

Report on the outcomes of a Short-Term Scientific Mission¹

Action number: CA 22145 Computational Techniques for Tabletop Games Heritage

Grantee name: Lisa Rougetet

Details of the STSM

Title: Study of Mathematical Games in the 1930s centered on Maurice Kraitchik

Start and end date: 20/01/2025 to 29/01/2025

Description of the work carried out during the STSM

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

(max. 500 words)

Grantee enters max 500 word summary here.

The STSM in Lisbon with Tiago Hirth enabled us to finalize an article on the Belgian mathematician Maurice Kraitchik (1882-1957), which we had already begun. This work presents previously unpublished biographical elements gathered during an archival visit to Brussels begun in 2021. It is due to be submitted shortly to the journal *Historia Mathematica*, and fits in perfectly with the activities of WG4 “Mathematics in Games”. Maurice Kraitchik was a major player in the field of French-speaking recreational mathematics in his day.

During my stay, Tiago and I also began work on a mathematical and historical analysis of two board games featured in the recreational journal *Sphinx* (published between 1931 and 1939 by Maurice Kraitchik): *Ruma* and *Tricolor*. These games were the subject of a joint communication at the Recreational Mathematics Colloquium (January 27-29) and aroused the interest of the participants, confirming our decision to pursue our research on this subject (see below for details). *Tricolor* and *Ruma* are interesting in several respects: firstly, they became known through the *Sphinx*'s contests, an original means of distribution. These games are therefore at the interface between the mathematicians (who described or invented them) and a wider public of recreational mathematicians, who could buy the games (*Tricolor* could be purchased from the

¹ This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

Sphinx bookshop) but also reflect on the winning strategies and share them with the *Sphinx* readership by publishing their ideas. The analysis of these games also feeds into one of the questions posed in WG2, namely to determine how mathematics are used in games and what the evidence from history can tell us about the use of mathematics in the games of past societies. Moreover, these two games are currently absent from the Ludii database: adding them will not only enrich it (work in progress for *Tricolor*), but will also enable us to compare historical mathematical analysis with the strategies developed by AI (direct link with WG1).

The STSM has also enabled us to tackle a project of more considerable scope dealing with the field of mathematics known as Mathematical Recreations. Reflection on the definition of this field of mathematics (what does it cover? since when has it existed? in what forms? who practises it? how? etc.) is proving necessary, so much so that the literature on the subject seems to have difficulty in finding a consensus. The reflection begun in Tiago Hirth's Ph.D. thesis seems a good starting point, with the identification of numerous sources (primary and secondary). However, we still have no precise ideas as to how this project might take shape (study day and proceedings? thematic issue in a journal? to be defined at a later date).

Finally, we have defined more precisely the content of the WG4 Summer School, scheduled for the week of June 30 to July 4 in Glasgow (see details below).

Description of the STSM main achievements and planned follow-up activities

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

- Main achievements

- finalization of the article on Maurice Kraitchik: forthcoming submission to *Historia Mathematica*

- joint presentation on the two board games *Ruma* and *Tricolor* to an audience of recreational mathematicians at the Recreational Mathematics Colloquium

- Planned follow-up activities

- Following the very positive response to our paper at the Recreational Mathematics Colloquium, we would like to publish what we have already done in *Board Game Studies Journal*, and then take this work a step further in the following two directions. 1) Propose collaboration with WG1 to implement *Ruma* and *Tricolor* in Ludii. We would like to subject them to an analysis with Ludii's AI, to understand the underlying strategic mechanisms and compare them with the strategic elements determined by Maurice Kraitchik at the time (1930s). 2) Propose an intervention as part of the WG2 webinar to feed their interest on the knowledge of the use of mathematics in games from previous societies.

- Summer School programming for WG4. The STSM helped define the themes that could be addressed during the Summer School, as well as the trainers. (Combinatorial Game Theory: Aline Parreau (FR), Eric Duchène (FR), Carlos Santos (PT), Miloš Stojakovic (RS); Game Theory: Ori Davidov (IL); Graph Theory; Jessica Enright (UK);

Mathematical Analysis of Games: David Richeson (US/UK), Georg Grasegger (AT), Jorge Nuno (PT), Emin Durmishi (MK); History of Mathematical Games: Lisa (FR), Tiago (PT), Jorge Nuno (PT), Carla Cardoso (PT); Games in Mathematics Education: Martijn Bousse (NL)). Most of the identified trainers are already Cost Action members.

- Consider publishing of a collective book with several contributions following the Summer School: 4/5 categories with 3/4 chapters each. Maybe a second book with active research papers.