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Influence of a board-game narrative framework on student's narrative writing in the context of evolution teaching

Magali Coupaud, François Dessart, Fabienne Paulin, Catherine Bruguere, Alice Delserieys

Preferred strand:

8. Writing, speaking, reading and argumentation

Rationale

This research studies the narratives of lower secondary school students after playing a board-game about evolution integrated into educational resources for lower secondary school. The board-game 'Darwinium' was designed by a team of researchers and teachers and places middle school students in the fictional situation of researchers observing the evolution of fictional animal populations placed in an experimental dome. The game mechanics and the story it tells is considered a "narrative framework" (Author, 2021). In other words, it sets the initial situation, a set of theoretical and methodological standards on which the players/students can base the reconstruction of future events. During a game play, players have to report on the evolution of their fictional animal population in verbal narrative form and graphic form. This project is based on previous work that has highlighted the difficulties in apprehending the theory of evolution of living things and the ideas of chance that are linked to it (Author, 2018; Fiedler, Sbeglia, Nehm & Harms, 2019).

A previous study (ESERA, 2023) revealed that after playing the game Darwinium, some students express an understanding of certain important ideas related to evolution in accordance with scientific knowledge. The game seems to enable students to consider the question of randomness in the evolutionary process, even though for some this idea of randomness coexists with their finalist conception of evolution. There was also an absence of the idea of contingency in the explanations of evolution.

Key objectives

The purpose of this paper is to study how the narration unfolds in students (13-14 years old) writings after a play activity about the mechanisms of evolution. The hypothesis is that the "narrative framework" given by the elements of the game influence the narrative texts produced by the students and the way they consider what is possible in the game, and in particular how they consider the idea of contingency.

Narrative framework of the board-game Darwinium

The board-game Darwinium, designed for this project, engages students in a fictional scenario of experimental evolution where players study changes occurring in a fictional

experimental population placed in an experimental dome in response to conditions imposed by the player but not totally controlled.

The salient elements that defines the “narrative framework” are:

- populational thinking: the narrative of the game and texts found in the element of the game never mention individuals but rather use groups of animals
- generational change: a timeline is not expressed as such, but the game introduces a temporality through the succession of generations in the population of animals
- material artefacts manipulation that introduce random processes: 1) Tokens, representing various traits of the populations of the game, thrown in a dice tower (random distribution of alleles during reproduction) (see fig. 1.1). 2) Preparation of the number of tokens to throw in the dice tower (contingency of natural selection). 3) “Traits” cards drawn depending on the sorting result of the dice tower (random mutations) (see fig. 1.2). 4) "event" cards randomly drawn (see fig. 1.3).
- modification of the environment: players can move their population to a different environment and “event” card impact the conditions of the environment.



Figure 1. Overview of parts of the Darwinium board-game. (1.1 token thrown in the dice tower (left) and selected (right), 1.2 “Trait” card drawn, 1.3 “Event” card drawn)

Methods

The proposed methodology is based on the analysis of the narrative writings produced by 57 students (13-14 years old) during a debriefing session after a game session of "Darwinium" conducted in a biology class. During a debriefing session, students are asked to write the story of their population, to express their understanding of what happened during the game and how it related to evolution. This study analyses a selection of narrative texts (N = 30) that feature either ideas of chance in evolutionary

processes or obstacles related to chance in evolutionary processes (finalism), or both, with the aim of highlighting the ways in which these texts fit into the narrative framework set up by the game (see fig. 2). The narrative texts were then analysed on the basis of structural and functional narrative criteria.

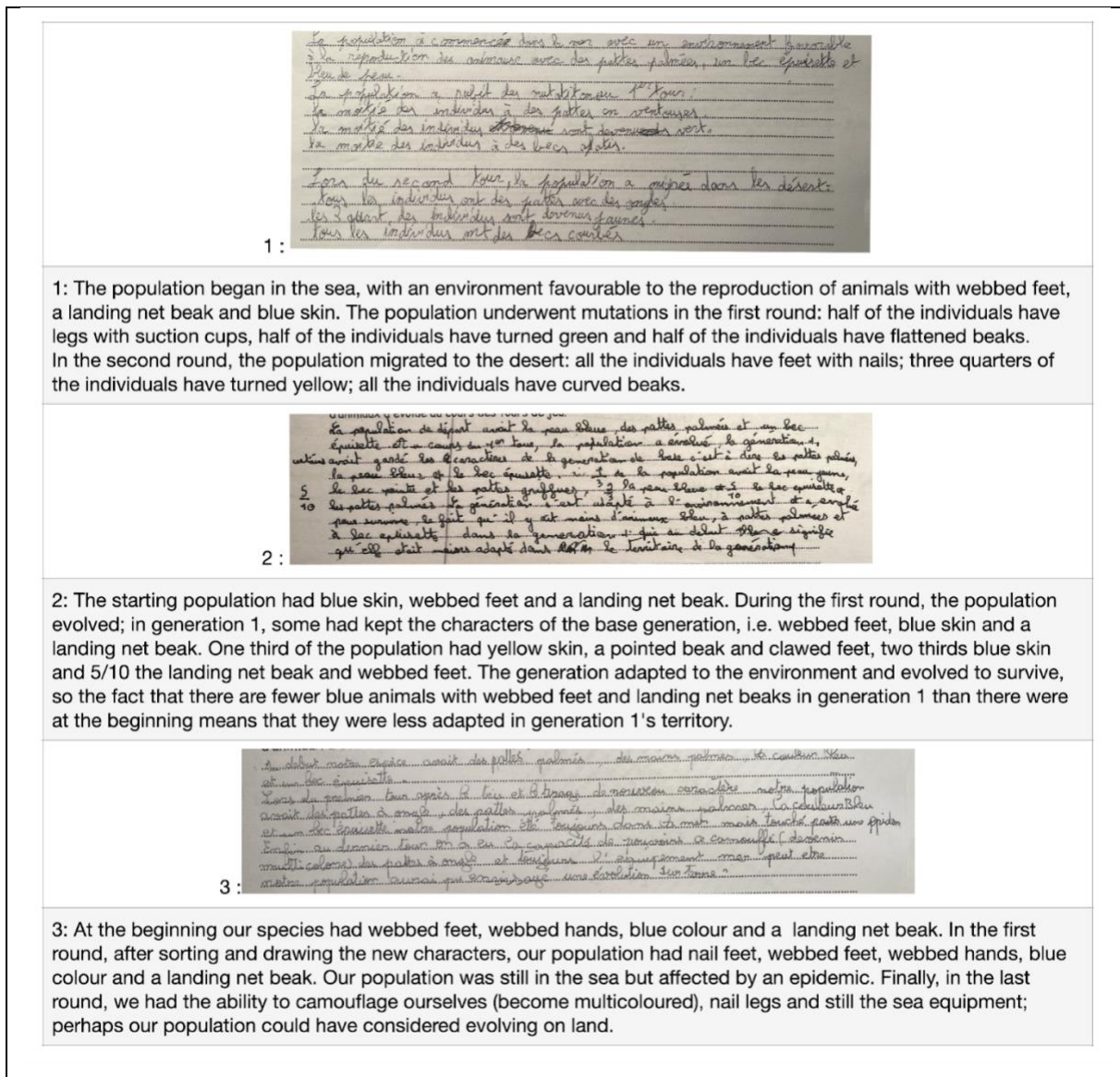


Figure 2. Example of student's narrative writing with ideas of chance in evolutionary processes (2.1), finalism (2.2), both (2.3). Translation by authors.

Results

The texts produced show varying degrees of closeness to the “narrative framework”: some do not detach themselves from the elements and temporality of the game (“we were able to draw cards and the cards allowed us to draw characteristics to have a new population”); others introduce elements of the temporality of the evolutionary processes (“The population began in the sea, where the environment was favorable to the reproduction of animals with webbed feet, a beak like a landing net and blue skin (...). During the second round, the population migrated to the desert, where all the

individuals have feet with nails”). Finally, others use chance as an event that triggers a disruption in an oriented evolutionary process. (*“chance during reproduction, at the level of genetics, has given the appearance of new traits such as hooves and hook-like beaks which are not, however, adapted to the sea environment”*).

Conclusion

The analyses show two ways of inserting the students' narrative texts into the narrative framework of the game:

- either by an explanation limited to the rules and progress of the game,
- or by explanations that use certain structural and functional elements to make the narrative framework more intelligible.

This work of narrative configuration (Ricœur, 1984) of the elements of the game enables some students to produce narratives telling a story of evolution of their population.

Reference list

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Ricœur, P. (1984). *Temps et récit Tome 2, La configuration dans le récit de fiction*. Seuil.