

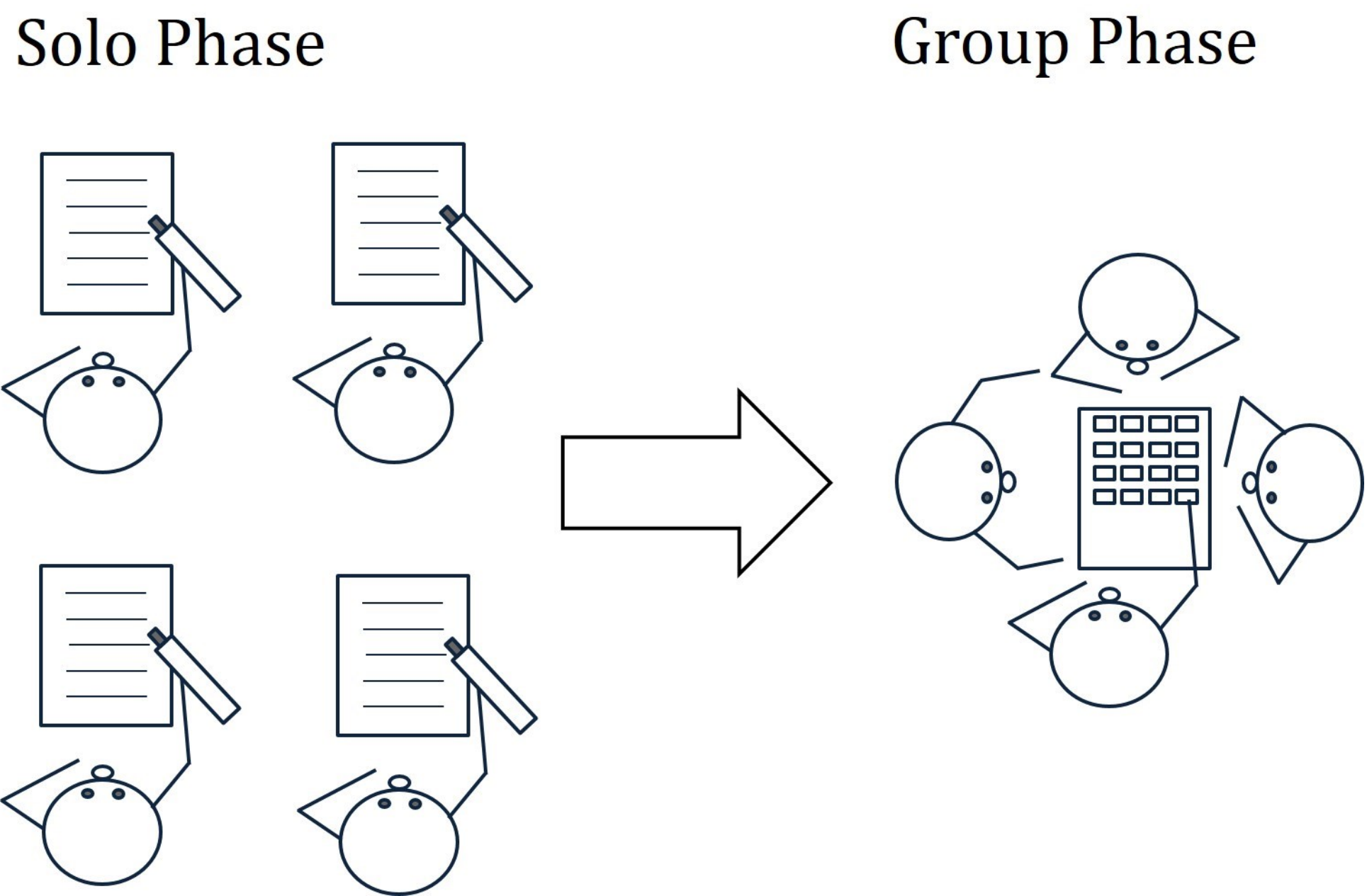


Examining Student Participation in Two-Phase Collaborative Exams through Video Analysis

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Context

Video was recorded for 27 groups in the group phase of various two-stage exams (ranging from 10-26 group questions) from 2 different introductory physics courses.



Coding the Video

The unit of analysis for coding was individual student participation for each question.

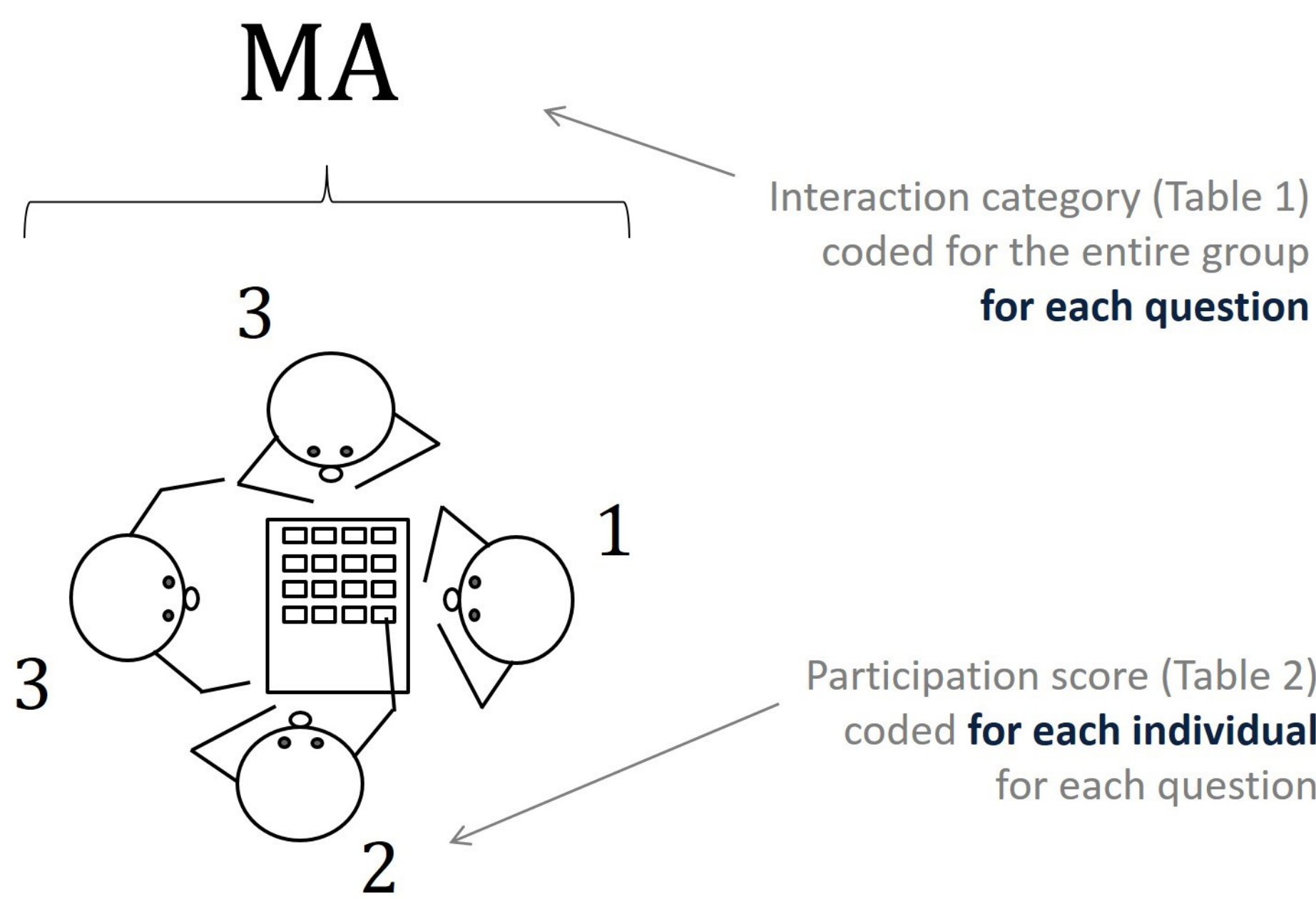


Table 1. Summary of the interaction categories.

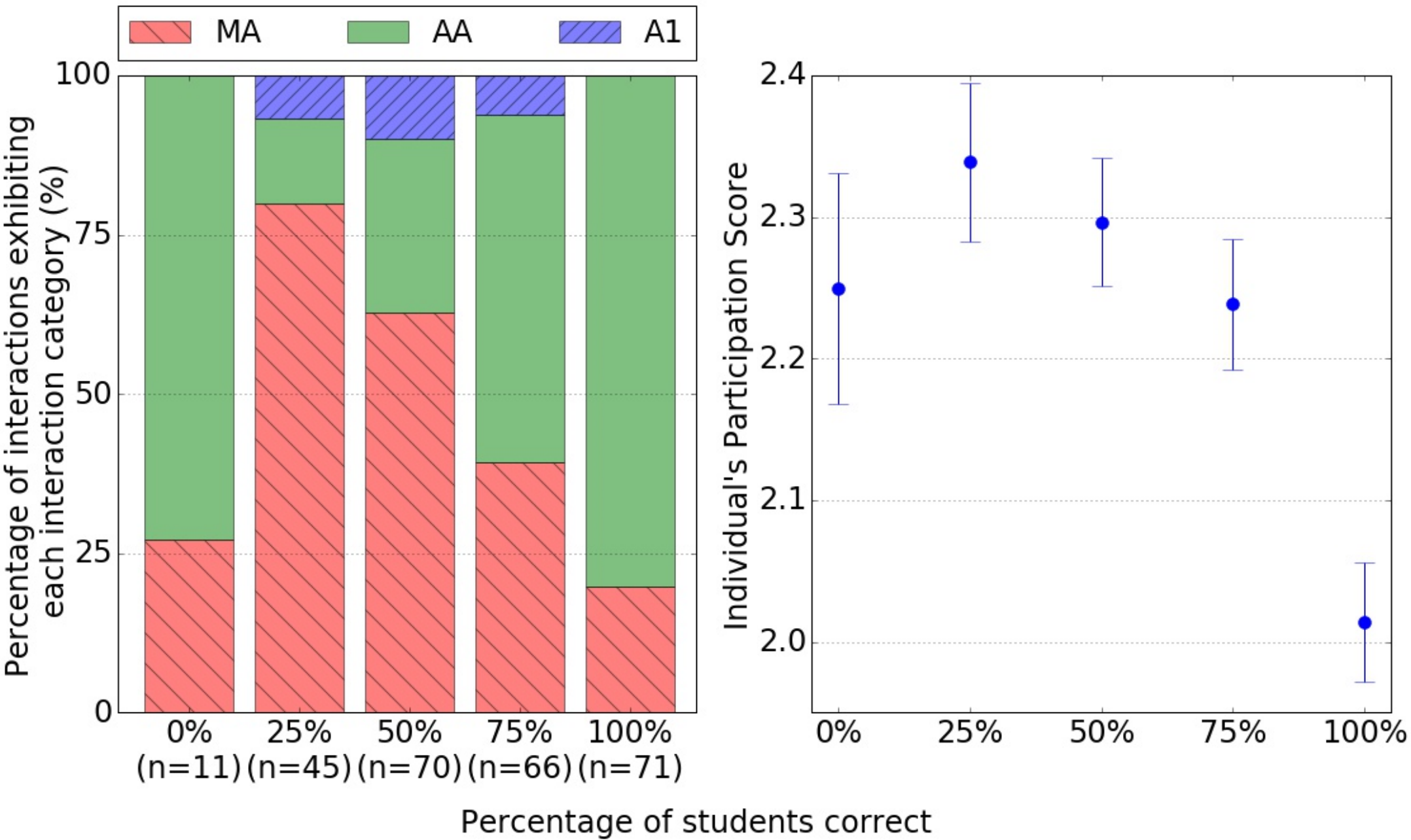
Code	Description of group interaction
A1	One person dominates the group discussion and no other members of the group ask any questions of significance.
AA	Multiple members of the group state their solo-phase answer and the group chooses their answer without any significant discussion.
MA	A variety of interaction types where multiple group members are interacting using a combination of asking questions, offering different viewpoints or explaining their reasoning.

Table 2. Summary of the participation rubric descriptors.

Score	Description of student's participatory behavior
3	Asks questions or provides answers with explanations
2	States their answer or assists in explanation
1	Visibly engaged but silent or intermittently engaged
0	No interactions with the group

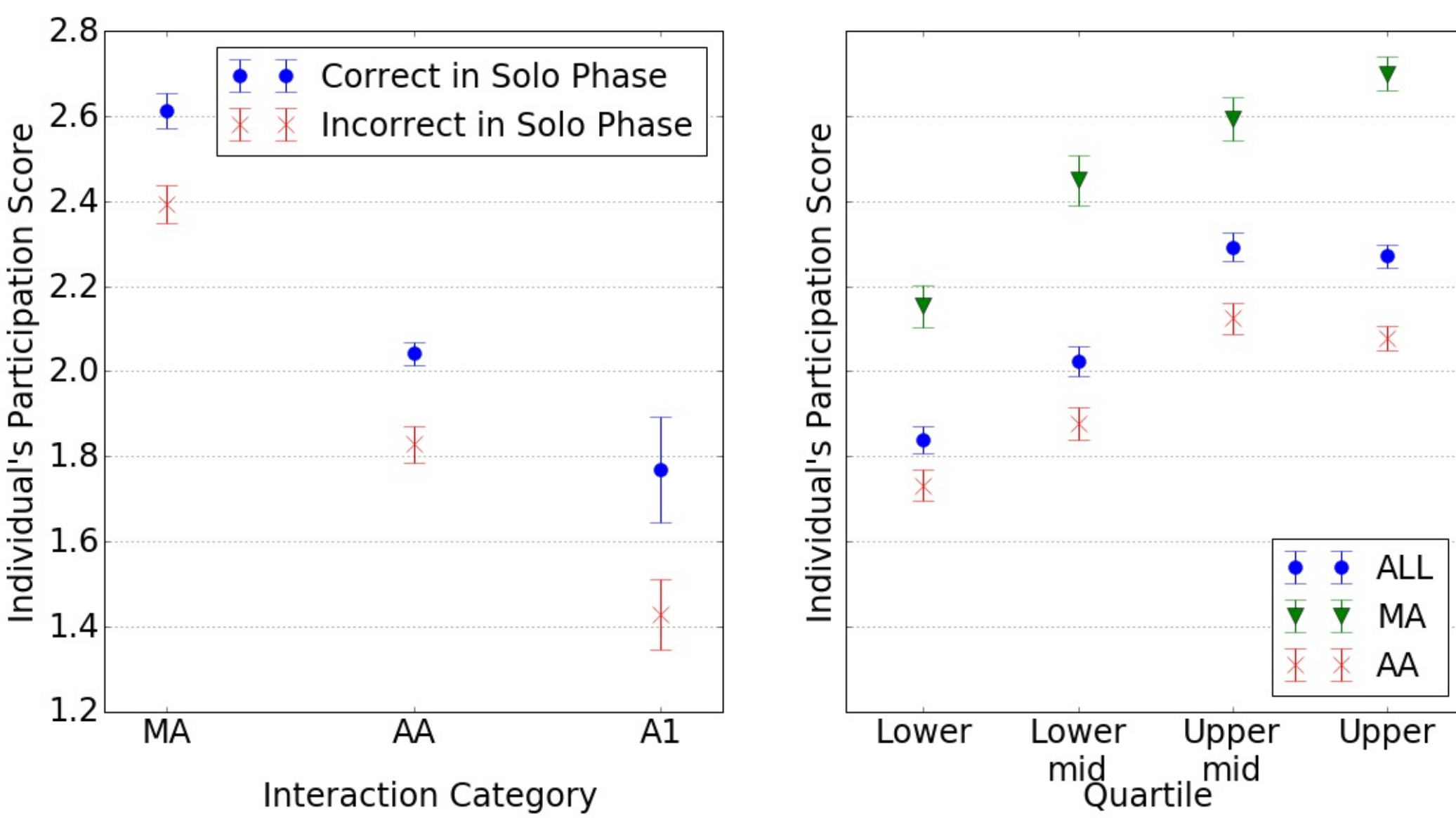
Results

There was high participation overall. There was maximum participation when there were diverse opinions in the group.



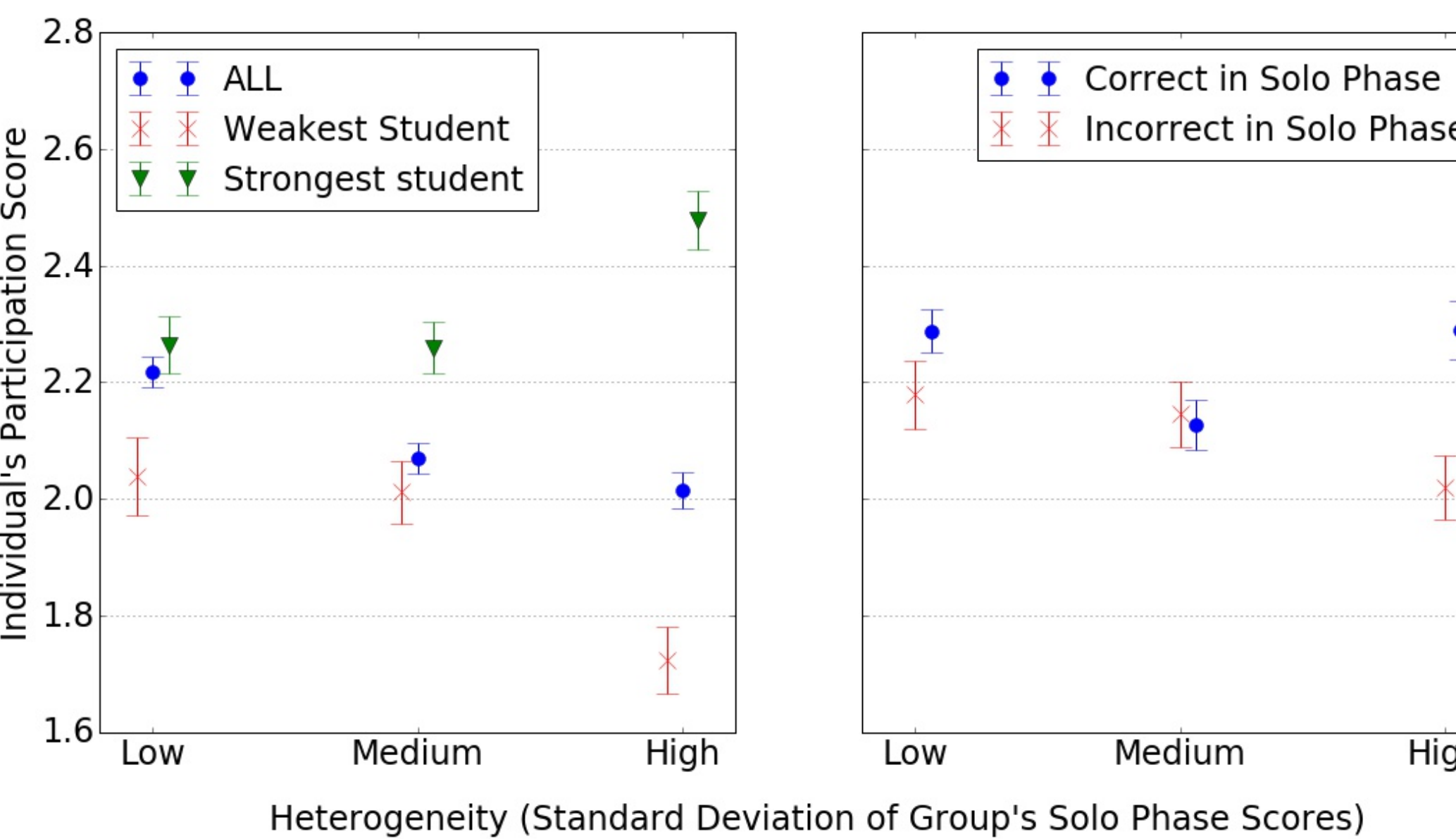
Percentage of interactions in each interaction category, broken down by the fraction of students in the group answering the question correctly on the solo phase of the exam (left) and participation scores for fraction of students correct (right). Groups of 3 were not included in these plots due to the small number of questions coded (N=53) for that group size. Participation scores are ordinal, but we visualize uncertainties as SEM as if they were interval scale

Stronger students and students correct in the solo phase participated more.



Comparison of the participation scores for individual students, broken down by interaction category. On the left is a comparison of participation when the individual student was correct or incorrect on that question in the solo phase. On the right is a comparison as a function of student performance on the solo phase of the exam, as grouped by quartile on that exam. Uncertainties are SEM.

Heterogeneity of student ability may amplify the participation differences of students with different abilities.



Participation scores as a function of group heterogeneity, as measured by the standard deviation of the group's solo phase scores. The scores in the right panel are a subset of those from the left panel because questions from the solo phase that involved partial marks (e.g., longer computational problems) were not included in the correct/incorrect part of the analysis. All uncertainties are SEM.