

Sci-Me! - Board Game and Card Game from the Life of a Scientist

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In the board game Sci-Me!, you build up your own scientific laboratory, hire people to do research for you and try to get as many grants as possible to fund your research. Since publications are the scientific currency, your main goal is to publish your scientific findings. Our game is a concept game designed for educational purposes. All actions in the game and their meta-level meaning are also explained in the interpretation book. In Sci-Me! we have different complexity modes to catch non-scientists, budding scientists as well as established scientists. The game is available as a digital prototype, a board game and a simplified travel version. Sci-Me! can also be extended with further add-ons to address specific areas of research or to emphasize different mechanics such as grant applications or open science.

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1. Introduction

One of the tasks of science is to communicate new results. Lately, science communication is on the rise and there are a lot of activities promoting various new findings. However, a crucial part of this process is trust, because without it communication is impossible. During the recent years, we could fully see the amount of mistrust towards scientists and scientific results in the society. However, this was much less frequent among scientists themselves. In general, researchers tend to believe and rely on opinions of other experts. The reason for this is that the researchers follow a uniform set of guidelines which are universal and independent of discipline. We are attempting to convey the everyday life of a scientist using our game Sci-Me! [2–4].

2. The board game

Three years ago, we have started developing the board game Sci-Me! with the goal to communicate how work in academia looks like. Originally, board game enthusiasts and high schools were our primary target group. However, during the course of playtesting we have decided to shift primary target group to university students who consider staying in academia. During the playtesting we have also obtained very positive feedback from people working in academia who found themselves in the game and agreed on the presentation of a scientist's everyday life.

2.1 Overview

The science educational board game Sci-Me! is a resource management and worker placement eurogame for 2 to 4 players. It lasts between 30–45 minutes per player. It is played over the course of 12 rounds. The goal of the game is to build up a laboratory/research group and have the most victory points at the end of the game. The victory points are awarded for successful publications. The players have two main limited resources at their disposal. The first one is money corresponding to the budget available to a research lab and knowledge which represents either results of experiments or theoretical calculations. During each round, players have 5 time tokens representing various activities players can focus on. Each action has a counterpart within the career of a researcher. The actions are summarized in Table 1.

Some of the actions have inherent randomness included in them. The process of publishing has a random element corresponding to the unpredictability of the reviewers. The grant application process has also a random component corresponding to the subjectivity of reviewers and unknown quality of other submitted proposals.

The game is designed in a modular fashion which allows gradual increase of complexity as well as testing how different aspects change the strategy of players. Currently we have several modules summarized in Table 2.

3. The card game - travel version

During the initial playtesting at several high schools we have found out that the full board game is too complex and long to be used within the classroom. However, we wanted to be able to convey at least some aspects of the life of a scientist. We started to work on a shorter travel version of

Action	Description
Do research	Player's character does experimental or theoretical work.
Hire staff	A player admits undergraduate student or hires a doctoral student or postdoctoral researcher into their research group. Staff members generate knowledge, but they require time tokens for consultation, money for salary or both.
Collect results	A player exchange knowledge tokens for finding cards representing analysis of obtained data or information. Finding cards can be either kept secret with the player or placed to preprint board for other players to use representing the principle of open science.
Buy equipment	Buy an equipment to your lab.
Publish	A player forms a meaningful equation out of available finding cards. This corresponds to writing a paper out of available results. After successful per review process a player gains a publication and discard used finding cards.
Collaboration	A player uses theirs finding cards together with cards of another player from preprint board and tries to publish a paper. In the case of success, both players obtain half of the victory points.
Read up	A player study books and journals and receives a literature token which improves odds of publishing and grant applying.
Apply for a Grant	A player spends a number of time tokens to write a grant proposal. At the end of the round the best grant application receives the funding for the given number of following rounds.
Teach students	Gain money for teaching a class at university.

Table 1: Table of actions (board game)

Module	Description
Surprising cards	The cards are drawn on several occasions during the game corresponding to random events out of a player control. They increase randomness.
Preprint board	Players have a possibility of sharing their finding cards with others on the preprint board showing advantages and disadvantages of open science. This module increase interactivity between players.
Common goal	This module transforms a game from competitive into semi-cooperative mode. With this module active the players must solve a crisis presented on the additional board by publishing relevant results. In the case they are unsuccessful everyone loses.

Table 2: Table of modules

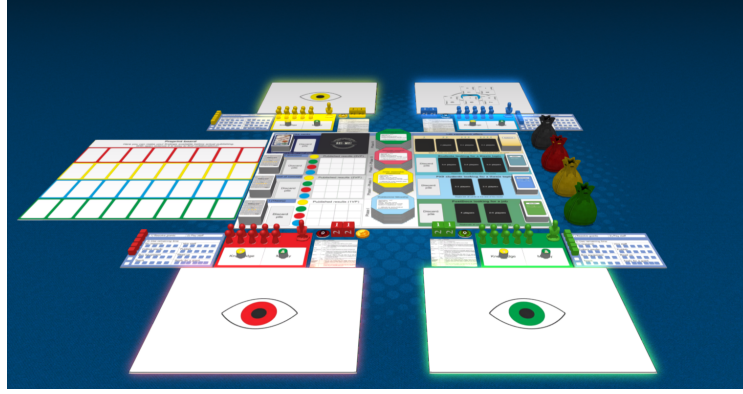


Figure 1: Screenshot of digital prototype [1]

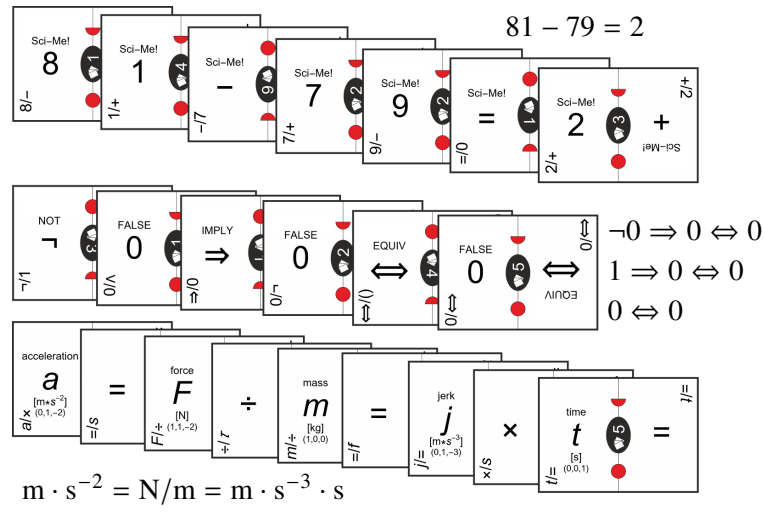


Figure 2: The example of different variants of card game. From top to bottom - arithmetic, logic and dimensional analysis

the full game where we focus only on the publication process. The travel version of the game is designed in such a way that it can be used to practice various topics with only one set of rules and several sets of the cards.

3.1 Overview

The game is created in such a way that the rules can be learned in few minutes and one game takes around 15-20 minutes. The game conveys process of scientific publishing. The game consists of cards which represent scientific findings used to form papers to be published. In the course of the game each player takes two actions one after another. The actions are summarized in Table 3. The game ends when one player obtains third publication [4].

3.2 Variants

The principle of the game is to form a meaningful sequence out of cards from a specific domain. This allows for various topics to be used as a foundation for the faces of the cards. This

Action	Description
Investigate	Player's character does experimental or theoretical work and draws two cards.
Study	A player study books and journals and takes a top card from a discard pile and places it in the draft of their paper.
Write	A player works on a draft of a paper by placing, replacing or rearranging cards in the draft of the paper in front of them.
Publish	A player tries to send theirs draft formed from cards to a journal. The paper undergoes per review process. In the case of success, a player discards the cards from the draft and receive one publication. Per review process is random where longer publications (publications with more findings) have higher chance of success.
Collaborate	A player combines their draft with a draft of another player and tries to publish combined paper. In the case of success, both players obtain half of the publication.

Table 3: Table of actions (card game)

is advantageous for educational purposes because it is enough to learn the rules once and then it can be used to practice various different topics with simple exchange of a deck. Currently, we have several different versions of the game in the form of prototypes and one published version. There are three examples on Figure 2. The first example is the simplest variant for elementary school children where one forms simple mathematical equations using only addition, subtraction and equal signs. This version can be easily extended to more advanced mathematical operations. The second example in the middle focuses on mathematical logic. It can be easily used to learn and practice forming of true statements during mathematics courses at high school or even university courses. The last shown example deals with dimensional analysis in physics. It is a very useful tool which can be used as a first check if the physics formula is correct or not. The shown example of the physics version uses units from classical mechanics.

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