Previous research shows that students struggle to develop probabilistic reasoning. In this study, our goal was to further investigate as well as expand students' understanding of compound probabilities. Our research questions were: (i) How do children's pre-existing notions of probability influence their probabilistic problem solving?; and (ii) What sequence of teaching methods can develop children's thinking about empirical and theoretical aspects of compound probability situations? The study participants had completed sixth grade and were entering seventh grade. Each student was given a pre-interview before specially designed teaching sessions took place. It was evident during the pre-interviews that students understood fairness in a colloquial rather than normative sense. They also lacked strategies for determining sample spaces in compound probability situations. To develop students' understanding of fairness, compound probabilities, and experimental and theoretical probabilities, we taught seven weekly one-hour lessons. Post-interviews were administered after the instructional sequence. All interactions with students were video recorded, transcribed, and analyzed qualitatively. Our weekly analyses of data were used to inform the design of each lesson. We employed a sequence of progressively more sophisticated games to engage students in reasoning about statistical variation, expected value, organized lists, and tree diagrams. By the conclusion of the study, each of the students demonstrated expanded notions of fairness and were able to determine sample spaces for certain compound probability situations. Some students still struggled to see similarities across isomorphic compound probability games, suggesting it would be fruitful to engage students in explicitly comparing such games in future research.

Poster available online: https://www.salisbury.edu/administration/parents-family/_files/SU-19-Groth-group-poster.pdf