An Application of Emotion Models to Digital Storytelling

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ABSTRACT

To generate a story, automatic story generation systems consist of models of how a story world and elements with in it can be seen. A study within this is how to create a believable story character, how to give a representation of a story character's feelings. In this research I will make an application of two well known emotion models, Em and Émile, to digital storytelling, using stories of the genre fairytales. Out of that a conclusion whether both models are usable in story generation systems will be made.

Keywords

Digital storytelling, emotion models

1. INTRODUCTION

Digital storytelling "is the art of creating and enhancing good stories with rich media development and distribution tools"[1]. A more specific direction within this study is the art of building 'automatic story generation' systems, in other words: systems that can create stories on their own. A few examples of such systems are Joseph [BL98], the Oz Project [MAT99] and the Virtual Storyteller [TH04], all using models of how a story and its elements can be seen. When generating a story, one of the aspects to take into account, is modeling emotions of fictional story characters. This is necessary, because of the believability of a character. People expect characters to care about things, to have a vision about the surrounding world, not to be indifferent about it [JB94]. An important problem associated with this is how to describe a characters emotional state, to make their (re)actions more believable. Therefore, one has to set up a decent model, to describe these emotions.

Currently, there are many general models which describe emotions and their effects, all with their own perspective. A few of such models are the Émile model [JG00], the Cathexis model [JV97] and the Em model from the Oz Project [RB92], which is a sub model of the more wide, abstract OCC model [OCC88].

These models are all quite abstract and try to represent the continuous changing emotional status of virtual humans as a being in a virtual world. As has already been done with the Em model in the Oz Project [MAT99], these models could be specifically applied to digital storytelling. Therefore it is

necessary to determine whether these general models are suitable for this study. To actually determine the suitability, the advantages and disadvantages of used emotion models should be described, when systematically applied to digital storytelling.

In this research, I have to select some emotional models. I will thereby focus mainly on two emotional models I selected from the three described before, both very developed and thought through, but obviously quite different from each other: the Em model and the Émile model. The other model, Cathexis [CAT97] was more focused on the visual part of the virtual human, which is not really relevant to a textual story, and is therefore not taken into account,

Mainly, Em keeps track of the most primary emotions of a human like fear, hope, joy and distress. More specific emotions could be determined from these primary ones. Further on, Em keeps track of goals of characters and how they are emotionally affected with goal related events.

The Émile model looks more closely at plans of a character and how actions, as a result of emotion, can be modeled, also with a character's primary emotions, his goal and his characteristics (like his standards) in mind.

To describe what advantages and disadvantages there are when Em and Émile are applied in digital storytelling systems, my working method will be to simulate these models on emotional moments in a few known stories with the same genre and investigate the output. Not only will the output evaluated by my opinion and what actually happened in the stories, but also by the trends that were used for evaluating the EMA model [GM04]. After evaluation, conclusions can be made, and findings of the two models can be compared.

With this research I hope to clarify the advantages of applying Em and Émile to stories of the used genre. The results could then be used as a guideline for implementing the used models in a real digital story telling system that is able to create or modify stories with the used genre.

2. STUDIED MODELS

To actually test the used models for suitability in digital storytelling, we first need to have a clear picture of how they work. Therefore, I will first give a more detailed description of the models I will be using in this research. Both models try to represent emotions and emotional effects, like reaction, in a structural way. I will try to explain the way they do that and which principles they are based on.

2.1 Em model

The emotion model Em [RB92] is an emotion model integrated in a greater whole, the so called Oz world, created in the Oz project. The Oz world consists of a simple simulated environment, agents that live in the environment and a planner that controls events in the world. In this case, a whole world is

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[1] dStory News, Issue 1, June 29th, 2000,
http://www.dstory.com/dsf6/newsletter_01.html#oped

not interesting, we just focus on an agent living in this world. In the Oz project, such an agent is called a Tok agent.

A Tok agent consists of a couple of continuously running modules communicating with each other: a sensing module, an emotion model (Em model) and a module which keeps track of the active goals of the agent, Hap [LB96]. This module stores goals into a tree that keeps track of goals and divides them into sub goals. When all sub goals of a goal have succeeded, the goal itself is achieved. This way, it is easier to know whether a goal has succeeded, by using the divide and conquer strategy: solve a complex problem by dividing it into a set of less complex problems.

The integrated sensing module passes information about sensed events in the world to the agent's Em model and to Hap. Em changes the emotional state of the Tok agent based on passed sensed information and the current state of the agent, which will be described in more detail further on. Whenever an agent's state is changed, Em notifies the rest of the modules in Tok, so that they can process this new information. The goal tracking module Hap then chooses the most appropriate action based on the agents active goals, the importance of that goals and the environment it finds itself in. Hap is also able to create a new goal based on received information; Em will then be notified about that, and, on its turn, update its state based on the notification, which makes a Tok agent dynamical.
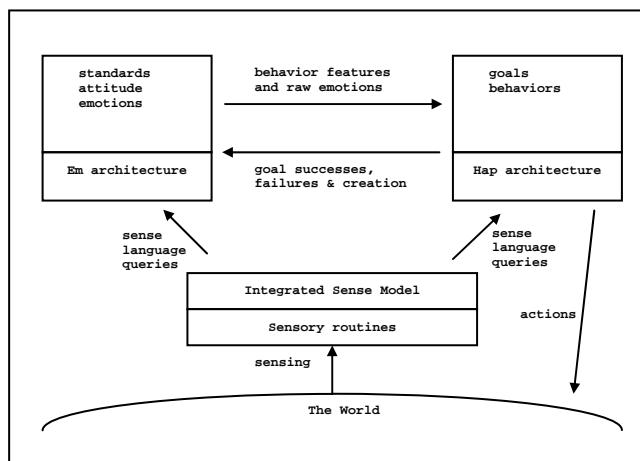

Figure 1. Overview of a Tok agent [RB92]

As mentioned before, the Em model integrated in the Tok agent, is based on a well known and often used model in this field, the OCC model [OCC88]. OCC characterizes itself by not tracking every possible emotion available, but generalizing emotions to a few abstract ones to prevent complexity. Specific emotions can then be viewed as a combination of a couple of primary emotions. For example, anger towards an entity could be described as a combination of reproach towards this entity combined with distress. Events that are sensed "turn out to be pleasing or unpleasing concerning the agent's goals"[2]. Goals of the agent can be either passive or active, depending on the fact whether the desire of the agent is present on the foreground or not. The approval of the agent's actions is done by his standards (moral beliefs) and finally, an agent may like an object based on his attitude towards this object.

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[2] Bates et al., Building emotional agents [RB92]

Like the OCC model, Em uses abstract primary emotions to describe an agent's emotional status, though not all primary emotions in OCC are integrated yet. As shown in figure 2, Em currently represents twelve types of primary emotions. These emotions are related to goal related events, but also by actions from agents. Actions are approved by a predefined set of standards that gives a representation of the agent's moral beliefs, but they are also liked or disliked by a predefined set of attitudes towards objects in the environment. To determine visible changes of an agent, Em uses threshold values for these emotion types. Moreover, intensity of the emotion types used, decrease slightly over time.

EMOTION	CAUSE
Joy	Goal success
Distress	Goal failure
Hope	Prospect on goals success
Fear	Prospect on goal failure
Pride	Action of self approved according to standards
Shame	Action of self disapproved according to standards
Admiration	Action of other approved according to standards
Reproach	Action of other disapproved according to standards
Love	Attention to liked object
Hate	Attention to disliked object
Gratification	Action of self causes joy and pride
Gratitude	Action of other causes joy and admiration
Remorse	Action of self causes distress and shame
Anger	Action of other causes distress and reproach

Figure 2. Primary emotions used in Em

In contrast with OCC, Em does not immediately update the emotional status after an event in the outside world has occurred. Instead, Em evaluates the outcomes of the goals of the agent before changing the emotional status. Whenever a goal succeeds, Em creates a joy emotion or a distress emotion whenever a goal, for some reason, respectively succeeds or fails, all with a certain intensity, determined by the importance of the goal.

While Em keeps track of passive goals from the agent, the Hap takes care of the active goals. Whenever Hap reports the outcome of a certain goal, Em has to figure out what the cause of the outcome itself, since it doesn't keep track of active goals. Em solves this by attaching a function on each active goal that looks into the memorized events in the sense module for related events to when these goals finish. After Em has figured out the cause of the outcome of the goal by applying this function, the agent's state can actually be changed.

Currently, there are still a lot of aspects that need to be implemented in Em, but it does give a clear representation of how standards, attitudes, emotions, and personality can be modeled in virtual agents. Concluding, this model is suitable to be used for this research.

2.2 Émile model
The emotion model Émile [JG00] is based on a different principle than Em. As described before, Em bases emotional changes on outcomes on goals and related events, which is done by continuously looking backward. Émile, however, tries to base the emotional status of an agent in a more progressive way, in other words by planning. Planning is done to define possible actions for making an agent's goal succeed. As a result, it is easier to reason about possible future outcomes, but also to see multiple plans between agents conflict. For example, when an agent's plan is likely to work out, that agent's

emotional status would be positively affected. Moreover, planning can help anticipating actions better before they are actually taken.

Émile globally exists of five separate modules, each of them aware of representations of plans. At first, Émile needs to make a representation of plans, and make clear which actions are needed to advance in the agent's goals. Then, secondly, Émile needs to appraise how events relate to the agent's plans and goals, followed by assigning a value to this appraisal. After that, the emotional status of the agent can be determined, based on the appraisals. Finally, the actual actions, based on emotional status and appraisals can be selected.

Plans are modeled according to STRIPS operators [FN71]. These operators represent the actions that can be taken, following a set of preconditions and the predicted outcome of an action. To represent plans, Émile uses a set of actions (operators) and varying types of constraints that must hold related to actions in the plan.
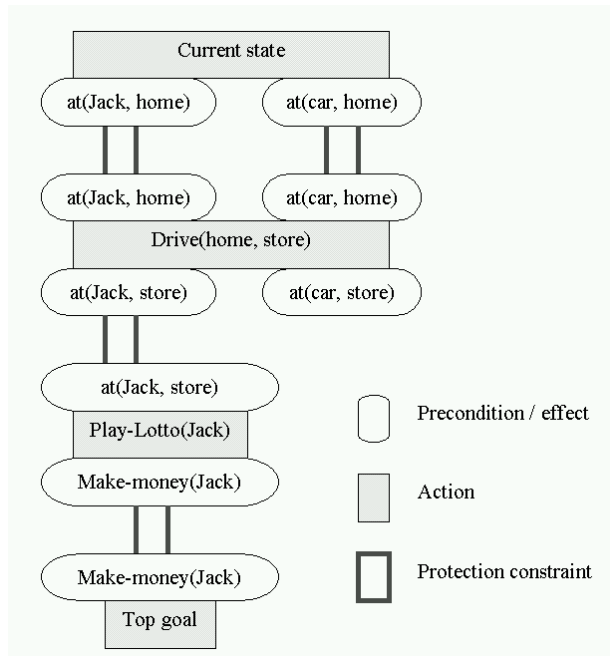

Figure 3. Example plan in Émile

After Émile has got a representation of a possible plan of an agent, it can begin to appraise events in the world related to its goals and plans, in terms of emotional significance. This is done by using the construal theory of Elliot [EL92], which tries to describe "the relationship between events and an agent's disposition by using so called construal frames"[3]. These frames all consist of a set of knowledge structures, little pieces of information about goals, standards and social preferences of a character. Construal frames are used to check whether an event is somehow related to an agent's disposition, and if so, they give a characterization of emotion-eliciting conditions, that represent the desirability, expectation status and an evaluation of the agent about the event. After that, emotions related to this event can be determined. Émile does not, unlike other models,

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[3] Gratch, J., Émile: Marshalling passions in training and education [JG00]

appraise events directly. Instead, it looks at the state of plans in memory, so that appraisal is not superficial. For example, an agent may sense a direct unpleasing event, but as long as it does not conflict with the plans of the agent, the event will not be appraised that negative concerning the agent's emotional status.

After the appraisals of possible events related to plans and goals, the intensity of the appraisals can be determined. Émile uses only two intensity variables, probability of goal attainment and goal importance. Probability of goal attainment is mainly determined by looking whether actions in plans leading to the goal are probable, dividing plans in steps and sub actions, but also by looking at the desire of making the goal succeed. For example, when an agent really wants his plans to succeed, he would make great effort and as a result goal attainment would be more probable. Goal importance is determined by the reward an agent receives from achieving a goal and from its sub goals. If an agent would get more result from a goal, he would find it more important to achieve.

The second phase of appraisal modifies an agent's emotional status, where importance is based on the intensity of the appraisal, given by probability of goal attainment and goal importance. Émile currently uses five primary emotion types, like Em based on the OCC model:

Hope   goal established, but not achieved
Joy   goal has been achieved
Fear   goal is unestablished or establisher is threatened
Distress goal prevented from occurring
Anger   other agent violated social principle

Further on, when a plan of an agent changes, Émile needs to make appraisals and probability assessments over again, because behavior of agents towards the environment can change when they tackle problems differently, when they use other plans in other words. To make the status of the agent more dynamical, Émile decays appraisals over time in a constant rate. Moreover, it stacks emotion appraisals caused by different events, to make an overall appraisal. It also checks which emotion types influence each other, given by a relation value between two emotion types. For example a high rate of joy, would increase upcoming hope, but decrease upcoming fear.

Émile uses the current emotional status of an agent to influence behavior, like communication, planning and action selection. Specifically, a characters emotional status can influence body language when talking about communication, or planning actions more intensely, recognizing events more intensely, and can cause different action selection.

Concluding, Émile is quite different than the Em model, mainly because its concept differs from Em. Émile focuses on plans and looks more in the future, which also makes it quite hard to implement, because prediction plays a great role in there. This makes it interesting to compare it against the Em model.

3. INPUT STORIES
Now that the used models have been described in more detail, the input data to actually test the models still remain to be given. I will test the used models by using two stories of the same genre and taking some moments in the story where emotion plays a clear part. Those moments will then be converted and transferred into the models as realistic as possible, because it is necessary to make assumption about a character's personal status, since stories cannot give an exact picture of that. Then output of the models will be compared with what actually happened in the stories.

To make the tests not too complex, I will take the genre fairytale for the stories that will be used, since fairytales tend to have a simple story line and have significant emotional moments. Therefore, I selected two stories in this genre, both with sufficient significant moments with emotional parts, 'Rumpelstiltskin' and 'Cinderella'. These two fairytales will be first summarized and then the moments that are used for model input will be described and argued for their significance, regarding to emotion transitions.

3.1 Rumpelstiltskin

Rumpelstiltskin tells the story of a daughter of a miller. Once upon a time, the king of the land was visiting al the inhabitants of his country. The miller told the king that his daughter could spin gold out of straw, to not look bad in front of him. The king wanted proof and told the millerdaughter to make gold out of straw in one night in his castle, or else she would die. The millerdaughter came and she was put into a locked tower during the night to perform the job, but she was not able to do this and became miserable. But all of a sudden, a little gnome appeared and did the task for her in exchange of her necklace. The day after the king still wasn't pleased, and wanted more from the daughter. So the other night the same happened: the little gnome came in when the millerdaughter almost gave up and completed the task in exchange for her ring. The other day, the king still wasn't satisfied and offered her to be her husband when she would spin another batch of straw into gold, or else she would die. That night the gnome appeared once again, but since she had nothing to offer him, he asked her to donate her firstborn child. When she accepted that, the gnome helped her once again, and after that the king married the daughter. In a short while the millerdaughter became pregnant and gave birth to a child, forgetting about the her promise to the gnome. The gnome, however, suddenly appeared for her and demanded her child. She didn't want this to happen and cried, out of compassion the gnome offered her to keep her child, if she was able to guess his name within three days. She accepted that, but the first two days the millerdaughter wasn't successful in guessing. The third day, before the gnome showed up in front of her, she heard from a messenger that a little gnome was singing a song in a forest, saying that no one knows that his name was Rumpelstiltskin. When the gnome appeared before the millerdaughter, his name turned out to be Rumpelstiltskin indeed. When the gnome heard this, he became really angry and stamped his foot so hard, that it went through the ground. Then he pulled himself up so hard, that he tore himself in two.

In this story I will take one emotional moment as an input for the models I am researching. This moment is when the millerdaughter is desperate, because she simply cannot spin gold out of straw, after which Rumpelstiltskin makes his entry and offers her his help. In this moment the emotional state of the millerdaughter changes from desperation to hope, while she is also surprised by the appearance of the gnome. It is interesting to see if Em and Émile come to the same result referring to the millerdaughter's emotional change.

3.2 Cinderella

Cinderella tells the story of the merchant's daughter, Cinderella After his wife died, the merchant married a widow with two children, and left for his work. Cinderella had to work a lot for her new stepmother, and was treated badly by her new family. After a short while, a ball was being organized by the king of the country. All the pretty girls in the country were invited to this, hoping that the king's son would meet a pretty girl to marry with. Cinderella and her stepmother and stepsisters heard about this ball and they all wanted to go, but Cinderella couldn't since she did not have decent clothes to wear. When her stepmother and sisters were gone to the ball, her godmother, which turned out to be a good fairy, appeared and conjured a beautiful dress and a luxuriously carriage. She told Cinderella to go to the ball, mentioning that the enchantment would disappear at twelve o'clock. Cinderella went and the prince had a great time along with her, eventually thinking that he would marry her. As a matter of fact, Cinderella completely forgot about the disenchantment at twelve o'clock. When the clock sounded for the first time, she quickly left the ball and went to home; however in her rush she lost one of her slippers. The prince decided that he would marry the woman who would fit the shoes exactly. As expected, Cinderella was the only one whom the shoe fit. The prince then realized it was Cinderella he was dancing with the whole time and married her and lived happily ever after.

For this story, I have selected two emotional moments. The first one is when Cinderella realizes that the enchantment is about to dispel and she needs to flee before the stroke of twelve. Interesting emotional effects in this part is the transition from the happiness of Cinderella, enjoying her time with the prince, to the fear of not getting away before the enchantment goes away, when she hears the clock strike one out of twelve. On top of that, scariness plays a clear role in this emotional transition.

The second emotional moment is when Cinderella is trying to fit the lost slipper, supposed that she already knows that it is in fact her slipper. Clear emotional aspects here are the reactions of her and her stepmother and sisters. While Cinderella gets happy, her stepmother and sisters feel astonished at first, and become full of anger after that. It is therefore interesting whether Em and Émile will come to the same result.

4. MODEL APPLICATION

Now that the emotional moments, used for input for Em and Émile have been determined, the actual method of how these moments will be used will be given. This method globally consists of a simulation in steps, all done by hand.

To be able to conclude something about a character's emotional status, Em and Émile need to obtain a structural representation of his initial emotional status, his goals and background. Therefore we need to convert the characteristics of characters we observe at the used moments (which will be assumptions) into a format Em and Émile can use. That format which will be different for both models, since they don't use the same data for input.

After having obtained the input, we can logically reason how Em and Émile would come to a result in the form of a new emotional status of a character. We can then reason about a character's status according to the results, and then determine whether the results are realistic. This will be done by referring to what actually happened in the stories, but also by what would be logical from my point of view.

Moreover, I will keep the trends in mind that are used in the evaluation of the EMA model [GM04]. These trends are approximations of ground rules common humans would handle in problem related situations. As stated in the evaluation of EMA, they can be compared at specific transitions within an emotion model. Originally, they were used at a questionnaire [PR92] where people had to describe their reaction to some problem related situations. These situations consisted of loss conditions and aversive conditions. Loss conditions are conditions where "some loss is looming in the future, the loss

continues to loom for some time, and then the loss either occurred or is averted". Aversive conditions are conditions where "some bad outcome occurred, but there is potential to reverse it and after a little while the outcome is either reversed or the attempt failed". The results of the tests were then compared with the trends, described below.

1.1   Aversive condition should yield appraisals of higher controllability and changeability than the loss condition (this follows from the design of the stimuli).

1.2   Appraisal of controllability and changeability decrease over phases (as likelihood of change drops).

1.3   Negative valence should increase over phases and there should be a strong difference in valence on negative vs. positive outcomes.

1.4   Aversive condition should lead to more anger and less sadness (the developers of the scale claim that this follows from the lack of appraised control in the loss condition).

2.1   Less appraised control should lead to less problem directed coping

2.2   Less appraised control may produce more passivity

3.1   Lower ambiguity should produce a more limited search for information

3.2   Lower ambiguity should yield more suppression of information about stressor

4   Less appraised control should produce more emotion focused coping.

When evaluating the Em and Émile, I will try to use trends (when they apply to the situation) for testing the emotion transitions of story characters, to make the total evaluation not an overall believability test.

As for Em, we need to convert the characters which we will observe into Tok agents. Therefore, we need to determine the character's current personal status, which will be based on logical assumptions, as said. After that we can determine the character's current goals at the relevant moments and put them into Hap, by determining sub goals and importance of the goals. Then, when everything is transformed into 'Em format', the actual processes of the Tok agents will be simulated. When doing this, we will assume that the functionality of Hap is realistic, so that Em can optimally show its functionality. After that, the emotional status of the Tok agents will be evaluated as a comparison between what actually happened in the story, the trends described before and my own point of view.

As for Émile, we need to set up a list of the goals of the characters involved. Then, we need to determine the plans of the character to make his goals succeed and converting them into STRIPS operators, taking into account that a character might have multiple plans in mind. On top of that, we need to set up Émile's representation of a character's beginning personal status. Further on, for this research, I assume that a character knows the exact relation between his plans and events that happens in the world around him, and I will therefore not determine the construal frames a character is using. This is done, so that a character is given the opportunity to react in a human way. After all initial information has been converted to a format Émile can use, Émile will be simulated and the resulting emotional status will be evaluated.

The input given to Em and Émile, consist of assumptions about a character's personal status, its goals and attitudes and standards. To give a more concrete picture, next are given two examples of a state of a character's current personal status, in formats for Em and Émile. Note that some emotions are not (yet) applying to the situation and are therefore set to 0.

```
SITUATION
Rumpelstiltskin offers millerdaughter to help

GOALS            Stay alive (active)
                   - Create gold out of straw

EMOTIONS
Joy              0
Distress         0
Hope             +
Fear             -

Pride            0
Shame            0
Admiration       + (towards Rumpelstiltskin)
Reproach 0

Love             0
Hate             0

Gratification       0
Gratitude + (towards Rumpelstiltskin)
Remorse          0
Anger            0

Relevant standards:
helping people when they are in trouble, is a nice  thing to do

Relevant attitudes:
<none>
```

Figure 4. Example of the personal status of a Tok agent

```
SITUATION
Rumpelstiltskin offers millerdaughter to help

GOALS            Stay alive

EMOTIONS
Joy              0
Distress         0
Hope             +
Fear             –
Anger            0

Relevant standards:
helping people when they are in trouble, is a nice  thing to do

Relevant attitudes:
<none>

A plan for goal achievement:
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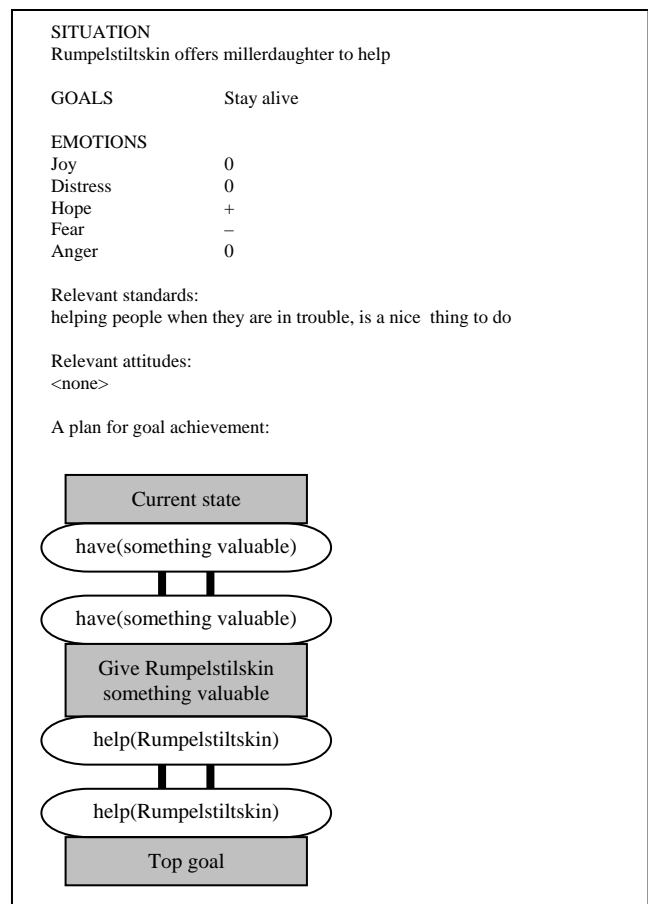

Figure 5. Example of the personal status of an Émile agent

5. OBTAINED RESULTS

After we apply the emotional moments from the selected stories to Em and Émile, we can evaluate the output. Therefore, I will describe in the following paragraphs what findings I have obtained.

5.1 Moment of Rumpelstiltskin

In this moment, it turned out that Em and Émile cannot give a representation of the phenomenon scariness, because they do not track natural responses to events. This is because clear emotional change will only arise in Em when events are related to a goal, or when they relate to plans in Émile.

Regarding to the offer of Rumpelstiltskin, it turned out that Em models the gratitude from the millerdaughter to Rumpelstiltskin quite well. According to the standard 'helping others is nice' Em finds that admiration is raised. Further on, when Rumpelstiltskin finishes the task, gratitude towards Rumpelstiltskin is raised, because joy of goal achievement is raised. Émile, however, does not currently possess the ability to track emotion types like admiration and cannot tell what the relation between the millerdaughter and Rumpelstiltskin is. This is of course more a matter of incompleteness, rather than a shortcoming.

When Rumpelstiltskin wants something back, we find that it is not completely certain how both models take this into account. It would be possible for a Tok agent or an Émile agent to not give Rumpelstiltskin something back, if the standard 'be careful with your precious possessions' is treated as very important. We assume however, that both find that the goal of staying alive is more important. In any case, Em would (in contrast with Émile) also increase reproach towards Rumpelstiltskin, because he would violate this standard.

Though there are still missing or unclear aspects in changing the emotional status of the millerdaughter in Em and Émile, they can lead to the same actions as stated in the story.

This moment can be seen as a situation with a loss condition in it. The millerdaughter is trying to prevent a loss, meaning that she is not going to be able to make gold out of straw. Trends 4, 2.1 and 2.2 apply for this situation, since the millerdaughter has got less control in the situation, because she cannot make gold out of straw. As trend 4 states, this case would make a character more emotional in reaching the goal, which can be compared with giving the millerdaughter a high rate of fear in both models. There are also no options for the agents to achieve the goal, which can be compared with 2.2 and 2.1.

5.2 First moment of Cinderella

When researching the models with the first moment of Cinderella as input, it is not clear whether Tok agents containing Em keep track of time factors. When the clock sounds for the first time, Cinderella needs to get out quick, and since this goal is hard to achieve because of the little time, fear should be increased. When this information is not available, Em could easily increase hope instead of fear, since it is not hard to leave, and therefore creating an unrealistic situation. Émile handles time constraints better, since the action in the plan to leave contains this constraint, and as a result this plan comes along with an increase of fear.

A second finding at this moment, is the fact that Em finds that Cinderella has both a lot of distress and a lot of joy when she leaves the ball. Distress is caused, because of the failure of the assumed goal of 'be with the prince the whole time', joy is caused from the achievement of 'getting away before clock sounds twelve', with a high importance rate at both goals. This emotion status is not realistic according to the story, since Cinderella is not happy (in other words joyful) at all when she has left the ball. Émile however, has a simple solution for this problem, by letting emotion types influence each other. In this case, the joy Cinderella receives from leaving the ball would be decreased by the distress resulting from the goal failure of 'be with the prince the whole time'.

Another interesting aspect that both models do not keep track of, is the principle of forgetting information. As stated in the story, Cinderella forgets that the dispel of the enchantment is about to happen, and after she realizes that, she suddenly wants totally something else, resulting in two conflicting goals, on which the previous finding is based on. Both a Tok agent and an Émile agent do not give a method to choose the right goal to follow, though this could be solved by looking at the importance of the goals and standards of characters, but the result of the goal thrown away remains unclear.

Taking the mentioned findings into account, we would find that a Tok agent might not be able to come to the same result as the story, Cinderella could, for example, not run out of the castle, but first say goodbye to the prince and then leave without rush, which would lead to an unexpected goal failure. Without this shortcoming, a Tok agent would, just like we found to an Émile agent, come to a result comparable with the story.

This moment can be seen as a situation with an aversive condition in it. Something bad has happened, meaning that the clock has sounded for the first time, but there is an option to revert it, meaning that Cinderella needs to leave quickly. Trends that apply are 1.1, 1.4. When we compare this to the findings of the models, we see that both trends do not show any incorrectness, note that anger and sadness do not apply to this situation, which means we cannot compare them with trend 1.4 and is therefore treated as correct.

5.3 Second moment of Cinderella

Using this story moment as input for both models, it turned out that Em comes to the conclusion that Cinderella feels hate for her stepsisters, since it is assumed that she dislikes them according to her attitudes, and is attended by them. Of course the same way leads to the fact that her stepsisters hate Cinderella. It seems reasonable that the second case is applying, but we can question whether the first case is. We know Cinderella dislikes her sisters, but according to the story it is never mentioned that she has hateful feelings. Her feelings were more directed to herself instead to others, which resulted in sadness. Note that we cannot tell how Cinderella would feel in an Émile agent, since this type of emotion is not available.

Further on, we see that both models increase hope before Cinderella fits the slipper, assuming the goal 'fit the slipper'. However, it could be more realistic if joy is increased instead of hope, since we assume that Cinderella already knows that the slipper will fit and therefore the goal will succeed anyway. More general, if a character would know that a goal is going to succeed no matter what, joy would be more on its place than hope to my opinion.

Apart from possible incorrect feelings towards her sisters, this test ended well, Cinderella fits the shoe, and becomes happy as a result.

Because this situation does not have either a loss condition or a aversive condition, we cannot compare them with the trends to evaluate correctness.

6. CONCLUSION

Despite of some details, which could be fixed easily, Em and Émile both show great perspective to be used in automatic story generation systems to create stories for the genre fairytales.

Of course there are things that could be changed or added to the models, such as the time constraint problem as described before in Em. Émile however, could use more primary emotions to tell more about viewings to other objects. Moreover, both models need to make use of the concept of forgetting.

To sum up, we find the following two main differences, when comparing the results of Em to the results of Émile.

- Em models relationships between an agent and objects or other agents better than Émile

- Émile is currently better for time planning than Em, because its concept is better for that (since planning looks into the future) and Em does not use it.

7. DISCUSSION

I cannot guarantee that the results I have obtained are hundred percent reliable, mainly because my tests were based on assumptions, goals and standards of characters could be easily different from the ones I have used.

My findings are of course theoretical, and therefore not proved to be right. It would be more thorough however, if an simple implementation of a Tok agent and an Émile agent would be test with input stories. Due to time limits, this was not an option.

The story genre I have been using is not one with complex stories bound to it in common. It would be interesting if characters with a more complex emotion status (in novels for example) would do the right actions when modeled in an Émile agent or a Tok agent. Considering the time that is bound to this, it would make a whole new research and I therefore only used a simple story genre.

The results I have obtained from the input stories, are quite different from each other. Therefore, more input for Em and Émile could be made and tested, so that the results can say more about the whole functionality of Em and Émile, but also make the tests more reliable.

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