Interweaving Story Coherence and Player Creativity through Story-making Games

Mirjam P Eladhari, Philip L Lopes, Georgios N Yannakakis

Institute of Digital Games, University of Malta,
Msida MSD 2080, Malta

Abstract. In story-making games, players create stories together by using narrative tokens. Often there is a tension between players playing to win using the rules of a story-making game, and collaboratively creating a good story. In this paper, we introduce a competitive story-making game prototype coupled with computational methods intended to be used for both supporting players' creativity and narrative coherence.

Keywords: story-making games, computational creativity, co-creation

1 Introduction

Tabletop *analog* story-making games such as *Fiasco* (Bully Pulpit Games, 2009), *Once Upon a Time* (Atlas Games, 2004) and *Microscope* (Lame Mage Productions, 2011) allow players to make stories together in a playful manner, where the resulting narratives is the product of play. Within the C2Learn Project the aim is to foster human-human creativity (co-creativity), via games and novel computational approaches. The domain of story-making games is highly co-creative in that players, via game rules, use tokens for narrative play in order to partake in a playful process that results in told stories. Our hypothesis in this paper is that the use of innovative computational tools that support a players' creativity in a story-making game could further foster human co-creativity, and also potentially result in story-making games that both support a players' creativity and help the creation of more coherent stories. With that hypothesis in mind, we are developing several varieties of *digital* storytelling games for use with tablet computers to be tested for their capacity to foster human co-creativity. The tablet platform allows for retaining the play modality of analogue table-top story-making games while, at the same time, facilitating the addition of computational aids as a core part of the games.

By *creativity* in our context, we define a process that results in the creation of story elements and artifacts within a story domain which are perceived by humans as novel and valuable [2]. Within the games proposed here co-creativity emerges through the unique collaboration of players with each other as well as players with advanced computational assistants.

To test our hypothesis we designed a table-top story-making game, we name *4Scribes*, that we playtested in an informal manner with our planned computational tools in mind. In particular we developed a deck of cards as narrative

tokens representing a set of storytelling elements such as characters and events to function as creative stimulus for players. Our playtests indicated that the tokens could function well as such, although a certain level of abstraction was necessary. Tests also showed that players easily got carried away on exploratory associative journeys.

Our key challenge during the design process was that the digital story-making game would not only be enjoyable to play but also result in coherent narratives that would justify for both novelty and value [12]. The above defined the design goals of this project. In order to achieve those two goals we are inspired by three popular aspects of computational creativity defined by Ritchie [12]: *novelty*, *typicality* and *quality* of machine-generated artifacts. Those aspects are integrated within a number of computational game "Assistants" that choose which artifacts (i.e. digital card tokens in a story-making game) players will use during play, in such a way that artifacts chosen maximize either a) the coherence (i.e. *typicality*) between an artifact and a set of expert-defined artifacts; or b) the *novelty* of an artifact by choosing the most novel out of a set of artifacts that has been played; or c) the *quality* of an artifact by picking the most valued artifacts rated (or ranked) by the players themselves.

First, this paper provides a brief overview of story-making games and approaches from creativity theory that are promising for the genre. Second, the game prototype *4Scribes* is described along with a brief recount of observations made during early playtests. Thirdly, we describe the computational approaches that will be used in the digital tablet version of the game, that may support both co-creativity and coherence in the narrated stories that are the product of play.

2 Background

While the literature is rich on the investigation of collaboratively emerging stories and storytelling in massively multiplayer role playing games, live action role play, and table top role playing games, it is rather sparse when it comes to cooperative story-making games. One important difference between the other game genres above-mentioned and story-making games is that in the latter, players do not act via an avatar or a game persona. Instead, players act as authors or narrators, collaboratively telling stories *about* the story tokens represented in the games, such as characters or objects. However, both Mitchell [9] and Wallis' [13], (whose work define, to the best of our knowledge, the only studies on story-making games) recognize that there often is an inherent tension in the genre between winning a story-making game and creating a good story through the game.

Creativity is an important facet of story-making games and creative writing in general. Boden [2] describes creativity as a process that results in novel, valuable and surprising outcomes for the creator and her society. Some game mechanics such as the tokens in *Once Upon a Time* or *Dixit* (Libellud, 2008) do have a clear creative purpose, such as stimulating multiple interpretations of an artifact during play. Lateral Thinking [5] theory suggests that problems

that seem unsolvable can be solved through an indirect and creative approach through the aid of random (or heuristically-driven) stimuli that help thinking *out-of-the-box* or braking one's lateral path of thought. The *random stimulus* principle of lateral thinking [1] implies the introduction of a foreign conceptual element with the purpose of disrupting preconceived notions, ideas and habitual patterns of thought, by forcing the user to integrate and/or exploit the foreign element in the creation of an idea.

This random stimulus concept is a predominant feature of analogue story-making games. In such games a large amount of predefined sets of stimuli — which are hand-picked by designers and specifically ad-hoc designed — are usually provided to the players; although, arguably, the novelty capacity of such stimuli eventually decreases after multiple play sessions. By bringing story-telling games into a digital medium this limitation can be combated through player- or machine-created stimuli, which can then be picked for play algorithmically. Specifically for story-making games, the semantic difference between two artifacts can be used [8, 4] in order to estimate the distance between a word in relation to a set of words associated to a specific theme or domain. Alternatively, a crowd-sourcing methodology, where players rank created artifacts, can be used to machine learn their value within the domain. In *4Scribes* artifacts are automatically chosen by applying Ritchie's [12] creativity metrics which rely on the semantic difference between words as well as their peer-evaluated quality (player ratings or ranks of artifacts). The metrics are described in detail in section 4.

3 Prototype Design and Testing

The design of the story-making games and the computational approaches supporting co-creativity for the C2Learn Project have been conducted in an iterative manner where simple prototypes have been tested and refined [7]. Our designs are inspired by existing story-making games. We use both symbolic images such as in *Story Cubes* (Rory OConnor, 2005) and words such as in *Once Upon a Time* as the narrative artifacts (i.e. game cards), and we use a similar way of generating the starting setting for a game as in *Fiasco*. Also inspired by *Once Upon a Time* players have a "hand" of cards as narrative tokens that they use during play creating a cooperative story.

The most promising of our early story-making game prototypes was *4Scribes*. In this section the *4Scribes* prototype and observations from its playtests are described. Due to space constraints the description herein is brief; instead, the section focuses on those observations we consider most relevant to coherence and creativity for story-making games.

In the *4Scribes* paper prototype three to five players collaboratively create a story while secretly steering it towards their own personalized endings. At the start of each gameplay session the game master sets a theme and a setting for the story. Players are dealt cards from a deck containing character, scene (that can be emotions or events), and myth cards that represent more dramatic

Fig. 1. Examples of narrative tokens in *4Scribes*. From the left: A Scene card, a Character card, and a Myth card.

story changing events (see Figure 1). Players each formulate a secret ending. The game is played in rounds where each player tells the continuation of the story by selecting one card from their hand, taking turns, until all cards are played. Each card has both a semantic meaning (i.e. a set of words) and a diagrammatic representation of that semantic meaning (see Figure 1). At the end, players reveal their endings and vote for whose ending best fits the story.

Ad-hoc Playtest *4Scribes* underwent "ad-hoc" tests [6]. These tests are typically the first to be conducted, ensuring that the game is mechanically sound before the work of piloting with end users and software prototyping starts.

Five playtest sessions were conducted with three to five players in each session. Of these, three sessions were conducted in Malta and two in Greece.

In total, the game was played by 10 players, 3 of which were female.Their average age was 37.5. All participants except one had experience playing board games, and all participants had experience of playing digital games.

In each playtest session, players were first briefly introduced to the key concepts of the game and encouraged to "think aloud" during the whole playtest. After playing, the players were interviewed about experience playing the game, followed by a survey for each player to answer with similar questions.

Observations In our playtest, we paid attention to those instances where players' creativity seemed hampered, in that they did not know what to do, or that the affordances given in at a particular time did not help them to come up with ideas on how to progress the story. With regards to the cards (creative stimuli) given to players, we made observations that led us to change both (1) what mix of cards players got in their hand at the beginning of play, and (2) the deck of cards. For example, we noted that too many character cards caused confusion and hesitation. Limiting the hand to contain only one character card appeared to work better, and resulted in the general pattern that players tended to use that card first, introducing 'their' character.

On several occasions players hesitated when they were to use numbered cards with only a single word on them, noting that it was too abstract to them. We also noted that the cards with images on them seem to sparkle more ideas, in comparison to those cards that did not have images on them. Players stated that they liked the myth cards better because they had illustrations. For the character cards, the feedback from players was quite the opposite: they were too concrete. The first naming of the cards used the traditional card deck names for them, such as "King'' and "Queen''. This was, in two sessions, interpreted in a literal fashion so that the settings became those of royal courts. To us, it seemed as it was crucial for the play experience to have the tokens used as external stimuli to be at the 'right' level of abstraction: concrete enough to give stimuli, but abstract enough to allow for the own creative input.

We saw that players gradually, while playing, forgot the initial theme and setting of the game session. Instead, players got carried away and created stories that albeit interesting, sometimes were extravagant and with a low degree of coherence.

Given the limited number of players and the early stage of the design, the players' responses can only be seen as illustrations and indications. However, the observations allowed us to further develop the computational approaches used for the story-making games in C2Learn as described in the next section.

4 Computational Approaches for Supporting Creativity and Coherence in Story-making Games

In the ad-hoc playtests we noted the dichotomy identified by Mitchell [9] and Wallis [13] between players *cooperating* to create a good story and *competing* to win; in *4Scribes* they achieve the latter by steering the story towards players' own secret endings. This player behavior opened new opportunities for using computational approaches that would steer towards typicality as a possible means to increase story coherence but while still maintaining the competitive goals of the game which act as an important driving force for the game play. In this paper we explore the use of user-generated digital content (i.e. cards) — see section 4.2 — and computational assistants that serve as heuristically-driven stimuli to player's creativity (see section 4.3) within story-making games.

4.1 The Tokens for Narrative Play in *4Scribes*

The deck of cards used in *4Scribes* are the narrative tokens used by players as creative stimuli during play. The deck was reiterated several times in order to present a balance of characters, events, objects, and actions that may be used across games. When creating the deck we took into account common game elements from adventure games and story-making games along with inspiration from basic components from narrative theory, mostly from Propps Morphology of the FolkTale [11], Campbells The Hero with a Thousand Faces [3], and Poltis 36 dramatic situations [10].

The tablet version of *4Scribes* has a deck consisting of 95 to 114 cards. It has several suits with 19 cards each: Fire, Water, Wind, Earth, Fifth and Myth. The purpose of the suites is to provide a structured set of tokens that contain types of stimulus that can aid in the creation of narratives. The Fire, Water, Wind and Earth are of two different types: Character or Scene. The Scene cards are of four types, loosely corresponding to their suits. The Fire Scene elements represent emotions, The Water elements represent actions, the Wind elements represent events, and the Earth elements represent objects. Each suit has 12 scene cards and 7 character cards. The Character cards represent different roles and character archetypes (see Figure 1 for a sample of cards available within the deck of *4Scribes*).

4.2 Co-creation of Narrative Tokens

The tests indicated that the tokens for creative stimulus needed to be of an abstraction level that both gave enough information for allowing creative association, but at the same time not be too specific. In order to address this we reiterated the card deck along with the playtesting. In addition we devised features for players to create their own cards that can be used in play in the tablet version of *4Scribes*. The aim with the player-created cards is that they would further increase the co-creative aspects in a story-making game and would allow players to add elements that have individual meaning to them.

Players can modify the cards, and make their own varieties that they can use in play in *4Scribes*. These modified cards become part of each players personal decks. Players can also create their own, completely customised cards - these become cards in the 'the fifth element' suite. The 19 Myth cards cannot be changed, each representing an important story changing event such as Justice or Death.

The card tokens created will be stored in a shared virtual space, that will contain an increasing amount of cards that players create. Players can rate each others card by 'liking' them, and as such some cards will have higher ratings than others. At the start of each new game session, the game master may define a setting (such as 'space' or 'London in the Victorian Era') and a theme, (such as 'Love conquers all'). They can also, optionally, define a set of typical terms by picking tokens from the virtual space. This provides information that the Assistants use when picking cards for use in a play session as described in the following section.

4.3 Selection of Narrative Tokens using Computational Assistants

Three game Assistants developed for *4Scribes* pick from a deck of cards, including player-created ones, and provide a starting hand for players. In order to stimulate creativity, improve the quality of cards available within a story domain, and provide semantically-coherent cards within the *4Scribes* game three metrics have been developed to drive the card selection from each of the three Assistants. In particular, the novelty, quality, and typicality metrics designed (and

their corresponding Assistants) are associated with creativity stimulation, card quality, and story coherence, respectively. These three metrics are inspired by Ritchie's [12] criteria on evaluating computational creativity and are described below.

The first metric is *novelty*, n, which is calculated as follows:

$$n(i) = \sum_{j=1}^{k} d_s(i,j)/w_i \tag{1}$$

where $d_s(i,j)$ is the semantic difference (as e.g. the one used in WordNet [8]) between the words of card i and the words of a predefined set of initial cards — that progressively gets larger as players create new cards — which we name *card pool*; w_i is a parameter between $[0,1]$, which represents the i's card playing weight. The game keeps track of the number of times a specific card has been played and adjusts the w_i weight accordingly, so that novelty is influenced by the number of times a card is played. In brief, novelty in *4Scribes* is proportional to the semantic difference of a card (compared to all cards existent in the card pool) and inversely proportional to its use in the game.

The second metric is a card's *quality* which relies on player (peer-) evaluation. Each card has a value attributed to it via crowd-sourced ratings (or ranks) and the Assistant associated with this metric will pick the highest-valued card for the players' hand.

The typicality aspect of creativity [12] is used for the design of the last metric: *typicality*. In order for it to be calculated an additional, typical, set of cards is necessary for comparison, henceforth called *comparison pool*. That set of cards is selected by the game designer and defines the typical set of cards that are expected to be used under a story domain. This approach makes it possible for a game master to define a set of cards with words that they think are 'typical' for the chosen theme and setting for the story of a session. Typicality of a card is measured in the same fashion as the novelty metric, with the difference that the comparison pool (instead of the card pool) is used for the calculation of d_s. The Assistant associated will choose cards that minimize the semantic difference between a card i from the card pool and all cards j from the comparison pool.

5 Future Work

Future work with the *4Scribes* game includes piloting the tablet version of the game in schools in Austria, UK and Greece. In the intended scenarios teachers lead the set-up play sessions, setting the theme and scenario, after which players are divided in groups who play 4Scribes using tablet computers. During these pilots the balancing of stimulating creativity and maintaining story coherence will be further investigated. Towards that aim, variants of the *4Scribes* game will be implemented. One will use the notion of role play, setting the player in a situation where one of the character cards is used as an avatar. Another version will enable players to have diametrically opposing story goals where one

or several players are to secretly steer the ending in a way that opposes the main theme of a play session. The metrics of the Assistants will be further iterated and used in the game design to the design goals. Based on these results, as well as further design work, we aim to implement a story-making game that suggests creative stimuli (selecting tokens from the virtual shared space) during the game play, i.e. suggesting new creative stimuli in real-time during play sessions.

6 Conclusions

This work in progress paper presented the story-making game *4Scribes* where players cooperatively make a story by using different types of tokens as creative stimuli. The game is part of the C2Learn Project which aims to foster creativity of players in social educational settings. *4Scribes* uses a set of narrative tokens, a deck of cards, as building blocks for the story creation. Players can add their own custom made cards to this set, allowing them to co-create both by adding structural elements, and by spinning narratives about them. A common issue in story-making games is that the competitive aspects can hinder the coherence of the story that the play results in. In this paper we have explored how computational approaches using artifact creativity aspects such as novelty, quality and typicality can be used as a means to select cards that may result in play sessions that both support creativity and coherence in the narrative that is the product of competitive play.

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