Specific tastes or cliques of jurors?
Designing scoring and voting systems resistant to manipulation.
Description for the general public.

"Surprise result in music competition!" "Public favorite eliminated in third round!" Sensational headlines like these frequently appear in articles on the international Chopin and Wieniawski competitions. Juries often make decisions that comply with the regulations yet defy the expectations of the public, and sometimes the cognoscenti as well. Both the daily press and specialist publications frequently speculate on the possibility of jury members having come to prior agreements. Only a dictatorial system (i.e. one with a single juror or voter) can prevent this sort of manipulation (Gibbard-Satterthwaite theorem). Other systems are susceptible to a greater or lesser extent. In the work conducted prior to submitting this grant, Kontek and Sosnowska (2018) have shown that some jurors in the 2016 Henryk Wieniawski International Violin Competition are suspected of having exploited a weakness in the voting system to manipulate the final results.

This project aims to design scoring and voting systems that are resistant to manipulation by experts or jurors. The study will be focused on the systems used in classical music competitions, as this area of research, hitherto focused mainly on political elections, is poorly represented in the academic literature. These are however selected only as an example of expert evaluations. The analysis conducted with the assistance of this grant could easily be extended to other areas, e.g. sport, design projects, and other competitions evaluated on the basis of subjective expert opinions.

The systems currently used in practice (e.g. the Borda count, approval voting) and the ones proposed in the project will be analyzed by applying the tools of mathematical economics and social choice theory. Tools of mechanism design theory will be applied to design systems resistant to manipulation. Experiments and computer simulations will be conducted to test the systems for their resistance to manipulability. Methods based on graph theory will be proposed to identify cliques of experts or jurors. The properties of the graphs obtained using real data will be examined in order to e.g. identify those jurors central to the formation of cliques. The game theory approach will be used to explain the voting schemes observed in experiments and in real competitions. The axiomatic foundations of the most resistant systems will be provided.

The project is original and integrates both theoretical and experimental research. It is multi-disciplinary, as it integrates concepts and tools from various areas of mathematical economics, statistics, social choice theory, graph and network theory, game theory, mechanism design theory, theory of decision-making and even psychophysical judgments. The anticipated results should have a considerable impact on the development of research in all of those areas, may contribute greatly to our understanding of expert decision making, and possibly extend the sub-field of research devoted to scoring and voting systems designed specifically for expert evaluations. From this viewpoint, the anticipated results of the of the research assisted by the grant are expected to be of great interest to a wide audience of researchers on social choice, will be presented at national and international conferences and should be published in the leading internationally renowned journals from the Journal Citation Reports list.

Apart from the theoretical implications, the systems and methods proposed in the grant application could serve to conduct fair and trustworthy competitions not only in music (or art generally), but in many other areas, e.g. elections in educational institutions or professional and technical societies, sports awards, and some political elections. Research on the manipulabilty of competition results and its main results should also appeal to the daily press and a wide range of non-professionals due to its "hot" topic. The research will potentially popularize the use of mathematical economics in real-life applications, and the role of the National Science Centre as a body that finances this kind of research.