditions.

Table 1. Sample sizes, means, and standard deviations for Study 1.

Grading	Status	N	M	SD
Normative	Proximate	61	3.79	1.86
	Distant	56	5.13	1.83
Absolute	Proximate	60	6.18	1.13
	Distant	57	5.81	1.45

Table 2. Sample sizes, means, and standard deviations for Study 2.

Grading	Status	N	M	SD
Normative	Proximate	30	3.30	1.82
	Distant	30	5.83	1.51
	Uncertain	30	4.33	2.07
Absolute	Proximate	30	6.10	1.00
	Distant	30	5.93	1.44
	Uncertain	30	5.50	1.53