

Chapter V

Analysis of MEXICA's Output

This chapter analyses some of the stories created by MEXICA. It is organised as follows. Sections 5.1 and 5.2 introduce an example where the reader can trace step by step the development of a story called *The princess who cured the jaguar knight* (the titles of all stories created by MEXICA have been assigned by the author of this work). Section 5.3 presents an analysis of this story. Section 5.4 examines the outcomes obtained when different parameters in the system are modified. Section 5.5 examines the development of a story called *The kidnapped Tlatoani* under ER2 operation mode, and analyses the consequences of modifying the operation mode to ER1. Finally, Section 5.6 discusses inadequate tales produced by MEXICA.

In order to make the explanation clearer, all reproductions of the report produced by MEXICA during the developing of a tale are printed in bold characters **like these**. In this chapter, all references to the parameter ACAS-Constant I are made only as ACAS-Constant.

5.1 *The princess who cured the jaguar knight.*

The following is an example of a story created by MEXICA:

JAGUAR_KNIGHT WAS AN INHABITANT OF THE GREAT TENOCHTITLAN. PRINCESS WAS AN INHABITANT OF THE GREAT TENOCHTITLAN. TLALOC —THE GOD OF THE RAIN— WAS ANGRY AND SENT A STORM. THE HEAVY RAIN DAMAGED THE OLD WOODEN BRIDGE. WHEN JAGUAR_KNIGHT TRIED TO CROSS THE RIVER THE BRIDGE COLLAPSED INJURING BADLY JAGUAR_KNIGHT'S HEAD. PRINCESS KNEW THAT JAGUAR_KNIGHT COULD DIE AND THAT PRINCESS HAD TO DO SOMETHING ABOUT IT. PRINCESS HAD HEARD THAT THE TEPESCOHUITLE WAS AN EFFECTIVE CURATIVE PLANT. SO, PRINCESS PREPARED A PLASMA AND APPLIED IT TO JAGUAR_KNIGHT'S WOUNDS. IT WORKED AND JAGUAR_KNIGHT STARTED TO RECUPERATE! JAGUAR_KNIGHT REALISED THAT PRINCESS'S DETERMINATION HAD SAVED JAGUAR_KNIGHT'S LIFE.

DURING THE LAST WAR PRINCESS'S FATHER HUMILIATED ENEMY'S FAMILY. NOW, IT WAS TIME OF REVENGE AND ENEMY KIDNAPPED PRINCESS. THEY WENT TO THE FOREST WHERE ENEMY TIED PRINCESS TO A HUGE ROCK. EXACTLY AT MIDNIGHT ENEMY WOULD CUT PRINCESS UP. ALTHOUGH IT WAS VERY DANGEROUS JAGUAR_KNIGHT DECIDED TO DO SOMETHING IN ORDER TO LIBERATE PRINCESS. FOR SOME MINUTES JAGUAR_KNIGHT PRAYED TO QUETZALCOATL —THE FEATHERED SNAKE, THE GOD BETWEEN THE GODS— AND ASKED FOR WISDOM AND BRAVENESS. NOW JAGUAR_KNIGHT WAS READY TO FIND OUT ITS FATE.

PRINCESS WAS REALLY ANGRY FOR WHAT HAD HAPPENED AND AFFRONTED ENEMY. ENEMY'S FRAME OF MIND WAS VERY VOLATILE AND WITHOUT THINKING ABOUT IT ENEMY CHARGED AGAINST PRINCESS. MEANWHILE JAGUAR_KNIGHT DECIDED TO START A SEARCH FOR ENEMY. AFTER HARD WORK AND DIFFICULT MOMENTS JAGUAR_KNIGHT COULD FINALLY FIND ENEMY. JAGUAR_KNIGHT, FULL OF ANGER, TOOK A DAGGER AND ATTACKED ENEMY. JAGUAR_KNIGHT THREW SOME DUST IN ENEMY'S FACE. THEN, USING A DAGGER JAGUAR_KNIGHT PERFORATED ENEMY'S

CHEST. IMITATING THE SACRED CEREMONY OF THE SACRIFICE, JAGUAR_KNIGHT TOOK ENEMY'S HEART WITH ONE HAND AND RAISED IT TOWARDS THE SUN AS A SIGN OF RESPECT TO THE GODS.

JAGUAR_KNIGHT WALKED TOWARDS PRINCESS. FULL OF ADMIRATION FOR ALL THE BRAVENESS THAT PRINCESS HAD SHOWN IN THOSE HARD MOMENTS JAGUAR_KNIGHT LIBERATED PRINCESS! ALTHOUGH AT THE BEGINNING PRINCESS DID NOT WANT TO ADMIT IT, PRINCESS FELL IN LOVE WITH JAGUAR_KNIGHT. PRINCESS WAS KISSING JAGUAR_KNIGHT WHEN SUDDENLY PRINCESS RECOGNISED JAGUAR_KNIGHT'S TATTOO. IT WAS THE SAME AS THE ONE USED BY THE FRATERNITY WHICH HAD MURDERED PRINCESS'S FATHER SOME MONTHS AGO. AT ONCE ALL THOSE TERRIBLE MEMORIES WERE PRESENT AGAIN. PRINCESS HAD AMBIVALENT THOUGHTS TOWARDS JAGUAR_KNIGHT. ON THE ONE HAND PRINCESS HAD STRONG FEELINGS FOR JAGUAR_KNIGHT BUT ON THE OTHER HAND PRINCESS ABOMINATED WHAT JAGUAR_KNIGHT DID. PRINCESS FELT A DEEPLY ODIUM FOR JAGUAR_KNIGHT. INVOKING HUITZILOPOCHTLI, GOD OF THE DEAD, PRINCESS CUT JAGUAR_KNIGHT'S JUGULAR. THE BLOOD COVERED THE FLOOR. PRINCESS TOOK A DAGGER AND CUT PRINCESS'S THROAT. PRINCESS BLED TO DEATH WHILE TONATIU (THE GOD REPRESENTING THE SUN) DISAPPEARED IN THE HORIZON.

The tale is divided in three parts or episodes, each one coinciding with the three degradation-improvement processes found in the story (for a visual representation of such degradation-improvement processes see the graphic of the Tensional Representation at the end of Section 5.2). From now onwards, an episode is defined as the set of actions included in a degradation-improvement process.

The first episode ranges from the first action to the event where the princess cures jaguar knight. The first two actions introduce the main characters in the story. The event of the accident suffered by the knight constitutes the peak (the part with the highest value of the variable Tension to the Reader) in the episode. The function in the story of this episode is to establish an Emotional Link between the jaguar knight and the princess. In this way, when the enemy kidnaps the princess, the knight has a motive to go and rescue her.

The kidnapping action marks the beginning of the second episode, which ends when the princess falls in love with the knight. The kidnapping action introduces the antagonist in the story; in this example that role is played by the enemy. This episode can be subdivided in two sections. The first section includes the events where the enemy kidnaps the princess, the princess insults the enemy and he responds attacking her. The second section includes the events where the knight finds, attacks and kills the enemy, rescues the princess and the princess falls in love with him.

During the first section the Tension to the Reader is incremented (to make the story more interesting) not just by making the princess a prisoner of the enemy, but also by putting her life at risk when the enemy attacks her. The function of this first section is to drive the story towards the climax.

The second section starts by reintroducing the character jaguar knight in the story. The Tension to the Reader reaches one of its highest points in the story when the knight faces the enemy and decides to attack him. When the enemy is killed and the princess is rescued, all Tensions are released. This is followed by the action where the princess falls in love with the knight. Thus, this second section reaches the climax and releases all the tensions.

The third episode starts when the princess realises about knight's tattoo and finishes with the last action in the tale. The story takes an unexpected twist when the princess realises that the knight participated in

her father's murder. The story ends with the princess killing the man she loves and also killing herself. Thus, this episode introduces an abrupt new direction in the unfolding of the story, which leads towards an unforeseen end.

Although this story has three well identifiable parts —each one with a specific function in the story— and the role of the characters (e.g. antagonist-protagonist) is very clear, it is not the result of predefined plans or structures. This story is the result of an Engagement-Reflection process, which develops this tale by retrieving and linking sequences of actions. This process is explained in detailed in the following section.

5.2 Trace of the Story.

The initial action (supplied by the user) which originated this tale was PRINCESS CURED JAGUAR_KNIGHT. From it MEXICA sorted out what led to such an action and what happened after it. Each time MEXICA develops a new story a report called *New Story Context's Report* is created where all the details of the process are recorded.

*** NEW STORY CONTEXT'S REPORT

**Initial State:EgS CtEg-Rf:3 ACAS-Constant:50% Guidelines.Chances:1
Forbidden Actors:Half Active Num_actions:34 times_used:85
Novelty=> Strict 15%(1) High 50%(2) Medium 75%(3)
Detection of end of cycle NO-active. Logical actions NO-active.
Operation Mode: Engaged and Reflective States 2**

The header of the report indicates the value of the most important parameters defined by the user to create the story. For instance, in this example MEXICA starts to develop the story in the Engaged State (EgS). The value of the constant which regulates the cycle between the Engaged and Reflective States (CtEg-Rf) is set to three, i.e. after every three actions the system switches from the Engaged to the Reflective State to verify preconditions and evaluate the story. The ACAS-Constant is set by default to 50%; the Chances in the guidelines are calculated to one and the forbidden actors are set to Half Active. The values of the Strict and Medium Novelty Constants are set to 15% and 75% respectively (by default the value of the High Novelty Constant is set to 50% and this parameter is not modifiable). The process to finish a story when an improvement-degradation cycle ends is set to NO-active, and the same occurs with the detection of illogical actions. And finally, MEXICA is running under the Engaged and Reflective States 2 (ER2) operation mode.

The header also includes information about the number of events occurring in Previous Stories; this information is utilised to evaluate the novelty of the story in progress. In this example, there are 37 different actions employed in Previous Stories and the total number of times that such actions have been used is 86. The ratio between these two values produces the average number of times that a Primitive Action has been performed; for this example such a value is two. This average number

represents a novelty of 50%, i.e. any Primitive Action which has been used two times in Previous Stories has a novelty of 50%.

In this way, when during the development of a tale the Novelty Guideline is set to High, MEXICA just selects actions which have been used previously in one or two occasions. When the Novelty Guideline is set to Strict, which in this example has a value defined by the user of 15%, MEXICA just selects actions that have been used previously in one occasion. Finally, when the Novelty Guideline is set to Medium, which in this example has a value defined by the user of 75%, MEXICA just selects actions which have been used previously in one or two or maximum three occasions.

The first action in the story produces the following context:

CONTEXT ***

***** Time => 1 Action: princess CURED jaguar_knight Tension: 0**

Charac: PRINCESS Pos: Texcoco Lake Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

Charac: JAGUAR_KNIGHT Pos: Texcoco Lake Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

The first line indicates the (chronological) number of the action, the identifier of the action and the characters participating in it, and the value of the variable Tension to the reader represented in the report by the symbol **Tension**.

The first line in each characters' context indicates the name of the character, his/her position in the story-world, and his/her status. A list with all Emotional Links and Tensions that the character is aware of comes after it. In this example, the postconditions of the action A CURED B trigger an Emotional Link of intensity +3 and type 1 between the jaguar knight and the princess. That is, jaguar knight develops an Emotional Link towards the princess and the princess is aware of it. Now, MEXICA creates the Associative Structures from each of the characters' context to try to retrieve possible next actions from long-term memory.

ASSOCIATIVE STRUCTURE ***

***** Time => 1 Action: princess CURED jaguar_knight Tension: 0**

Charac: PRINCESS Pos: Texcoco Lake Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

Charac: JAGUAR_KNIGHT Pos: Texcoco Lake Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

The information related to the Associative Structure is presented in the report in the same format as the information related to the characters' contexts; first, a line with general data about the character followed by a list of Emotional Links and Tensions. However, by contrast with the context, just those Emotional Links and Tensions used to form the Associative Structure are listed in this part of the

report. In the current example MEXICA is able to match for both characters, princess and jaguar knight, Associative Structures of type I; so, the characters' contexts and Associative Structures are currently the same.

The Associative Structure formed from the princess' context is matched against the following atom:

```
** Atom
EmoLin=>          A(+3,1):B

Possible Next Actions=>  A WENT_PALACE
                        C MUGGED B
                        A WENT_HUNTING_WITH B
                        A HAD_AN_ACCIDENT
                        A REWARDED B
```

A map is created to establish a relation between the characters in such an Associative Structure and the atom; so jaguar knight is correlated with character A and princess with character B.

The Associative Structure formed from the jaguar knight's context is matched against the following atom:

```
** Atom
EmoLin=>          A(+3,1):C
                  B(+3,1):C

Possible Next Actions=>  D KIDNAPPED C
```

MEXICA creates another map to correlate characters where jaguar knight is linked to A and princess to C.

The New Story Context's Report does not include a detailed description of the atoms matched as it is presented in this example; instead it prints general information about such atoms under the title of INDEXES.

INDEXES ***

PRINCESS: 0,1 ASI-100 JAGUAR_KNIGHT: 0,2 ASI-50

This information includes the position in the Abstract Representation of the atoms matched, the type of Associative Structures used to match such atoms, and what percentage of the atom is equal to the Associative Structure (remember that an atom where the Associative Structure can be found as part of its organisation can be matched). Also, a list with all the possible next actions retrieved from long-term memory is printed.

For instance, in this example the Associative Structure created from the princess' context matches an atom in the position (0,1) (the Abstract Representation is organised as a matrix indexed by the number of Tensions and Emotional Links in the atom; thus, the atom is located in the position 0 Tensions, 1 Emotional Link). The Associative Structure used to match the atom belongs to type I (ASI) and the

atom is 100% equal to the Associative Structure (i.e. they are the same). All these information is encoded in the report as **PRINCESS: 0,1 ASI-100**.

In the same way, the Associative Structure created from the jaguar knight's context matches an atom in the position (0,2). The Associative Structure used to match the atom belongs to the type I (ASI) and 50% of the atom is equal to the Associative Structure (i.e. the Associative Structure constitutes 50% of the atom). All these information is encoded in the report as **JAGUAR_KNIGHT: 0,2 ASI-50**.

Notice that although the princess and jaguar knight's contexts are identical (and hence their Associative Structures) they match different atoms. The reason is that, in order to produce more alternatives, MEXICA avoids retrieving the same set of possible next actions twice.

Using the map to correlate characters described some lines earlier, all abstract characters in the list of possible next actions are substituted by the concrete characters in the princess' Associative Structure. This produces the following actions:

PRINCESS possible next actions: ****
JAGUAR_KNIGHT WENT_PALACE
ANYONE MUGGED PRINCESS
JAGUAR_KNIGHT WENT_HUNTING_WITH PRINCESS
JAGUAR_KNIGHT HAD_AN_ACCIDENT
JAGUAR_KNIGHT REWARDED PRINCESS

Because character C in the first atom cannot be correlated with any of the characters in the Associative Structure, it is substituted with the symbol ANYONE which indicates that it has to be instantiated later. MEXICA now substitutes the set of possible next actions retrieved from the jaguar knight's Associative Structure. Again, the first character in the set possible next actions (character D) cannot be linked to any character in the Associative Structure and it is substituted by the symbol ANYONE.

JAGUAR_KNIGHT possible next actions: ****
ANYONE KIDNAPPED PRINCESS

In the next step MEXICA instantiates unknown characters and filters the set of possible next actions to eliminate those not useful for the story.

***** FILTER JAGUAR_KNIGHT WENT_PALACE NoFlow-**
E\$ instantiating JAGUAR_KNIGHT MUGGED PRINCESS ReiCha
***** FILTER JAGUAR_KNIGHT WENT_HUNTING_WITH PRINCESS NoFlow-**
E\$ instantiating ENEMY KIDNAPPED PRINCESS PSt-

The symbol E\$ in the report indicates that MEXICA is running under the Engaged State. The action JAGUAR_KNIGHT WENT_PALACE is eliminated because it does not flow. This is represented in the report by the symbol **NoFlow** at the end of the line. MEXICA instantiates ANYONE MUGGED PRINCESS with JAGUAR_KNIGHT MUGGED PRINCESS. The character jaguar knight was selected by reincorporating characters; this is indicated in the report by the symbol **ReiCha** at the end

of the line. The action JAGUAR_KNIGHT WENT_HUNTING_WITH PRINCESS is eliminated because it does not flow. And finally the action ANYONE KIDNAPPED PRINCESS is instantiated with ENEMY KIDNAPPED PRINCESS. The character enemy was selected based on the group class in Previous Stories. This is represented in the report by the symbol **PSt**.

So, after the processes for instantiating and filtering are executed, the sets of possible next actions looks as follows:

PRINCESS possible next actions: ****
VIRGIN MUGGED PRINCESS
JAGUAR_KNIGHT HAD_AN_ACCIDENT
JAGUAR_KNIGHT REWARDED PRINCESS

JAGUAR_KNIGHT possible next actions: ****
ENEMY KIDNAPPED PRINCESS

From these possible actions, MEXICA randomly selects the action ENEMY KIDNAPPED PRINCESS, and the following context is produced:

CONTEXT ***

***** Time => 2 Action: enemy KIDNAPPED princess Tension: 40**

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Pd(ENEMY):PRINCESS+

Charac: JAGUAR_KNIGHT Pos: Texcoco Lake Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Charac: ENEMY Pos: Chapultepec Forest Status: Alive

Emotional Links =>

PRINCESS(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Pd(ENEMY):PRINCESS+

Each character's context is updated in a different way. What follows is an explanation of what postconditions and inferred postconditions are added to each of the characters' context.

Princess' Context.- In the case of the princess, all action's postconditions are added to her context. That is, the field position is set to *Chapultepec Forest* (this is one of the postconditions of the action KIDNAPPED). The Emotional Link PRINCES(-3,1):ENEMY is triggered. Because the princess is

aware that jaguar knight is a linked character towards her (this is represented in her context by JAGUAR_KNIGHT(+3,1):PRINCESS), JAGUAR_KNIGHT(-3,1):ENEMY is also added to the princess' context. The tension Pr(PRINCESS):ENEMY is triggered too. Finally, MEXICA detects that the princess hates the enemy and that they are in the same position, so it triggers the inferred postcondition Pd(enemy):princess+.

Jaguar knight's Context.- Because jaguar knight was in the same location as the princess when she was kidnapped, the Emotional Link PRINCESS(-3,1):ENEMY and the tension Pr(PRINCESS):ENEMY are added to his context. Because he is a linked character towards the princess, the Emotional Link JAGUAR_KNIGHT(-3,1):ENEMY is also added to it. Notice that jaguar knight does not register the inferred postcondition Potential Danger (Pd). This is because MEXICA verifies inferred postconditions after the context has been updated; at that moment jaguar knight is in a different location to the princess or the enemy so the knight cannot register the inferred postcondition.

Enemy's Context.- This action introduces the enemy character into the story. His position is set to *Chapultepec Forest* and PRINCESS(-3,1):ENEMY and Pr(PRINCESS):ENEMY are added to his context as a result of the action's postconditions. Also, the inferred postcondition Pd(enemy):princess+ is triggered. Notice that the field Position in the enemy's context would be set to Lake (princess' location before the kidnapping) if the action did not include as a postcondition to locate the characters in the Chapultepec Forest (when a new character is introduced in the story, its location is set with the same value that the location of the other characters participating in the action). Also notice that, because the enemy is not aware of the Emotional Link between jaguar knight and the princess, the enemy's context does not include JAGUAR_KNIGHT(-3,1):ENEMY, i.e. the enemy does not know that the knight hates him.

The Tension to the reader after this action is performed rises to 40. The Tension Pr(PRINCESS):ENEMY in the princess' contexts contributes with 20 units and the Tension Pd(ENEMY):PRINCESS+ in the enemy's context contributes the other 20 units.

Now MEXICA forms new Associative Structures and tries to retrieve a new set of possible next actions from memory.

ASSOCIATIVE STRUCTURE ***

***** Time => 2 Action: enemy KIDNAPPED princess Tension: 40**

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Pd(ENEMY):PRINCESS+

Charac: JAGUAR_KNIGHT Pos: Texcoco Lake Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY
JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Charac: ENEMY Pos: Chapultepec Forest Status: Alive

Emotional Links =>

PRINCESS(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Pd(ENEMY):PRINCESS+

INDEXES ***

PRINCESS: 3,7 ASI-50 JAGUAR_KNIGHT: 1,7 ASI-50 ENEMY: 2,1 ASI-100

The report indicates that in position (3,7) an Associative Structure of type I formed from the princess' context matches an atom; 50% of such an atom is equal to the Associative Structure, i.e. the atom contains as part of its organisation such a structure. In position (1,7) an Associative Structure of type I formed from the jaguar knight's context matches an atom; 50% of such an atom is equal to the Associative Structure, i.e. the atom contains as part of its organisation the structure. Finally, in position (2,1) an Associative Structure of type I formed from the enemy's context matches an atom; 100% of such an atom is equal to the Associative Structure, i.e. they are identical.

The sets of possible next actions brought to working memory are:

PRINCESS possible next actions: ****

JAGUAR_KNIGHT ATTACKED ENEMY

JAGUAR_KNIGHT possible next actions: ****

JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY

ENEMY possible next actions: ****

ANYONE REALISED

ANYONE FOUND_BY_ACCIDENT ENEMY

ENEMY ATTACKED PRINCESS

Now, the instantiation and filtering processes take place.

***** FILTER ANYONE REALISED**

E\$ instantiating PRINCESS FOUND_BY_ACCIDENT ENEMY ReiCha

E\$ Instantiated action deleted (NoFlow-); trying again.

E\$ instantiating JAGUAR_KNIGHT FOUND_BY_ACCIDENT ENEMY ReiCha

The action ANYONE REALISED is eliminated because the present prototype does not include a routine to manage compound actions during the Engaged State; the prototype is just able to work with compound actions during the Reflective State.

The action ANYONE FOUND_BY_ACCIDENT ENEMY is instantiated with the character princess. Princess was selected because she is already a character in the story and MEXICA is trying to reincorporate existing characters. This is indicated by the symbol **ReiCha** at the end of the line.

However, the action does not flow and MEXICA tries again to instantiate the action with another character in the story. Jaguar knight is chosen and this time the action flows (if jaguar knight finds by accident the enemy, i.e. if they are in the same location, the inferred Tension Potential Danger is triggered in the knight's context).

So, the sets of possible next actions look as follows.

PRINCESS possible next actions: ****

JAGUAR_KNIGHT ATTACKED ENEMY

JAGUAR_KNIGHT possible next actions: ****

JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY

ENEMY possible next actions: ****

JAGUAR_KNIGHT FOUND_BY_ACCIDENT ENEMY

ENEMY ATTACKED PRINCESS

MEXICA selects randomly the action ENEMY ATTACKED PRINCESS producing the following context.

CONTEXT ***

***** Time => 3 Action: enemy ATTACKED princess Tension: 60**

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Lr(PRINCESS):ENEMY+

Pd(ENEMY):PRINCESS+

Charac: JAGUAR_KNIGHT Pos: Texcoco Lake Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Charac: ENEMY Pos: Chapultepec Forest Status: Alive

Emotional Links =>

PRINCESS(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Lr(PRINCESS):ENEMY+

Pd(ENEMY):PRINCESS+

As a result of the postconditions, the Tension Lr(PRINCESS):ENEMY+ is added to the princess and enemy's contexts. Notice that all the Emotional Links triggered by the action (princess(-3,1):enemy and jaguar_knight(-3,1):enemy) already exists in the princess' context, so MEXICA does not duplicate them.

In the same way, the first Emotional Link in the postconditions is not duplicated in the enemy's context. However, with respect to the second one —that of the linked characters— because the enemy is not aware of the tie between the jaguar knight and the princess, his context does not register it.

Finally, because the jaguar knight is in a different location it does not register any of the postconditions triggered by the action.

Now MEXICA forms the Associative Structures and tries to retrieve possible next actions from memory.

ASSOCIATIVE STRUCTURE ***

***** Time => 3 Action: enemy ATTACKED princess**

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Tensions =>

**Pr(PRINCESS):ENEMY
Lr(PRINCESS):ENEMY+
Pd(ENEMY):PRINCESS+**

Charac: JAGUAR_KNIGHT Pos: Texcoco Lake Status: Alive

Emotional Links =>

**JAGUAR_KNIGHT(+3,1):PRINCESS
PRINCESS(-3,1):ENEMY
JAGUAR_KNIGHT(-3,1):ENEMY**

Tensions =>

Pr(PRINCESS):ENEMY

Charac: ENEMY Pos: Chapultepec Forest Status: Alive

Tensions =>

**Pr(PRINCESS):ENEMY
Lr(PRINCESS):ENEMY+
Pd(ENEMY):PRINCESS+**

INDEXES ***

PRINCESS: 10,15 ASIII-0 JAGUAR_KNIGHT: 1,7 ASI-50 ENEMY: 10,15 ASIII-0

This time the Associative Structure formed from the princess' context cannot retrieve anything from memory. This is represented in the report by the symbol **ASIII-0** where the zero indicates that the structure did not match any atom. The Associative Structure of type I formed from the jaguar knight's context matched an atom in the position (1,7) which is 50% equal to it. Finally, the Associative Structure formed from the enemy's context also fails to retrieve anything from memory.

PRINCESS possible next actions: ****

JAGUAR_KNIGHT possible next actions: ****

JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY

ENEMY possible next actions: ****

So, the only option available is used as the next action in the story. In this way, the story developed so far looks as follows.

*** NEW STORY:
 PRINCESS CURED JAGUAR_KNIGHT
 ENEMY KIDNAPPED PRINCESS
 ENEMY ATTACKED PRINCESS
 JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY

At this moment, the number of actions produced during the Engaged State is equal to the value of the constant which regulates the cycle between the Engaged and Reflective States (CtEg-Rf) which for this example has been set to three. So, MEXICA switches to the Reflective State to verify preconditions and evaluate the story.

*** Switching to Rf-S ...

R\$ inserting JAGUAR_KNIGHT ACTOR Loc PRINCESS CURED JAGUAR_KNIGHT
R\$ inserting PRINCESS ACTOR Pos PRINCESS CURED JAGUAR_KNIGHT
R\$ inserting JAGUAR_KNIGHT HAD_AN_ACCIDENT Pre PRINCESS CURED
JAGUAR_KNIGHT
R\$ inserting PRINCESS AFFRONTED ENEMY Pre ENEMY ATTACKED PRINCESS

R\$ Checking novelty: number of times a sequence happens in other stories
R\$ Seq:1x1 Seq:2x0 Seq:3x0 Seq:4x0 Seq:5x0 Seq:6x0 Seq:7x0 Seq:8x0
R\$ Adequate novelty: guideline set to LOW.

R\$ Evaluating the Tensional Representations ...
R\$ F1-R:4 F2-R:0 F3-R:5 F4-R:1 F5-R:3
R\$ F6-R:3 F7-R:4
R\$ Frame:3 PT:TDn Chances:1

The symbol **R\$** indicates the MEXICA is running under the Reflective State. To make the present explanation clearer, this section of the report is divided in three parts. The first is related to the process of checking preconditions, the second to the process of evaluating novelty, and the last one to the process of evaluating the Tensional Representation.

1)The first four lines contain information related to the process of checking preconditions.

R\$ inserting JAGUAR_KNIGHT ACTOR Loc PRINCESS CURED JAGUAR_KNIGHT
R\$ inserting PRINCESS ACTOR Loc PRINCESS CURED JAGUAR_KNIGHT
R\$ inserting JAGUAR_KNIGHT HAD_AN_ACCIDENT Pre PRINCESS CURED
JAGUAR_KNIGHT
R\$ inserting PRINCESS AFFRONTED ENEMY Pre ENEMY ATTACKED PRINCESS

MEXICA detects that the preconditions of the first action in the tale PRINCESS CURED JAGUAR_KNIGHT are not fulfilled. Because jaguar knight intervenes in the preconditions and he is a new character (it is the first action in the story so there were no characters before) MEXICA inserts the actions PRINCESS ACTOR and JAGUAR_KNIGHT ACTOR to solve the location problem. This is indicated by the symbol **Loc** between the two actions in the first two lines.

MEXICA inserts the action JAGUAR_KNIGHT HAD_AN_ACCIDENT to satisfy the preconditions of PRINCESS CURED JAGUAR_KNIGHT. This is indicated in the report by the symbol **Pre** between

the two actions in the third line. Finally, the action PRINCESS AFFRONTED ENEMY is inserted to fulfil the preconditions of ENEMY ATTACKED PRINCESS.

Each time an action is inserted, MEXICA updates the characters' contexts with the consequences of such an action. In this way, when it switches back to the Engaged State all the contexts are properly updated. So, after all preconditions have been satisfied the story in progress looks as follows:

```
*** NEW STORY:
JAGUAR_KNIGHT ACTOR
PRINCESS ACTOR
JAGUAR_KNIGHT HAD_AN_ACCIDENT
PRINCESS CURED JAGUAR_KNIGHT
ENEMY KIDNAPPED PRINCESS
PRINCESS AFFRONTED ENEMY
ENEMY ATTACKED PRINCESS
JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY
```

2)MEXICA now checks the novelty of the story in progress.

R\$ Checking novelty: number of times a sequence happens in other stories
R\$ Seq:1x1 Seq:2x0 Seq:3x0 Seq:4x0 Seq:5x0 Seq:6x0 Seq:7x0 Seq:8x0
R\$ Adequate novelty: guideline set to LOW.

The second line in this part of the report indicates that the first sequence (i.e. the sequence JAGUAR_KNIGHT ACTOR / PRINCESS ACTOR) has occurred once in Previous Stories. This is represented by the symbol **Seq:1x1** where Seq:1 means *sequence one* and x1 means *appears once in previous stories*. The rest of the sequences have never occurred in the Previous Stories; this is indicated in the report by the symbol **x0** after the sequence number. In this way, the novelty of the story is classified as adequate and the guideline is set to Low.

3)Finally, MEXICA evaluates the Tensional Representation of the story in progress.

R\$ Evaluating the Tensional Representations ...
R\$ F1-R:4 F2-R:0 F3-R:5 F4-R:1 F5-R:3 F6-R:3 F7-R:4
R\$ Frame:3 PT:TDn Chances:1

For this example there are seven tales in the file of Previous Stories, i.e. there are seven Tensional Representations or *frames* that MEXICA uses to compare the Tensional Representation of the story in progress with. (From now onwards all the Tensional Representations of the Previous Stories are referred as frames.) The result of the comparison of the first frame and the story in progress is four; this is represented in the report by the symbol **F1-R:4** where F1 means *comparing with the frame one* and -R:4 means *the result of the comparison is four*. The same applies for all the seven frames. The frame with the highest result is frame three, so MEXICA uses it to set the guidelines. Thus, the Permanent Tension is set to Tendency Down (TDn); because the frame and the Tensional Representation of the

story in progress are similar in more than 50%, the value of the Chances is not modified, i.e., it still has the value one.

Figures 5.1a to 5.1g show the frames of all the Previous Stories. Note that graphs are not drawn on the same scale (y-axis). Figure 5.2 compares the Tensional Representation of the story in progress against frame #2 (the frame with the lowest result) and frame #3 (the frame with the highest result).

Fig. 5.1a Frame #1

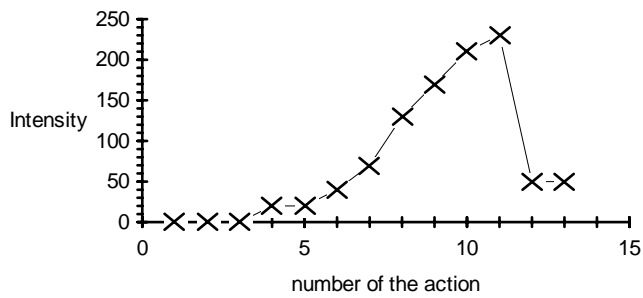


Fig. 5.1b Frame #2

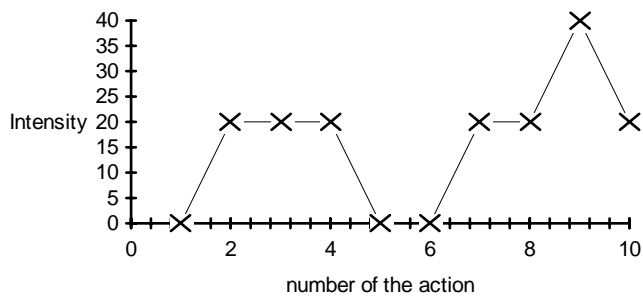


Fig. 5.1c Frame #3

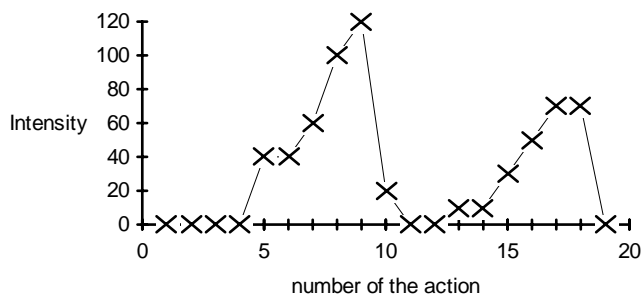


Fig. 5.1d Frame #4

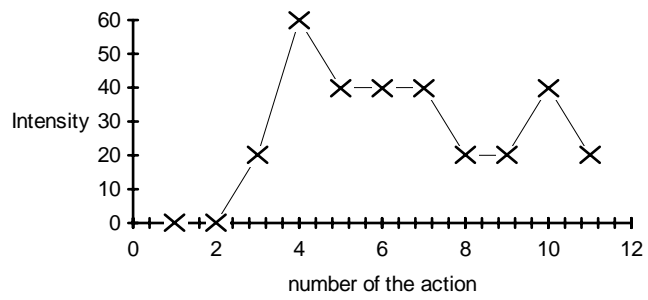


Fig. 5.1e Frame #5

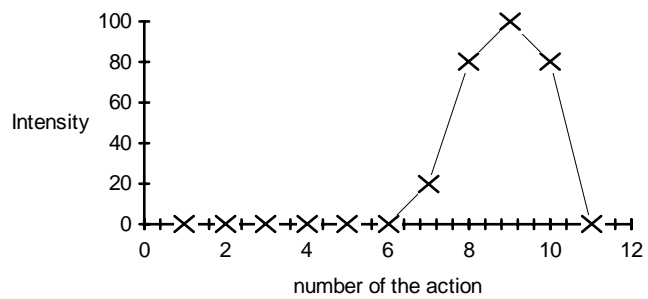


Fig. 5.1f Frame #6

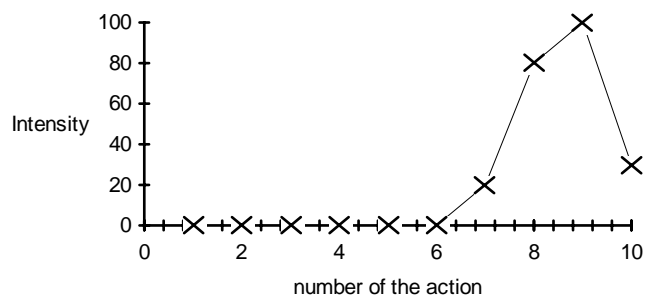


Fig. 5.1g Frame #7

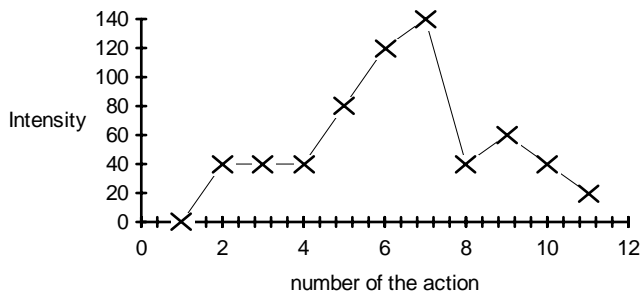
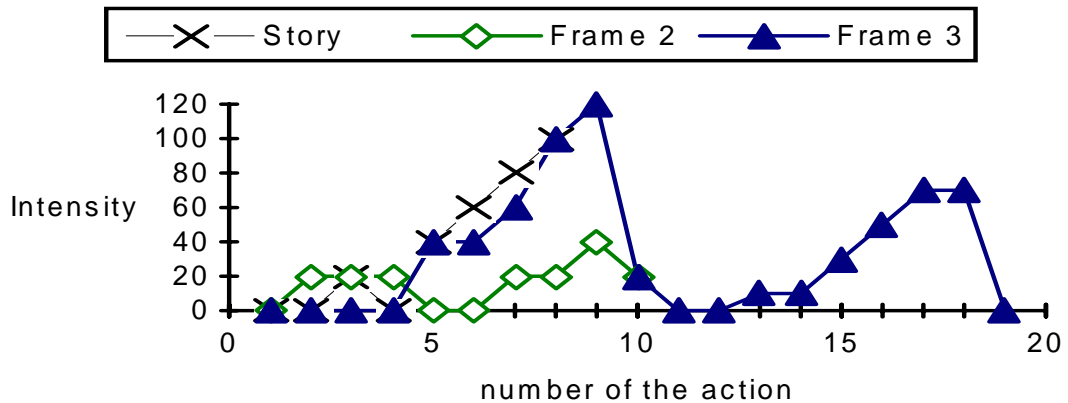


Fig. 5.2 Comparing the Tensional Representations



Once MEXICA finishes verifying preconditions and evaluating the story, it switches back to the Engaged State and updates the context with the last action selected.

*** Switching to Eg-S ...

CONTEXT ***

*** Time => 8 Action: jaguar_knight LOOKED_FOR_AND_FOUND enemy Tension: 100

Charac: JAGUAR_KNIGHT Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Pd(ENEMY):PRINCESS+

Pd(ENEMY):JAGUAR_KNIGHT+

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

ENEMY(-2,1):PRINCESS

Tensions =>

Pr(PRINCESS):ENEMY

Lr(PRINCESS):ENEMY+

Pd(ENEMY):PRINCESS+

Pd(ENEMY):JAGUAR_KNIGHT+
Pd(PRINCESS):ENEMY+

Charac: ENEMY Pos: Chapultepec Forest Status: Alive

Emotional Links =>

PRINCESS(-3,1):ENEMY
ENEMY(-2,1):PRINCESS

Tensions =>

Pr(PRINCESS):ENEMY
Lr(PRINCESS):ENEMY+
Pd(ENEMY):PRINCESS+
Pd(PRINCESS):ENEMY+

Notice that, because MEXICA inserted some actions to satisfy preconditions, the number representing the story-time in which the action LOOKED_FOR_AND_FOUND occurred has been updated to 8 (this is indicated in the report by **Time=>8**).

Here it is possible to observe how the actions inserted to satisfy the preconditions during the Reflective State have modified the characters' context. For example, the princess and the enemy added to their contexts the Emotional Link ENEMY(-2,1):PRINCESS triggered by the action PRINCESS AFFRONTED ENEMY. This new Emotional Link produces the inferred postcondition Pd(PRINCESS):ENEMY+ to be triggered increasing the Tension to the Reader.

Also, it is possible to see how MEXICA's routine to reduce Emotional Links works. The actions ENEMY KIDNAPPED PRINCESS and ENEMY ATTACKED PRINCESS trigger the same Emotional Link PRINCESS(-3,1):enemy; to avoid an unmanageable number of elements in the context, MEXICA reduces it and just keeps one of them.

As a consequence of the action JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY the location of jaguar knight is set to Chapultepec Forest and the inferred postcondition Pd(ENEMY):JAGUAR_KNIGHT+ is triggered. Notice that the enemy's context does not register such inferred postcondition. The reason is that the enemy is not aware that the jaguar knight is a Linked Character to the princess, i.e. that jaguar knight also hates enemy because he kidnapped the princess. So, the enemy does not know of the potential danger of being in the same location as jaguar knight.

At this moment the value of the Tension to the Reader is 100. This value is calculated as follows. 60% comes from the tensions Pr(PRINCESS):ENEMY, Lr(PRINCESS):ENEMY+ and Pd(ENEMY):PRINCESS+ in the princess' context. 20% comes from Pd(ENEMY):JAGUAR_KNIGHT in the jaguar knight's context. Finally, the remaining 20% come from the tension Pd(PRINCESS):ENEMY+ in the enemy's context.

MEXICA creates new Associative Structures and tries to retrieve more possible next actions from memory.

ASSOCIATIVE STRUCTURE ***

***** Time => 8 Action: jaguar_knight LOOKED_FOR_AND_FOUND enemy Tension: 100**

Charac: JAGUAR_KNIGHT Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS
PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY
Pd(ENEMY):PRINCESS+
Pd(ENEMY):JAGUAR_KNIGHT+

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Tensions =>

Pr(PRINCESS):ENEMY
Lr(PRINCESS):ENEMY+
Pd(ENEMY):PRINCESS+
Pd(PRINCESS):ENEMY+

Charac: ENEMY Pos: Chapultepec Forest Status: Alive

Tensions =>

Pr(PRINCESS):ENEMY
Lr(PRINCESS):ENEMY+
Pd(ENEMY):PRINCESS+
Pd(PRINCESS):ENEMY+

INDEXES ***

JAGUAR_KNIGHT: 3,7 ASI-60 PRINCESS: 10,15 ASIII-0 ENEMY: 10,15 ASIII-0

JAGUAR_KNIGHT possible next actions: ****

JAGUAR_KNIGHT ATTACKED ENEMY

PRINCESS possible next actions: ****

ENEMY possible next actions: ****

E\$ JAGUAR_KNIGHT ATTACKED ENEMY was not deleted because 1 chances left.

The only option retrieved from memory is JAGUAR_KNIGHT ATTACKED ENEMY. But there is a problem with it; this option does not fulfil the tensional requirements set by the guidelines. Such requirements specify a tendency to go down in the value of the Tension to the Reader and the action ATTACKED increments such a tension. However, the guidelines also establish a chance (or flexibility) of one, so the action is not eliminated. This is indicated in the report by the line **E\$ JAGUAR_KNIGHT ATTACKED ENEMY was not deleted because 1 chances left.**

CONTEXT ***

***** Time => 9 Action: jaguar_knight ATTACKED enemy Tension: 140**

Charac: JAGUAR_KNIGHT Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS
PRINCESS(-3,1):ENEMY
JAGUAR_KNIGHT(-3,1):ENEMY
ENEMY(-3,1):JAGUAR_KNIGHT

Tensions =>

Pr(PRINCESS):ENEMY
Lr(ENEMY):JAGUAR_KNIGHT+
Pd(ENEMY):PRINCESS+
Pd(ENEMY):JAGUAR_KNIGHT+
Pd(JAGUAR_KNIGHT):ENEMY+

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS
 PRINCESS(-3,1):ENEMY
 JAGUAR_KNIGHT(-3,1):ENEMY
 ENEMY(-2,1):PRINCESS
 ENEMY(-3,1):JAGUAR_KNIGHT

Tensions =>

Pr(PRINCESS):ENEMY
 Lr(PRINCESS):ENEMY+
 Lr(ENEMY):JAGUAR_KNIGHT+
 Pd(ENEMY):PRINCESS+
 Pd(ENEMY):JAGUAR_KNIGHT+
 Pd(PRINCESS):ENEMY+
 Pd(JAGUAR_KNIGHT):ENEMY+

Charac: ENEMY Pos: Chapultepec Forest Status: Alive

Emotional Links =>

PRINCESS(-3,1):ENEMY
 ENEMY(-2,1):PRINCESS
 ENEMY(-3,1):JAGUAR_KNIGHT

Tensions =>

Pr(PRINCESS):ENEMY
 Lr(PRINCESS):ENEMY+
 Lr(ENEMY):JAGUAR_KNIGHT+
 Pd(ENEMY):PRINCESS+
 Pd(PRINCESS):ENEMY+
 Pd(JAGUAR_KNIGHT):ENEMY+

The postconditions triggered by the action are added to all characters' contexts. The Tension to the Reader rises to 140 due to the tensions Lr(ENEMY):JAGUAR_KNIGHT+ and the inferred postcondition Pd(JAGUAR_KNIGHT):ENEMY+.

MEXICA creates the Associative Structures and searches memory.

ASSOCIATIVE STRUCTURE ***

*** Time => 9 Action: jaguar_knight ATTACKED enemy Tension: 140

Charac: JAGUAR_KNIGHT Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS
 PRINCESS(-3,1):ENEMY
 JAGUAR_KNIGHT(-3,1):ENEMY
 ENEMY(-3,1):JAGUAR_KNIGHT

Tensions =>

Pr(PRINCESS):ENEMY
 Lr(ENEMY):JAGUAR_KNIGHT+
 Pd(ENEMY):PRINCESS+
 Pd(ENEMY):JAGUAR_KNIGHT+
 Pd(JAGUAR_KNIGHT):ENEMY+

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Tensions =>

Pr(PRINCESS):ENEMY
 Lr(PRINCESS):ENEMY+
 Lr(ENEMY):JAGUAR_KNIGHT+
 Pd(ENEMY):PRINCESS+
 Pd(PRINCESS):ENEMY+

Charac: ENEMY Pos: Chapultepec Forest Status: Alive

Tensions =>

Pr(PRINCESS):ENEMY
Lr(PRINCESS):ENEMY+
Lr(ENEMY):JAGUAR_KNIGHT+
Pd(ENEMY):PRINCESS+
Pd(PRINCESS):ENEMY+
Pd(JAGUAR_KNIGHT):ENEMY+

INDEXES ***

JAGUAR_KNIGHT: 5,8 ASI-69 PRINCESS: 10,15 ASIII-0 ENEMY: 10,15 ASIII-0

JAGUAR_KNIGHT possible next actions: ****

JAGUAR_KNIGHT FOUGHT ENEMY

PRINCESS possible next actions: ****

ENEMY possible next actions: ****

***** FILTER JAGUAR_KNIGHT FOUGHT ENEMY Ten(GLn:TnDn)-**

Like in the previous action, MEXICA just retrieves one possible next action from memory. It does not fulfil the requirements established by the guidelines and it is deleted since there are no chances left. The symbol **Ten(GLn:TnDn)-** at the right end of the line indicates that the actions was deleted because it did not fulfil the tensional requirement (Ten) and it shows that the guidelines (GLn) are set to tendency down (TnDn).

So, MEXICA tries again to retrieve possible next actions.

Trying again ***

INDEXES ***

JAGUAR_KNIGHT: 6,8 ASI-64 PRINCESS: 10,15 ASIII-0 ENEMY: 10,15 ASIII-0

JAGUAR_KNIGHT possible next actions: ****

JAGUAR_KNIGHT KILLED ENEMY

PRINCESS possible next actions: ****

ENEMY possible next actions: ****

This time MEXICA brings to working memory the action JAGUAR_KNIGHT KILLED ENEMY. As it can be observed in the context, almost all the tensions in the story are linked to the enemy; so, if the enemy dies all those tensions disappear decreasing the value of the Tension to the Reader. In this way, this action fulfils the requirements of Tendency Down established by the guidelines. Also notice that in MEXICA, when someone kills the character enemy, the Tension to the Reader is not incremented.

So, the action is selected producing the following context:

CONTEXT ***

***** Time => 10 Action: jaguar_knight KILLED enemy Tension: 20**

Charac: JAGUAR_KNIGHT Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Ad(ENEMY):JAGUAR_KNIGHT

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Ad(ENEMY):JAGUAR_KNIGHT

Charac: ENEMY Pos: NoWhere Status: Dead

Associative Structures are created in order to try to retrieve some actions from memory. Since the enemy is dead, he no longer has a context.

ASSOCIATIVE STRUCTURE ***

***** Time => 10 Action: jaguar_knight KILLED enemy Tension: 20**

Charac: JAGUAR_KNIGHT Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

Tensions =>

Pr(PRINCESS):ENEMY

Ad(ENEMY):JAGUAR_KNIGHT

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Tensions =>

Pr(PRINCESS):ENEMY

Charac: ENEMY Pos: NoWhere Status: Dead

INDEXES ***

JAGUAR_KNIGHT: 2,7 ASI-56 PRINCESS: 10,15 ASIII-0 ENEMY: 0,0 ASIII-0

JAGUAR_KNIGHT possible next actions: ****

JAGUAR_KNIGHT RESCUED PRINCESS

PRINCESS possible next actions: ****

ENEMY possible next actions: ****

MEXICA is able to retrieve just one option from memory. It fulfils the requirements established by the guidelines, so it is used as the next action in the story.

Taking this last action into account, the story created so far looks as follows:

*** NEW STORY:
 JAGUAR_KNIGHT ACTOR
 PRINCESS ACTOR
 JAGUAR_KNIGHT HAD_AN_ACCIDENT
 PRINCESS CURED JAGUAR_KNIGHT
 ENEMY KIDNAPPED PRINCESS
 PRINCESS AFFRONTED ENEMY
 ENEMY ATTACKED PRINCESS
 JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY
 JAGUAR_KNIGHT ATTACKED ENEMY
 JAGUAR_KNIGHT KILLED ENEMY
 JAGUAR_KNIGHT RESCUED PRINCESS

MEXICA detects that three new actions have been joined to the story since the last time it switched to the Reflective State, so the system switches back to it again.

*** Switching to Rf-S ...

R\$ Checking novelty: number of times a sequence happens in other stories

R\$ Seq:1x1 Seq:2x0 Seq:3x0 Seq:4x0 Seq:5x0 Seq:6x0 Seq:7x0 Seq:8x1 Seq:9x0 Seq:10x1 Seq:11x0

R\$ Adequate novelty: guideline set to LOW.

R\$ Evaluating the Tensional Representations ...

R\$ The frame number 2 is smaller than the story in progress.

R\$ The frame number 6 is smaller than the story in progress.

R\$ F1-R:3 F3-R:8 F4-R:1 F5-R:6 F7-R:7

R\$ Frame:3 PT:TUp Chances:1

In this occasion all preconditions in the story are fulfilled, so no action is inserted. Regarding novelty, just sequences one, eight and ten have occurred in Previous Stories. Thus, the story is classified as having an adequate novelty and the guideline is set to Low.

Regarding the Tensional Representation, the story in progress has reached eleven actions, i.e. it is bigger than tales number two and six in the file of Previous Stories. As a result, the Tensional Representations of such tales cannot be used any more as frames to be compared with the story in progress. This situation is indicated in the report by the line **R\$ The frame number 2 is smaller than the story in progress** and the line **R\$ The frame number 6 is smaller than the story in progress**. The following line in the report indicates which frames have been used to compare the story with and the result of the comparison.

Again, the most similar frame to the story in progress is number three which is the one used to set the Guidelines. This time, however, the Permanent Tension is set to Tendency Up (this is indicated in the report by **PT:TUp**).

Now MEXICA switches back to the Engaged State.

*** Switching to Eg-S ...

CONTEXT ***

***** Time => 11 Action: jaguar_knight RESCUED princess Tension: 0**

Charac: JAGUAR_KNIGHT Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY
JAGUAR_KNIGHT(-3,1):ENEMY
PRINCESS(+3,1):JAGUAR_KNIGHT
JAGUAR_KNIGHT(+2,1):JAGUAR_KNIGHT

Tensions =>

Ad(ENEMY):JAGUAR_KNIGHT

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS
PRINCESS(-3,1):ENEMY
JAGUAR_KNIGHT(-3,1):ENEMY
PRINCESS(+3,1):JAGUAR_KNIGHT
JAGUAR_KNIGHT(+2,1):JAGUAR_KNIGHT

Tensions =>

Ad(ENEMY):JAGUAR_KNIGHT

Charac: ENEMY Pos: NoWhere Status: Dead

As a consequence of this action the Tension Pr(PRINCESS):ENEMY is eliminated, and the Emotional Links PRINCESS(+3,1):JAGUAR_KNIGHT and JAGUAR_KNIGHT(+2,1):JAGUAR_KNIGHT are added to both characters' context. This last Emotional Link represents a special case. One of the postconditions in the action RESCUED is that the Linked Characters to the princess establish an Emotional Link towards the character who rescued her (this is represented as LPRINCESS(%,1):JAGUAR_KNIGHT). In this case, the character that rescued the princess (i.e. jaguar knight) is also a linked character to her; so the consequence of the action is that jaguar knight develops a positive Emotional Link towards himself.

New Associative Structures are created and a search in memory launched.

ASSOCIATIVE STRUCTURE ***

***** Time => 11 Action: jaguar_knight RESCUED princess Tension: 0**

Charac: JAGUAR_KNIGHT Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS
PRINCESS(-3,1):ENEMY
JAGUAR_KNIGHT(-3,1):ENEMY
PRINCESS(+3,1):JAGUAR_KNIGHT
JAGUAR_KNIGHT(+2,1):JAGUAR_KNIGHT

Tensions =>

Ad(ENEMY):JAGUAR_KNIGHT

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS
PRINCESS(-3,1):ENEMY
JAGUAR_KNIGHT(-3,1):ENEMY
PRINCESS(+3,1):JAGUAR_KNIGHT
JAGUAR_KNIGHT(+2,1):JAGUAR_KNIGHT

Tensions =>

Ad(ENEMY):JAGUAR_KNIGHT

Charac: ENEMY Pos: NoWhere Status: Dead

INDEXES ***

JAGUAR_KNIGHT: 1,9 ASI-60 PRINCESS: 1,10 ASI-55 ENEMY: 0,0 ASIII-0

Two possible next actions are retrieved from memory.

JAGUAR_KNIGHT possible next actions: ****

PRINCESS REALISED

PRINCESS possible next actions: ****

PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT

ENEMY possible next actions: ****

***** FILTER PRINCESS REALISED**

The filters eliminate the compound action and the remaining action works as the next action in the story.

CONTEXT ***

***** Time => 12 Action: princess FELL_IN_LOVE jaguar_knight Tension: 0**

Charac: JAGUAR_KNIGHT Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

PRINCESS(+3,1):JAGUAR_KNIGHT

PRINCESS(+3,2):JAGUAR_KNIGHT

JAGUAR_KNIGHT(+2,1):JAGUAR_KNIGHT

Tensions =>

Ad(ENEMY):JAGUAR_KNIGHT

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS

PRINCESS(-3,1):ENEMY

JAGUAR_KNIGHT(-3,1):ENEMY

PRINCESS(+3,1):JAGUAR_KNIGHT

PRINCESS(+3,2):JAGUAR_KNIGHT

JAGUAR_KNIGHT(+2,1):JAGUAR_KNIGHT

Tensions =>

Ad(ENEMY):JAGUAR_KNIGHT

Charac: ENEMY Pos: NoWhere Status: Dead

This action triggers PRINCESS(+3,2):JAGUAR_KNIGHT. In this way, the princess has two different Emotional Links towards jaguar knight; on one hand she loves him (type 1) because he rescued her, and on the other hand she has fallen in love with him (type 2). Because the links are different types MEXICA does not reduce them.

The Associative Structures are created and the search in memory fired.

ASSOCIATIVE STRUCTURE ***

***** Time => 12 Action: princess FELL_IN_LOVE jaguar_knight Tension: 0**

Charac: JAGUAR_KNIGHT Pos: Chapultepec Forest Status: Alive

Emotional Links =>

**JAGUAR_KNIGHT(+3,1):PRINCESS
PRINCESS(-3,1):ENEMY
JAGUAR_KNIGHT(-3,1):ENEMY
PRINCESS(+3,1):JAGUAR_KNIGHT
PRINCESS(+3,2):JAGUAR_KNIGHT
JAGUAR_KNIGHT(+2,1):JAGUAR_KNIGHT**

Tensions =>

Ad(ENEMY):JAGUAR_KNIGHT

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

**JAGUAR_KNIGHT(+3,1):PRINCESS
PRINCESS(-3,1):ENEMY
JAGUAR_KNIGHT(-3,1):ENEMY
PRINCESS(+3,1):JAGUAR_KNIGHT
PRINCESS(+3,2):JAGUAR_KNIGHT
JAGUAR_KNIGHT(+2,1):JAGUAR_KNIGHT**

Tensions =>

Ad(ENEMY):JAGUAR_KNIGHT

Charac: ENEMY Pos: NoWhere Status: Dead

INDEXES ***

JAGUAR_KNIGHT: 1,9 ASI-70 PRINCESS: 2,11 ASI-54 ENEMY: 0,0 ASIII-0

JAGUAR_KNIGHT possible next actions: ****

PRINCESS REALISED

PRINCESS possible next actions: ****

**PRINCESS LOOKED_FOR_AND_FOUND ANYONE
PRINCESS KILLED ANYONE**

ENEMY possible next actions: ****

***** FILTER PRINCESS REALISED**

E\$ instantiating PRINCESS LOOKED_FOR_AND_FOUND JAGUAR_KNIGHT ReiCha

E\$ Instantiated action does not flow (NoFlow-); trying again.

E\$ instantiating PRINCESS LOOKED_FOR_AND_FOUND LADY PSt-

***** FILTER PRINCESS LOOKED_FOR_AND_FOUND LADY NoFlow-**

E\$ instantiating PRINCESS KILLED JAGUAR_KNIGHT ReiCha

Three possible next actions are brought to working memory. The first is a compound action, which is deleted by the filters. The second is instantiated by MEXICA reintroducing one of the characters from the story. However, the action does not flow because the princess and the jaguar knight are already in the same location. So, MEXICA tries to instantiate the action copying the way it has been instantiated in Previous Stories using the class group; however, again the action does not flow and it is deleted by the filters. Finally, the last possible action is instantiated reincorporating the character jaguar knight; this action flows and, as the only option available, it is used as the next action in the story.

CONTEXT ***

***** Time => 13 Action: princess KILLED jaguar_knight Tension: 30
Charac: JAGUAR_KNIGHT Pos: NoWhere Status: Dead**

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

**PRINCESS(-3,1):ENEMY
PRINCESS(+3,1):JAGUAR_KNIGHT
PRINCESS(+3,2):JAGUAR_KNIGHT
PRINCESS(-3,1):PRINCESS**

Tensions =>

**Ad(ENEMY):JAGUAR_KNIGHT
Ad(JAGUAR_KNIGHT):PRINCESS**

Charac: ENEMY Pos: NoWhere Status: Dead

At this point the story has taken a 'strange' direction; the princess fell in love with jaguar knight and then she killed him. This apparent incongruity will be resolved later; at the moment MEXICA is busy generating actions. Observe that the princess' context now includes the Emotional Link PRINCESS(-3,1):PRINCESS, i.e. the princess hates herself as a consequence of killing the jaguar knight.

New possible next actions are again retrieved from long-term memory:

ASSOCIATIVE STRUCTURE ***

***** Time => 13 Action: princess KILLED jaguar_knight Tension: 30
Charac: JAGUAR_KNIGHT Pos: NoWhere Status: Dead**

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Tensions =>

Ad(JAGUAR_KNIGHT):PRINCESS

Charac: ENEMY Pos: NoWhere Status: Dead

INDEXES ***

JAGUAR_KNIGHT: 0,0 ASIII-0 PRINCESS: 10,15 ASIII-0 ENEMY: 0,0 ASIII-0

JAGUAR_KNIGHT possible next actions: ****

PRINCESS possible next actions: ****

ENEMY possible next actions: ****

***** Impasse : Engage-State with evaluation ...**

No possible next actions are brought to working memory and an impasse is declared. MEXICA switches to the Reflective State in order to try to break the impasse.

***** Switching to Rf-S ...**

R\$ inserting PRINCESS DISCOVERED_MURDER_OF JAGUAR_KNIGHT Pre PRINCESS KILLED JAGUAR_KNIGHT

MEXICA detects that some preconditions have not been fulfilled and inserts an action to satisfy them. The process works as follows. MEXICA retrieved from memory the action PRINCESS KILLED JAGUAR_KNIGHT which (at least at the moment) does not make any sense at all. Thus, it is necessary to insert an action to explain the killing event. MEXICA justifies the princess' behaviour (i.e. fulfils the preconditions) by inserting the action **PRINCESS DISCOVERED_MURDER_OF JAGUAR_KNIGHT** (this action represents that the princess realises that the knight murdered someone she loves). In this way the coherence problem, i.e. the preconditions problem, is resolved.

So, the story developed so far looks as follows:

*** NEW STORY:
 JAGUAR_KNIGHT ACTOR
 PRINCESS ACTOR
 JAGUAR_KNIGHT HAD_AN_ACCIDENT
 PRINCESS CURED JAGUAR_KNIGHT
 ENEMY KIDNAPPED PRINCESS
 PRINCESS AFFRONTED ENEMY
 ENEMY ATTACKED PRINCESS
 JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY
 JAGUAR_KNIGHT ATTACKED ENEMY
 JAGUAR_KNIGHT KILLED ENEMY
 JAGUAR_KNIGHT RESCUED PRINCESS
 PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT
 PRINCESS DISCOVERED_MURDER_OF JAGUAR_KNIGHT
 PRINCESS KILLED JAGUAR_KNIGHT

Now, MEXICA switches back to the Engaged State to verify if the actions inserted help to break the impasse. That is, the consequences of the actions inserted might have modified the characters' context in such a way that the Associative Structures are perhaps now able to match an atom in long-term memory.

*** Switching to Eg-S ...

CONTEXT ***

*** Time => 14 Action: princess KILLED jaguar_knight Tension: 70
 Charac: JAGUAR_KNIGHT Pos: NoWhere Status: Dead

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Emotional Links =>

PRINCESS(-3,1):ENEMY
 PRINCESS(+3,1):JAGUAR_KNIGHT
 PRINCESS(-3,1):JAGUAR_KNIGHT
 PRINCESS(+3,2):JAGUAR_KNIGHT

PRINCESS(-3,1):PRINCESS

Tensions =>

Ad(ENEMY):JAGUAR_KNIGHT
Ad(JAGUAR_KNIGHT):PRINCESS
Ce(PRINCESS):JAGUAR_KNIGHT

Charac: ENEMY Pos: NoWhere Status: Dead

A Tension due to Clashing Emotions has been added in the princess' context. When the princess realises that the knight is the murder of someone she loves the Emotional Link PRINCESS(-3,1):JAGUAR_KNIGHT is triggered. As a consequence, when the inferred postconditions are verified, MEXICA detects that the princess has contradictory (or clashing) Emotional Links towards jaguar knight. In this way, the Tension Ce(PRINCESS):JAGUAR_KNIGHT is also triggered.

So, MEXICA forms the Associative Structure from the princess' context and verifies if the impasse is broken, i.e. it tries again to retrieve possible next actions from memory.

ASSOCIATIVE STRUCTURE ***

***** Time => 14 Action: princess KILLED jaguar_knight Tension: 70**

Charac: JAGUAR_KNIGHT Pos: NoWhere Status: Dead

Charac: PRINCESS Pos: Chapultepec Forest Status: Alive

Tensions =>

Ad(JAGUAR_KNIGHT):PRINCESS
Ce(PRINCESS):JAGUAR_KNIGHT

Charac: ENEMY Pos: NoWhere Status: Dead

INDEXES ***

JAGUAR_KNIGHT: 0,0 ASIII-0 PRINCESS: 10,15 ASIII-0 ENEMY: 0,0 ASIII-0

JAGUAR_KNIGHT possible next actions: ****

PRINCESS possible next actions: ****

ENEMY possible next actions: ****

***** Impasse : Engage-State with evaluation ...**

However, nothing is brought to working memory so, MEXICA switches back to the Reflective State to try to break the impasse.

***** Switching to Rf-S ...**

***** Breaking an impasse.**

R\$ Attempting to select a next action...

R\$ Deleting ANYONE REALISED

R\$ Action selected: PRINCESS EXILED PRINCESS

R\$ Action selected does not flow (NoFlow-); trying again.

R\$ Attempting to select a next action...

R\$ Action selected: PRINCESS KILLED PRINCESS

***** R\$ Impasse BROKEN...**

MEXICA groups all those actions which in Previous Stories have followed the action KILLED, deletes all compound actions in such a group and selects one of them randomly. In this case PRINCESS

EXILED PRINCESS is chosen; however, as the reports indicates, this action does not flow and a new one is selected. In the second attempt the action PRINCESS KILLED PRINCESS is chosen, it flows, so the impasse broken.

After the impasse has been broken the story is evaluated again.

R\$ Checking novelty: number of times a sequence happens in other stories
R\$ Seq:1x1 Seq:2x0 Seq:3x0 Seq:4x0 Seq:5x0 Seq:6x0 Seq:7x0 Seq:8x1 Seq:9x0 Seq:10x1
Seq:11x1 Seq:12x0 Seq:13x0 Seq:14x1 Seq:15x2
R\$ Adequate novelty: actual value is LOW
R\$ Evaluating the Tensional Representations ...
R\$ The frame number 1 is smaller than the story in progress.
R\$ The frame number 2 is smaller than the story in progress.
R\$ The frame number 4 is smaller than the story in progress.
R\$ The frame number 5 is smaller than the story in progress.
R\$ The frame number 6 is smaller than the story in progress.
R\$ The frame number 7 is smaller than the story in progress.
R\$ F3-R:9
R\$ Frame:3 PT:TDn Chances:1
==> End of Story: All characters are dead.

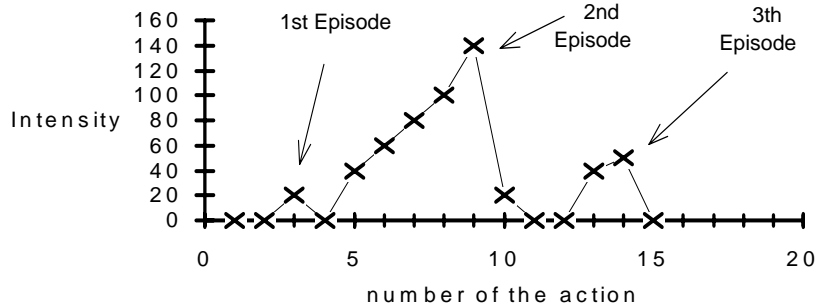
Regarding novelty, the story is classified as adequate and the Novelty Guideline set to Low. Regarding the Tensional Representation, the story in progress is bigger than all Previous Stories except story number three. So, again frame three is used to set the Tensional Guidelines. However, MEXICA detects that all characters in the story are dead and it finishes the story.

So, the story created by MEXICA is:

*** NEW STORY:
 JAGUAR_KNIGHT ACTOR
 PRINCESS ACTOR
 JAGUAR_KNIGHT HAD_AN_ACCIDENT
 PRINCESS CURED JAGUAR_KNIGHT
 ENEMY KIDNAPPED PRINCESS
 PRINCESS AFFRONTED ENEMY
 ENEMY ATTACKED PRINCESS
 JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY
 JAGUAR_KNIGHT ATTACKED ENEMY
 JAGUAR_KNIGHT KILLED ENEMY
 JAGUAR_KNIGHT RESCUED PRINCESS
 PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT
 PRINCESS DISCOVERED_MURDER_OF JAGUAR_KNIGHT
 PRINCESS KILLED JAGUAR_KNIGHT
 PRINCESS KILLED PRINCESS

The final graphic of the Tensional Representation looks as follows:

Fig. 5.3 Tensional Representation



Now, MEXICA performs the Final Analysis and inserts three new actions. After the event where the knight has the accident, MEXICA inserts HEALTH_RISK_1 to indicate that the princess has decided to cure the knight. After the kidnapping, the action PR_FREE_1 is inserted to indicate that the knight has decided to rescue the princess. Finally, after the princess discovers that the knight murdered her father, the action CLASH_EMOTION_1 is inserted to indicate the princess' contradictory feelings towards the knight.

*** NEW STORY:

JAGUAR_KNIGHT ACTOR
 PRINCESS ACTOR
 JAGUAR_KNIGHT HAD_AN_ACCIDENT
 PRINCESS HEALTH_RISK_1 JAGUAR_KNIGHT
 PRINCESS CURED JAGUAR_KNIGHT
 ENEMY KIDNAPPED PRINCESS
 JAGUAR_KNIGHT PR_FREE_1 PRINCESS
 PRINCESS AFFRONTED ENEMY
 ENEMY ATTACKED PRINCESS
 JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY
 JAGUAR_KNIGHT ATTACKED ENEMY
 JAGUAR_KNIGHT KILLED ENEMY
 JAGUAR_KNIGHT RESCUED PRINCESS
 PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT
 PRINCESS DISCOVERED_MURDER_OF JAGUAR_KNIGHT
 PRINCESS CLASH_EMOTION_1 JAGUAR_KNIGHT
 PRINCESS KILLED JAGUAR_KNIGHT
 PRINCESS KILLED PRINCESS

Finally, MEXICA gets from the Primitive Actions Structure all the texts associated to the Primitive Actions and prints the final version of the story. That is the version that the reader found at the beginning of this chapter.

5.3 Analysis of the story.

The princess who cured the jaguar knight is a good example of the kind of story that MEXICA develops as a result of the interaction between the Engaged and Reflective States. This story is clearly the result of teamwork between states; eight actions were produced during the engagement (actions number 6, 9, 10, 11, 12, 13, 14, 17) and nine during reflection (1, 2, 3, 4, 7, 8, 15, 16, 18; action number five was the initial one). MEXICA starts to develop the story producing material under the Engaged State. Then, it switches to the Reflective State where the story is modified to satisfy preconditions, and the guidelines are set according to the result of the analysis and comparison between the story in progress and the Previous Stories. It switches back to the Engaged State where new material is produced following the requirements specified by the guidelines. It regularly returns to the Reflective State where the guidelines are updated based on the new material produced. MEXICA goes back to the Engaged State to produce more material and, when an impasse is declared, it switches to the Reflective State, breaks the impasse and ends the story.

So, during the Reflective State MEXICA sets the value of the guidelines based on the analysis of the material produced during the Engaged State. On the other hand, during the Engaged State MEXICA produces material following the guidelines set during the Reflective State.

In the following paragraphs, some important aspects of the development of the story are analysed.

5.3.1 Lack of Possible Next Actions.

In the example story, actions 10 to 13 are included in the story because they are the only possible next actions retrieved from long-term memory.

(Act 10) JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY

(Act 11) JAGUAR_KNIGHT ATTACKED ENEMY

(Act 12) JAGUAR_KNIGHT KILLED ENEMY

(Act 13) JAGUAR_KNIGHT RESCUED PRINCESS

That is, MEXICA only knows one way to continue the story when the enemy kidnaps the princess. The reason why this situation arises can be explained through an example based on an experience of the author of this work. If some years ago someone had asked this author to write a short story (about any topic) where a particular scene required a detailed description of a deserted beach, such a description would have included a very sunny and warm beach full of sand. Some years ago that was the only coherent, possible description which could have been retrieved from the author's mind; or in other words, that was the only kind of beach he knew. The reader can imagine how shocking was for the writer of these lines his first visit to Brighton. It was a real experience to discover that, cold beaches full of pebbles also exist!

Something analogous happens to MEXICA in this story. The information encoded in the Abstract Representation, including all possible next actions, comes exclusively from the file of Previous Stories. So, the potential directions that a story written by MEXICA can take depend on the number of choices provided by such Previous Stories. In this example, MEXICA can just retrieve one sequence of actions when the enemy kidnaps the princess. If new stories with alternative next actions are added to the Previous Stories, MEXICA will be able to retrieve different options from long-term memory. These new alternatives must satisfy genre constraints. Genre constraints prevent the system from including unacceptable possible next actions in a story. For instance “Jaguar Knight washed his sucks” might well be a possible next action; only genre constraints make it unacceptable. MEXICA utilises the filters to verify these type of constraints.

5.3.2 The ACAS-Process and the Development of the Story.

For this particular example, all Associative Structures which retrieved sets of possible next actions from long-term memory belong to Type I. That is, MEXICA was not able to match atoms with Associative Structures of Type II or III. So, this example does not show the utility of Dynamic Structures. However, the significance of the ACAS-Process can be observed through the whole example. Seven of the eight actions chosen as the next event in the story during the Engaged State were brought into working memory through the ACAS-Process. And twelve of the 14 sets of possible next actions retrieved during the development of the tale were brought into working memory in the same way.

The ACAS-Constant plays an important role in the development of the tale. For example, in four of those twelve sets of possible next actions the atom matched was equal to the Associative Structure in 50%; in seven, the atom matched was equal to the Associative Structure in less than 57%; and in ten such a similarity was under 65%. These data evidence the strong relation between the evolution of the story and the value of the ACAS-Constant (particularly in the range from 50% to 65%). For example, if such a constant is modified in one point (i.e. to 51%) MEXICA can no longer reproduce the story under analysis since the atom which contains the action ANYONE KIDNAPPED PRINCESS cannot be matched (see the analysis of the first context produced in the story in section 5.2 and the example in section 5.4.1).

5.3.3 An Example of an Action Retrieved Through the ACAS-Process.

There is a peculiar moment in the development of the tale when, after the knight rescues the princess and she falls in love with him (during the production of material in the Engaged State), the story seems to take a senseless direction.

JAGUAR_KNIGHT RESCUED PRINCESS

PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT
 PRINCESS KILLED JAGUAR_KNIGHT

An action which (at least at that moment) does not have any connection with the previous events in the story and which appears to be completely illogical (PRINCESS KILLED JAGUAR_KNIGHT) is chosen as the next event in the tale.

This situation arises as a result of the ACAS-Process and the value of the ACAS-Constant. By default at least 50% of the atom must be equal to the Associative Structure. MEXICA matches an atom that fulfils this condition in the position (2,11). The Associative Structure used to match that atom, and a comparison between the original atom and the same atom after being instantiated is now presented (see also in Appendix E the report of the Abstract Representation produced by the Previous Stories).

Associative Structure.

Charac: PRINCESS

Emotional Links =>

JAGUAR_KNIGHT(+3,1):PRINCESS
 PRINCESS(-3,1):ENEMY
 JAGUAR_KNIGHT(-3,1):ENEMY
 PRINCESS(+3,1):JAGUAR_KNIGHT
 PRINCESS(+3,2):JAGUAR_KNIGHT
 JAGUAR_KNIGHT(+2,1):JAGUAR_KNIGHT

Tensions =>

Ad(ENEMY):JAGUAR_KNIGHT

Original Atom	Atom after been instantiated
Tension: 2 EmoLin: 11	Tension: 2 EmoLin: 11
EmoLin=>	EmoLin=>
A(+3,1):C	jaguar_knight(+3,1):princess
B(+3,1):C	B(+3,1):princess
C(-3,1):D	princess(-3,1):enemy
A(-3,1):D	jaguar_knight(-3,1):enemy
B(-3,1):D	B(-3,1):enemy
C(+3,1):A	princess(+3,1):jaguar_knight
C(+3,2):A	princess(+3,2):jaguar_knight
A(+2,1):A	jaguar_knight(+2,1):jaguar_knight
B(+2,1):A	B(+2,1):jaguar_knight
B(+3,2):A	B(+3,2):jaguar_knight
A(+3,2):B	jaguar_knight(+3,2):B
Tension=>	Tension=>
Ad(D):A	Ad(enemy):jaguar_knight
Lc(C):B	Lc(princess):B
NexAct=>	NexAct=>
cLOOKED_FOR_AND_FOUNDb	princessLOOKED_FOR_AND_FOUNDb
cKILLEDb	princessKILLEDb

This atom encodes the context produced after the following sequence of actions in tale number three in the file of Previous Stories were executed (see Appendix D for a list of the Previous Stories):

PRINCESS REALISED EAGLE_KNIGHT WERE_IN_LOVE_WITH LADY
 PRINCESS LOOKED_FOR_AND_FOUND LADY

The action which follows this sequence (and which becomes one of the possible next actions in the atom) is PRINCESS KILLED LADY. Although this atom encodes the context of a scene different to the actual context of the story in progress, MEXICA recognises enough similarities between them and matches the atom. This makes sense since both stories share a similar prior episode (an enemy who kidnaps the princess and a knight who rescues her). So, it is not strange that at least 50% of the atom is equal to the Associative Structure. However, the circumstances surrounding the action where the princess kills the Lady (in the tale in the Previous Stories) are completely different to the circumstances when the princess kills jaguar knight.

In the former case, a Tension due to a Love Competition between the princess and the Lady causes the murder of the Lady; in the latter case there is not a reason to justify the action.

So, what it is happening here is that, based on the similarities detected between the atom and the Associative Structure, and as a result of the instantiation process, MEXICA identifies as a coherent possible next action in the story the killing of the knight by the princess. Is this a mistake in the design of the system? No; after all it is the episode unfolded from the incongruous princess' conduct that at the end gives the originality to the story. What this situation shows is the importance of an adequate value for the ACAS-Constant. A high value produces actions which fit well in the story, but which are very predictable. A low value produces novel situations; however, as this example demonstrates, they might require that MEXICA sorts out a way to link previous events in the story with that particular situation. If they are completely unrelated to the context of the story in progress, MEXICA might not be able to sort this situation out.

5.3.4 Instantiating the Action.

The process followed to obtain such an event includes another step. When MEXICA matches the atom, what it retrieves is the action PRINCESS KILLED ANYONE. That is, it is necessary to instantiate it. And as the examples in section 5.4.2 shows, the character chosen to instantiate the action can affect the direction that a story takes.

E\$ instantiating PRINCESS KILLED JAGUAR_KNIGHT ReiCha

In this case, the parameter Forbidden Actors is set to Half-Active which allows reincorporating the character jaguar knight in the action. And it is at this moment when MEXICA produces the novel action.

The following paragraphs describe the role of such an instantiation process in the production of new actions.

Atoms have a strong relation between the characters in the body of the atom (i.e. the characters included in the Tensions and Emotional Links) and the characters in the set of possible next actions. For instance, in the atom matched in this example it is possible to observe a Tension due to Love Competition between characters C and B and, as one of the possible next actions, the same character C killing B.

Now, when the characters in the atom are substituted with those in the Associative Structure, B cannot be correlated to any of them (the correlation between characters is established as follows: A-jaguar_knight, B-?, C-princess, D-enemy)

This brings a problem; the victim of the murder must be someone who has a love competition with the princess, but no one in the Associative Structure (and in the story in progress) fulfils this requirement. That is the reason why when PRINCESS KILLED JAGUAR_KNIGHT is selected it looks out of context. In the original setting the princess kills her rival, not the man she is in love with.

MEXICA has three alternative solutions to instantiate actions in this situation; reincorporate characters, choose a character based on the Group Class and Previous Stories, or select one randomly. As mentioned earlier, for this example MEXICA reincorporates a character.

The relevant point to observe here is how the combination of the ACAS-Process and the instantiation process generates a unique situation. MEXICA retrieves an action that is not very well connected with the rest of the story; however, for the way it is instantiated, that action opens a new range of possibilities for the story to move forwards. In this case, by reincorporating jaguar knight MEXICA modifies the dynamic between the characters producing a situation not present in any of the tales in the file of Previous Stories (a princess killing her lover). If the action had been instantiated in a different way, this unique situation never would have been arisen.

So, MEXICA produces a novel event that gives an unexpected twist to the story. Such an event is not the consequence of a random procedure, a routine written with the specific goal to achieve this scene, or predefined story-structures; it is the result of general retrieval and instantiation processes that are able to construct a story-context not present in the Previous Stories. These general routines give MEXICA enough flexibility to produce novel situations in different contexts.

5.3.5 Preconditions.

This example clearly shows the role and importance of preconditions in MEXICA. They are not taken into consideration during the production of material in the Engaged State; however, during the Reflective State they play a central part to maintain the logic in the story. This characteristic allows the material produced during engagement to escape from the rigidity imposed by the requirement of satisfying an action's preconditions before they can be used. But at the same time it permits, through a

precondition verification process run each time MEXICA switches to the Reflective State, to corroborate and correct the consistency of the story in progress.

Thus, during the Engaged State a new situation is made up and during the Reflective State a link between the previous events in the story and the new action is developed. In this way, both states work together to produce novelty while the Reflective State preserves the consistency in the story.

5.3.6 The Importance of Flowing.

The process that verifies if an action flows is one of the most frequently used routines during story development. It is utilised both during the Engaged and the Reflective States, which evidences its importance. Through this example there are different instances of the way it helps to keep the story moving. For example, after the action PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT is performed, MEXICA retrieves PRINCESS LOOKED_FOR_AND_FOUND ANYONE as one of the possible next actions.

E\$ instantiating PRINCESS LOOKED_FOR_AND_FOUND JAGUAR_KNIGHT ReiCha
E\$ Instantiated action deleted (NoFlow-); trying again.

MEXICA attempts to instantiate the action reincorporating the character jaguar knight, but it is rejected because it does not flow. And of course such an action cannot make the story flow because the princess is already in the same location as the jaguar knight. That is, to introduce an action where the princess looks for and finds jaguar knight does not make much sense in a story where both characters are already in the same place. So, the option is deleted and an incongruity avoided through the verification of the flowing of an action.

It can be argued that MEXICA should be able to sort out this impropriety in the same way it does when the princess kills the jaguar knight (also, one of the possible next actions retrieved at that moment). However, there is an important difference between those two actions. MEXICA knows that if the princess kills the jaguar knight the Tension to the Reader increases, so the story moves on. By contrast, the action LOOK_FOR_AND_FOUND just produces a change in location; in MEXICA a change in location (which does not modify Emotional Links or Tensions) has a low probability of leading to some interesting sequence of actions. Nevertheless, the function of this process is to make sure the story flows, not to avoid incongruousness (that is the work of the precondition verification process); this extra help that the process provides to keep the logic in the story is a side effect and it is subordinated to the condition of making the story move.

So, in general terms during the Engaged State MEXICA makes the story flow and during the Reflective State MEXICA connects coherently the different events happening in the tale.

5.3.7 Guidelines.

MEXICA starts the story development under the Engaged State; so all the guidelines are set to their default values: Permanent Tension to TendencyUp and Novelty to Low. After three actions have been generated MEXICA switches to the Reflective State to evaluate the story in progress.

R\$ Adequate novelty: guideline set to LOW.
R\$ Evaluating the Tensional Representations ...
R\$ F1-R:4 F2-R:0 F3-R:5 F4-R:1 F5-R:3 F6-R:3 F7-R:4
R\$ Frame:3 PT:TDn Chances:1

In this first evaluation the novelty is classified as adequate and set to Low. The Tensional Representation of the story in progress matches frame number three, which provokes that the Permanent Tension is set to the new value of Tendency Down. The Chances are set to one.

Now, MEXICA switches back to the Reflective State. After updating the context with JAGUAR_KNIGHT LOOK_FOR_AND_FOUND ENEMY, it retrieves from long-term memory the action where the knight attacks the enemy.

E\$ JAGUAR_KNIGHT ATTACKED ENEMY was not deleted because 1 chances left.

This action does not fulfil the requirement of Tendency Down specified in the guidelines; however, MEXICA does not delete it because the guidelines also specify that there is one chance left. So, as the only option retrieved from long-term memory, this action is selected as the next event in the tale.

After the context is updated with the event of the attack, MEXICA retrieves the following possible next action from long-term memory:

***** FILTER JAGUAR_KNIGHT FOUGHT ENEMY Ten(GLn:TnDn)-**

However this time, because it does not fulfil the guidelines and there are no chances left, the action is deleted. Since it was the only option retrieved from long-term memory MEXICA launches a new search to find the next event in the story. It retrieves JAGUAR_KNIGHT KILLED ENEMY and the story keeps on developing.

These two examples show the influence of the guidelines in the production of material during the Engaged State. Each time an action is eliminated or approved (i.e. not deleted) the fate of the story in progress is affected. For instance, JAGUAR_KNIGHT FOUGHT ENEMY triggers the postconditions Lr(enemy):jaguar_knight+ and Lr(jaguar_knight):enemy+; that combination of Tensions is never present in the story. So, if this action had been used (instead of being deleted) MEXICA would have retrieved from long-term memory a different set of possible actions which would have led the story towards a different direction.

In the same way, if JAGUAR_KNIGHT ATTACKED ENEMY had been rejected and other action used instead, the story would have developed in a different way.

The function of the Tensional Guidelines is to push the story towards degradation-improvement processes necessary to generate interesting stories. As the graphic of the Tensional Representation shows (see Figure 5.3), for this example MEXICA produces three of such processes. Guidelines are set based on Previous Stories; and although the Tensional Representation of the story in progress is similar to the one of tale number three in the file of Previous Stories, they are not the same. In this way MEXICA generates a new Tensional Representation which can be used in the develop of future stories. Nevertheless, the final story, and consequently the final Tensional Representation, is the result of the interaction of the whole system. And the guidelines are just another element of such a system. If during the developing of a tale they hinder the attempt to solve a problem instead of helping (e.g. when breaking an impasse) they are ignored.

There is a point to mention regarding originality. Although MEXICA never detects any problem with the novelty of the story in progress (the guideline is always set to Low), it is possible to discover a complication with it. The rescuing scene in the story in progress is very similar to the one found in tale number three in the Previous Stories.

Story in Progress

JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY
 JAGUAR_KNIGHT ATTACKED ENEMY
 JAGUAR_KNIGHT KILLED ENEMY
 JAGUAR_KNIGHT RESCUED PRINCESS
 PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT

Previous Story (tale 3)

EAGLE_KNIGHT LOOKED_FOR_AND_FOUND ENEMY
 EAGLE_KNIGHT ATTACKED ENEMY
 EAGLE_KNIGHT FOUGHT ENEMY
 EAGLE_KNIGHT KILLED ENEMY
 EAGLE_KNIGHT RESCUED PRINCESS
 PRINCESS FELL_IN_LOVE EAGLE_KNIGHT

MEXICA does not detect this similarity because its main concern is to avoid copying any of the Previous Stories. That is, MEXICA does not verify if the story in progress is developing a scene already used in other tale; what it is checking is that the (whole) story it is creating has not been already written. Or in other words, if a used scene does not constitute more than 49% of the story in progress MEXICA does not detect the similarity.

Although the story in progress and tale number three as a whole are not very similar, it will improve MEXICA's performance to detect those cases.

5.4 Modifying some of the Parameters Definable by the User.

In all the following examples the initial action given by the user is PRINCESS CURED JAGUAR_KNIGHT. The story analysed in section 5.2 is referred to as the Story-Sample. In order to make the following explanations as simple as possible, the Final Analysis and the conversion from Primitive Actions to the final text are not included in any of the stories in the rest of the chapter.

5.4.1 Modifying the ACAS-Constant.

When the ACAS-Constant is set to 51% the action ANYONE KIDNAPPED PRINCESS is not retrieved anymore; MEXICA selects randomly an action between the available options and goes ahead with the story. This is an example of a story developed under such constraint.

```
*** NEW STORY:
JAGUAR_KNIGHT ACTOR
PRINCESS ACTOR
JAGUAR_KNIGHT HAD_AN_ACCIDENT
PRINCESS CURED JAGUAR_KNIGHT
JAGUAR_KNIGHT MUGGED PRINCESS
PRINCESS ATTACKED JAGUAR_KNIGHT
JAGUAR_KNIGHT WOUNDED PRINCESS
JAGUAR_KNIGHT RAN_AWAY
```

In this story a knight has an accident and the princess cures him. However, by contrast with the Story-Sample, this time the knight mugs the princess. The princess reacts by attacking the knight, who wounds her and runs away.

It can be observed that this story is 50% shorter than the Story-Sample. Two characters are used instead of three and certainly it does not lack originality; one never expects the mugging scene. However, the story does not end properly; the reader never knows what happens to the princess. The reason for this bad end is explained later.

For some readers there might be a further problem: an explanation of why the knight mugs the princess is necessary. It can be argued that the answer to this question must be found in a reader's interpretation of the tale; i.e. based on the information given by the story, the reader must imagine what circumstances lead to that situation. For example, it can be supposed that the knight is a corrupt character that obtains satisfaction by mugging persons. So, after the princess cures him she becomes an easy victim.

Although this is an arbitrary explanation, for some readers it might justify the mugging event; but even if this explanation is not good enough, at least it brings to discussion an interesting matter. How explicit must the stories be? How much space must be left to readers' imagination? In MEXICA the answer to these questions is in the user's hands; as more preconditions are defined more explicit explanations of characters' behaviour will be produced. However, the more preconditions are attached to a Primitive Action the more difficult it is to satisfy them, which implies less options available to develop the story. This might lead the system to the generation of more predictable stories. So, it is necessary to find an adequate balance.

A general review of the inside process followed to develop this story is now explained. After the characters' context is updated with PRINCESS CURED JAGUAR_KNIGHT, MEXICA retrieves from long-term memory a set of possible next actions. It selects randomly JAGUAR_KNIGHT MUGGED PRINCESS between the options available and updates characters' contexts. However, when it tries to retrieve more possible next actions an impasse is declared.

***** Impasse : Engage-State**
***** Switching to Rf-S ...**
***** Breaking an impasse.**
R\$ Attempting to select a next action...
R\$ Deleting PRINCESS REALISED
R\$ No Action selected!.
R\$ looking for equivalent action..
R\$ WOUNDED is equivalent to MUGGED
R\$ Attempting to select a next action...
R\$ Action selected: PRINCESS ATTACKED JAGUAR_KNIGHT
***** R\$ Impasse BROKEN...**

MEXICA verifies which actions have followed MUGGED in the Previous Stories. It just finds the compound action REALISED which is eliminated (compound actions are just used when solving preconditions). So, MEXICA looks in the Primitive Actions Structure for an action equivalent to MUGGED; the action selected is WOUNDED. So, MEXICA looks again in the Concrete Representations for all actions that have followed WOUNDED in the Previous Stories. This time it finds ATTACK, which is instantiated and the impasse is broken.

In this part of the story it is possible to observe the way MEXICA breaks impasses using equivalent actions. MEXICA finds that to wound someone has similar consequences as mugging someone. So, this similarity is exploited to break the impasse.

MEXICA switches back to the Engaged State and again it cannot retrieve possible next actions from long-term memory and another impasse is declared. The impasse is broken with the action JAGUAR_KNIGHT WOUNDED PRINCESS. It switches back to the Engaged State and an impasse

happens again; this time it is broken with the action JAGUAR_KNIGHT RAN_AWAY. Finally, another impasse is declared but in this occasion MEXICA cannot break it and the story is abandoned.

As this analysis shows, to increment the ACAS-Constant in one point does not just imply that an action is not available anymore. Its major consequence is that the whole dynamic of the system is modified. All actions, except number four (given by the user) and five (retrieved from long-term memory) are generated during the Reflective State. So, during the development of the story MEXICA cannot match any atom in long-term memory.

The effect that the modification of the ACAS-Constant has depends on the information in the Abstract Representation. For example, if the ACAS-Constant is set to 40% MEXICA has the same behaviour than the one reported in this section. The reason is that the Abstract Representation does not include any atom that can be matched under that condition. So, in practical terms, for this example it is the same if the ACAS-Constant is set to 40% or 50%.

The reason for the bad end in this story is that MEXICA does not know how to continue the tale. The Previous Stories do not include any analogous situation to the one of the story in progress and the system simply has to renounce it.

5.4.2 Modifying the Instantiation of Characters (Forbidden Actors).

The way an action is instantiated has important consequences in the development of a tale. It shapes the relation between the characters in the story. This relation (represented by the Emotional Links and Tensions in the characters' context) forms the material to construct the Associative Structure. Thus, the way an action is instantiated influences which possible next actions are retrieved from long-term memory. In this section, two examples are presented to illustrate this situation. All the parameters definable by the user in these two stories have the same value as those used to generate the Story-Sample; the only difference is the value of the Forbidden Actors.

A. Forbidden Actors Set to No Active.

```
*** NEW STORY:
JAGUAR_KNIGHT ACTOR
PRINCESS ACTOR
JAGUAR_KNIGHT HAD_AN_ACCIDENT
PRINCESS CURED JAGUAR_KNIGHT
JAGUAR_KNIGHT KIDNAPPED PRINCESS
```

This story is generated with the parameter Forbidden Actors set to No Active. As a consequence MEXICA is able to use any of the characters in the story to instantiate an action retrieved from long-term memory.

JAGUAR_KNIGHT possible next actions: **
ANYONE KIDNAPPED PRINCESS**

E\$ instantiating JAGUAR_KNIGHT KIDNAPPED PRINCESS ReiCha(ActualActor)-

As in the case of the Story-Sample, after characters' contexts are updated with PRINCESS CURED JAGUAR_KNIGHT the action ANYONE KIDNAPPED PRINCESS is retrieved. MEXICA instantiates the action with the character jaguar knight and uses it as the following event in the tale. However, after it is executed MEXICA cannot match any atom in long-term memory. The impasse cannot be broken, so the story is abandoned.

In this way, although the information in the Abstract Representation is the same for the Story-Sample and for this tale, a difference in the manner an action is instantiated results in an unsuccessful attempt to develop a story.

B. Forbidden Actors Set to Active.

*** NEW STORY:
JAGUAR_KNIGHT ACTOR
PRINCESS ACTOR
JAGUAR_KNIGHT HAD_AN_ACCIDENT
PRINCESS CURED JAGUAR_KNIGHT
ENEMY KIDNAPPED PRINCESS
PRINCESS AFFRONTED ENEMY
ENEMY ATTACKED PRINCESS
JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY
JAGUAR_KNIGHT ATTACKED ENEMY
JAGUAR_KNIGHT KILLED ENEMY
JAGUAR_KNIGHT RESCUED PRINCESS
PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT
LADY ACTOR
PRINCESS WENT_TEXCOCO_LAKE
PRINCESS WAS_FOND_OF LADY
LADY ATTEMPTED_TO_TAKE_ADVANTAGE_OF PRINCESS
PRINCESS AFFRONTED LADY
LADY ATTACKED PRINCESS
PRINCESS KILLED LADY
JAGUAR_KNIGHT WENT_TEXCOCO_LAKE
PRINCESS ATTEMPTED_TO_TAKE_ADVANTAGE_OF JAGUAR_KNIGHT
JAGUAR_KNIGHT AFFRONTED PRINCESS
PRINCESS ATTACKED JAGUAR_KNIGHT
JAGUAR_KNIGHT KILLED PRINCESS

This story is generated with the parameter Forbidden Actors set to Active. As a consequence MEXICA cannot use the forbidden characters to instantiate actions retrieved from long-term memory. In this way, as in the case of the Story-Sample, when the action ANYONE KIDNAPPED PRINCESS is retrieved it is instantiated (based on the Group Class and the Previous Stories) with the character enemy. The story

in progress develops in the same way that the Story-Sample does. After PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT is executed MEXICA retrieves as one of the possible next actions PRINCESS KILLED ANYONE.

PRINCESS possible next actions: ****

**PRINCESS LOOKED_FOR_AND_FOUND ANYONE
PRINCESS KILLED ANYONE**

E\$ instantiating PRINCESS KILLED LADY PSt-

Because Forbidden Actors is active MEXICA needs to introduce a new character in the story (neither princess nor jaguar knight nor enemy can be used to instantiate the action). Based on Group Class and Previous Stories the character Lady is selected. As a consequence the relation between characters changes in comparison with the characters' relation in the Story-Sample; so, at this point this story takes a different direction. MEXICA updates the characters' contexts with the last event selected and retrieves new actions from long-term memory. JAGUAR_KNIGHT KILLED PRINCESS is chosen as the next event in the story. So, the last four actions in the story in progress are:

JAGUAR_KNIGHT RESCUED PRINCESS
PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT
PRINCESS KILLED LADY
JAGUAR_KNIGHT KILLED PRINCESS

MEXICA switches to the Reflective State and inserts all the actions necessary to justify the killing of the Lady and the killing of the princess. However, when it tries to evaluate the tale it turns out that the story in progress is bigger than any of the tales in the Previous Stories. So, MEXICA has to abandon it.

Again, this example shows the significance of the way actions are instantiated in the shape of the resulting tale. A whole new episode to justify the killing of the Lady has to be inserted as a consequence of the introduction of the new character. Or in other words, the introduction of a new character to instantiate PRINCESS KILLED ANYONE causes a different episode to the one used to justify the murder of the knight in the Story-Sample is generated. The action JAGUAR_KNIGHT KILLED PRINCESS is retrieved just because of the context produced by the event where the lady is murdered (this option is not available in the Story-Sample); MEXICA now requires to justify this new death. In this way, the episode to justify the killing of the princess is an indirect consequence of the use of the character Lady.

Ensuing from it one can realise that the final direction that this story takes, which differs from the Story-Sample's end, is produced by the introduction of the new character in the tale.

This story also gives the opportunity to analyse a shortcoming in MEXICA; it is related to the process to fulfil preconditions. MEXICA justifies the murder of the Lady in an inadequate way. That episode

does not really connect with the rest of the story; in fact, if it is eliminated it does not make any difference to the tale. This problem arises because that routine just concerns finding actions which fulfil the preconditions; that is, it is insensitive to the characters' context. Something similar happens with the following episode; it is not very convincing that the princess tries to take advantage of the man she loves.

The necessity for a more sophisticated problem-solving routines in the Reflective State is clear. For instance, a procedure where an initial state, final desired state and a set of constraints are defined, and as an outcome an episode is developed. In this example the initial state would be the characters' contexts after the princess falls in love with the knight; the final state the action where she kills the lady; finally, based on an analysis of the princess' context (she is the murderer), the constraint would be to involve the new character with some of the other characters in the tale. In this case, since the princess is in love with the knight but he is not in love with her, a good reason to kill the lady would be that the knight loves her and the princess gets jealous.

5.4.3 Modifying the Operation Mode.

In this section stories generated under different operation modes are shown. Comparison of these different modes is delayed until Section 5.5

The differences between the E1&ER1 and E2&ER2 operation modes affect the filtering process and the way actions are instantiated. Under the E1&ER1 operation modes any action retrieved from long-term memory is a candidate to be selected as the next event in the story; all actions are instantiated through a random procedure.

Under the E2&ER2 operation modes the filtering process eliminates those actions retrieved from long-term memory which neither flow nor fulfil the requirements specified by the guidelines (when MEXICA is running under the E2 operation mode it lacks the evaluation process executed during the Reflective State; such a process updates the values of the guidelines according to the way the story is developing. So, during this operation mode the guidelines are set with default values and kept unchanged during the whole process). The instantiation process reincorporates characters, or copies the way actions have been instantiated in Previous Stories, or as the last option randomly instantiates an action.

The type of outcome obtained when running different operation modes depends very much on the Previous Stories. For example, actions 10 to 13 are included in the Story-Sample because they are the only option retrieved from long-term memory (see Section 5.3.1). So, in this case it does not really matter which operation mode is active, the outcome is the same.

When the Previous Stories offer more options the differences start to become obvious. For example, the lack of the Novelty Guideline under E1 and ER1 operation modes leaves MEXICA blind to detect when it is just copying an old tale instead of developing a new one. Also, the lack of the flowing-routine, which helps to avoid wandering around without any direction, makes MEXICA more vulnerable to generating senseless and/or uninteresting sequences of actions.

However, on the other hand the ER1 operation mode gives the opportunity to experiment with a system where the interaction between the Engaged and Reflective State is reduced. During the Reflective State MEXICA just breaks impasses and solves preconditions; no guidelines are created. In this way, it is possible to study the effect that the feedback (the guidelines) has on the development of a story. For example, the experiment described in section 5.5 shows how in certain circumstances the ER2 operation mode gets blocked while the ER1 is able to produce some material. The E1 allows evaluation of the effect of the Reflective State in such circumstances.

The features displayed by the operation modes also change according to the usefulness of the material retrieved from long-term memory (an action is classified as useful when it flows and follows the guidelines). Three general cases illustrate this situation.

Case 1: When during the development of a story at least one of the sets of possible next actions retrieved from long-term memory contains as a minimum one useful action to the story together with some other no useful actions (either in the same set and/or in other of the sets).

Set of possible next actions Character 1.

Action 1: not useful

Action 2: useful

Set of possible next action Character 2.

Action 1: not useful

When MEXICA is running under E1 or ER1 it has the potential to reproduce any of the stories developed under E2 or ER2; however, the same is not true in the opposite direction. That is, when running under E2 or ER2 MEXICA cannot reproduce all the stories created under E1 or ER1. So, it looks as if the E1&ER1 have the potential to be more productive than the E2&ER2 operation modes. It can be argued that the extra options that the first two operation modes have are just actions that are not useful for the story, hence they will not lead to anything productive. However, that is not necessarily true all the time. For example, in the Story-Sample the possible next action JAGUAR_KNIGHT WENT_HUNTING_WITH PRINCESS is eliminated because it does not flow, although it looks as a sensible action to do after the princess cures the knight.

In the same way, the fact that a possible next action does not follow the guidelines it does not necessarily imply that it will mislead the development of the tale (in fact the guidelines allow some

flexibility at that respect with the field Chances). The concept of actions that are not useful is a general one, and those which fall in this category are not always non-productive for the story in progress. The study and comparison of tales developed under E1&ER1 and E2&ER2 operation modes might help to establish better ways to classify the actions.

Case 2: When during the development of a story all sets of possible next actions retrieved from long-term memory contain just useful actions to the story.

Possible net actions Character 1.

Action 1: useful

Action 2: useful

Possible next actions Character 2.

Action 1: useful

In this case, there is no difference if MEXICA is running under the ER1 or ER2 operations modes; the options to produce the outcome are the same.

Case 3: When during the development of a story, all the sets of possible next actions retrieved from long-term memory contain just no useful actions to the story.

Possible net actions Character 1.

Action 1: not useful

Action 2: not useful

Possible next actions Character 2.

Action 1: not useful

In this case, under the E2&ER2 when the filters reject all the sets of possible next actions retrieved from long-term memory the system is forced to launch a new search in memory; or in other words, it is forced to bring new options to working memory. The E1&ER1 will never have access to this new set of possible next actions.

The following lines shown examples of stories produced by MEXICA under different operation modes. They are all variations of the Story-Sample; i.e. they were developed exactly in the same conditions that the Story-Sample (same initial action, same value for all the parameters, and same set of Previous Stories).

A. Engaged and Reflective States 1 (ER1)

```
*** NEW STORY:
JAGUAR_KNIGHT ACTOR
PRINCESS ACTOR
JAGUAR_KNIGHT HAD_AN_ACCIDENT
```

PRINCESS CURED JAGUAR_KNIGHT
 LADY KIDNAPPED PRINCESS
 JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND LADY
 VIRGIN FOUND_BY_ACCIDENT LADY
 PRINCESS AFFRONTED LADY
 LADY ATTACKED PRINCESS
 PRINCESS FOUGHT LADY
 LADY KILLED PRINCESS
 JAGUAR_KNIGHT MADE_PRISONER LADY

The first actions in this story are developed in the same way as in the Story-Sample. However, soon some differences start to appear. MEXICA instantiates the kidnapping (action number 5) with the character Lady instead of the character enemy. That is, Under ER2 MEXICA instantiates that action through the Groups Class and Previous Stories method; however, under ER1 MEXICA instantiates the same action randomly. Or in other words, under ER2 MEXICA knows that the enemy is a plausible character to kidnap the princess (that is the way it has been used in Previous Stories); however, under ER1 MEXICA does not have that information, so it instantiates the action with any available character. For this example it is not really important who kidnaps the princess; both, the enemy and the Lady are new so the dynamic between characters is not altered. Nevertheless, it might make more sense to have the enemy as a kidnapper than the Lady.

After the kidnapping MEXICA selects the event where the knight looks for and finds the Lady (instead of the one where the Lady attacks the princess, like in the Story-Sample). This selection is made randomly (i.e. it does not have to do with the operation mode) but it causes the characters' contexts to change with respect to the characters' contexts in the Story-Sample. So, the story starts to take its own direction.

Now MEXICA selects VIRGIN FOUND_BY_ACCIDENT LADY. It is clear how this action does not match with the rest of the story, i.e. the action does not flow. But because MEXICA is running under ER1 it cannot detect this situation. However, apart from distracting the story's reader with an irrelevant event, this action has another consequence. It introduces a new character in the story, or maybe it is better to say, a new character's context; and, as explained later, this new character's context plays a relevant role in the development of the tale. But at the moment Virgin's context is empty (the action FOUND_BY_ACCIDENT just produces a change in location, it does not trigger Emotional Links or Tensions).

The story continues with the princess affronting the Lady. Then, the attack on the princess is performed; at that moment all characters are in the same location, therefore, all their contexts are updated with the consequences of that action.

Now, when MEXICA tries to retrieve possible next actions from long-term memory, the Associative Structure built from the Virgin's context is the only one which can match an atom; neither of the other characters' Associative Structures are able to bring options to working memory. Thus, as a result of the introduction of a new character through a no flowing action MEXICA avoids an impasse.

PRINCESS FOUGHT LADY (the only option available) is chosen as the next action in the tale. When MEXICA tries to bring more possible next actions to working memory, again Virgin's Associative Structure is the only one which can match an atom (another impasse avoided). This time LADY KILLED PRINCESS is incorporated into the tale.

Then, MEXICA retrieves from the knight's Associative Structure JAGUAR_KNIGHT MADE_PRISONER LADY. After this action is incorporated into the story an unbreakable impasse is declared and the story ends.

When MEXICA is running under ER1 operation mode actions which do not flow might be included in the story in progress; VIRGIN FOUND_BY_ACCIDENT LADY is an example. From a reader's point of view that action is irrelevant for the tale. However, from a ER1 operation mode's perspective, it gives to MEXICA the opportunity to avoid two impasses. It would be helpful to have a process that, after the story is finished, could detect such kind of actions and eliminate them from the tale.

B. Engaged State 2 (E2).

*** NEW STORY:
 PRINCESS CURED JAGUAR_KNIGHT
 ENEMY KIDNAPPED PRINCESS
 ENEMY ATTACKED PRINCESS
 JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND ENEMY
 JAGUAR_KNIGHT ATTACKED ENEMY
 JAGUAR_KNIGHT FOUGHT ENEMY
 JAGUAR_KNIGHT KILLED ENEMY
 JAGUAR_KNIGHT RESCUED PRINCESS
 PRINCESS FELL_IN_LOVE JAGUAR_KNIGHT
 PRINCESS KILLED LADY
 JAGUAR_KNIGHT KILLED PRINCESS
 JAGUAR_KNIGHT KILLED JAGUAR_KNIGHT

This story is presented for comparison with the Story-Sample developed under the ER2 operation mode. It shows how the story looks without the actions inserted during the Reflective State. This example must not be taken as a suggestion that differences between tales developed under E2 and ER2 operation modes are always just some extra events. Actions inserted during the Reflective State can modify the characters' context in a way that a story developed under E2 operation mode will take a completely different direction than one developed under ER2.

C. Engaged State 1 (E1).

*** NEW STORY:
 PRINCESS CURED JAGUAR_KNIGHT

LADY KIDNAPPED PRINCESS
 JAGUAR_KNIGHT LOOKED_FOR_AND_FOUND LADY
 VIRGIN FOUND_BY_ACCIDENT LADY
 LADY ATTACKED PRINCESS
 PRINCESS FOUGHT LADY
 LADY KILLED PRINCESS
 JAGUAR_KNIGHT MADE_PRISONER LADY

As in the previous story, this tale is presented for comparison with the story developed under the ER1 operation mode.

5.5 Comparing Operation Modes.

This section compares the results obtained when MEXICA runs under different operation modes; in particular it concentrates on explaining and comparing a story produced by the system under ER1 and ER2 operation modes.

5.5.1 *The Kidnapped Tlatoani.*

When MEXICA tries to develop a story under the operation mode E1 or E2 having as a first action TLATOANI BECAME_FREE, the outcome obtained is:

*** NEW STORY:
 TLATOANI BECAME_FREE

MEXICA is not able to produce anything. The reason is that such a first action has never been used in any of the tales in the Previous Stories, therefore, the first action produces an impasse.

When MEXICA runs under the ER2 operation mode the following story, called *The Kidnapped Tlatoani*, is developed:

*** NEW STORY:
 TLATOANI ACTOR
 PRIEST KIDNAPPED TLATOANI
 TLATOANI BECAME_FREE
 TLATOANI AFFRONTED PRIEST
 PRIEST ATTACKED TLATOANI
 TLATOANI FOUGHT PRIEST
 PRIEST WOUNDED TLATOANI
 PRIEST RAN_AWAY
 PRINCE ACTOR
 PRINCE WENT_FOREST
 PRINCE REALISED PRIEST WOUNDED TLATOANI
 TLATOANI WAS_FOND_OF PRINCE
 PRINCE ATTEMPTED_TO_TAKE_ADVANTAGE_OF TLATOANI
 TLATOANI AFFRONTED PRINCE
 PRINCE DID_NOT_CURE TLATOANI
 PRINCE WENT_TENOCHTITLAN_CITY
 TLATOANI DIED_BY_INJURIES

As commented before, the first action produces an impasse. MEXICA switches to the Reflective State and before trying to break the impasse it verifies preconditions. MEXICA inserts the kidnapping (and the action ACTOR) to justify the escaping. Because some actions are inserted to fulfil the preconditions MEXICA switches back to the Engaged State to see if the impasse has been broken through the new two actions. That is, MEXICA checks if such actions have modified the characters' contexts in a way that the Associative Structures are now able to match an atom. And they do. Both the Priest and Tlatoani's Associative Structures are able to bring possible next actions to working memory.

MEXICA retrieves from long-term memory the events where the Priest attacks the Tlatoani, the fight between both of them and the wounding of the Tlatoani. Then MEXICA switches back to the Reflective State. It inserts the affront action to justify the attacking, and verifies novelty and the Tensional Representation. The system switches back to the Engaged State and the development of the story continues.

MEXICA retrieves from long-term memory the actions PRIEST RAN_AWAY, PRINCE DID_NOT_CURE TLATOANI and PRINCE WENT_TENOCHTITLAN_CITY. Then, it switches back to the Reflective State.

At this point the story has a singular moment; after the Priest runs away the system introduces a new character in the tale that decides not to help the wounded Tlatoani. MEXICA requires to justify this situation.

PRIEST RAN_AWAY
PRINCE DID_NOT_CURE TLATOANI

The first step is to sort the location problem out; in order for the Prince does not cure the Tlatoani it is necessary that both characters are located in the same place.

R\$ inserting PRINCE ACTOR Loc PRINCE DID_NOT_CURE TLATOANI
R\$ inserting PRINCE WENT_FOREST Loc PRINCE DID_NOT_CURE TLATOANI

MEXICA solves it by sending the Prince to the forest (the original setting of the story is the Texcoco Lake; however, as a result of the kidnapping action the Tlatoani is located in the forest. See the postconditions of this action in the definition of the Primitive Actions in Appendix C). At the moment, this part of the story looks as follows:

PRIEST RAN_AWAY
PRINCE ACTOR
PRINCE WENT_FOREST
PRINCE DID_NOT_CURE TLATOANI

Now, there is another problem to solve. The Prince cannot decline to cure the Tlatoani if he is not aware that the Tlatoani is injured. Because the Prince was not present when the Priest wounded the Tlatoani, his context did not register that situation.

R\$ inserting PRINCE REALISED PRIEST WOUNDED TLATOANI pre PRINCE DID_NOT_CURE TLATOANI

MEXICA sorts out this situation by inserting the compound action REALISED. MEXICA analyses all characters' contexts and discovers that the preconditions which satisfies the action DID_NOT_CURE are already present in some of them, but not in the Prince's context. That means that the action which fulfils the required preconditions has already been performed in the story; the problem is that the Prince is not aware of it. MEXICA examines the story in progress to detect which action satisfies the desired preconditions and creates a compound action to make the Prince aware of it.

Then, in a similar way as in the Story-Sample, the rest of the events necessary to justify DID_NOT_CURE are inserted producing the following scenario:

PRINCE WENT_FOREST
 PRINCE REALISED PRIEST WOUNDED TLATOANI
 TLATOANI WAS_FOND_OF PRINCE
 PRINCE ATTEMPTED_TO_TAKE_ADVANTAGE_OF TLATOANI
 TLATOANI AFFRONTED PRINCE
 PRINCE DID_NOT_CURE TLATOANI

MEXICA checks novelty and the Tensional Representation and switches back to the Engaged State. A couple of attempts to retrieve possible next actions from long-term memory are launched but no useful actions are brought to working memory.

***** FILTER TLATOANI DIED_BY_INJURIES Ten(GLn:GoUp)-**

One of those useless retrieved actions is TLATOANI DIED_BY_INJURIES; it does not satisfy the guidelines and is eliminated. An impasse is declared and MEXICA switches to the Reflective State. The process to break the impasse is run and the action selected by the system to keep on moving the story is TLATOANI DIED_BY_INJURIES, the one just rejected.

What happens is that after PRINCE DID_NOT_CURE TLATOANI is justified MEXICA tries to go ahead with the story and, as indicated by the guidelines, it is looking for an action which increments the Tension to the Reader. The death of the Tlatoani produces the opposite effect, so it is discarded as an option when it is retrieved from long-term memory. However, no other alternative is retrieved and an impasse is declared. Under this circumstances the priority of the system is to break the impasse, so the guidelines are put aside and MEXICA switches to the Reflective State looking for any action which helps to continue the story. And TLATOANI DIED_BY_INJURIES is the first option it finds which

can break the impasse; thus, it is inserted in the story in progress and MEXICA switches back to the Engaged State.

Then, another impasse is declared but this time MEXICA cannot break it and the story finishes.

It might seem that although MEXICA is set to start the development of this story under the Engaged State, in practical terms it really starts under the Reflective State. That is, nothing is done under the initial Engaged State but to declare the impasse; MEXICA switches to the Reflective State where it inserts some actions to satisfy the preconditions and switches back to the Engaged State to develop the story. And apparently that is the process that will be followed if MEXICA is set to start the story under the Reflective State. Thus, it looks as in practical terms MEXICA starts the development of this tale under such a Reflective State.

However that is not really true. If MEXICA is set to start to develop the story under the Reflective State the impasse at the beginning of the story will never be declared. After the initial action is given by the user MEXICA will go straight to insert the actions required to satisfy the preconditions, and assign to the guidelines the right values based on the results of the evaluation of novelty and the Tensional Representation; then, it will switch to the Engaged State to start to retrieve actions which fulfil such guidelines.

However, when MEXICA starts under the Engaged State and the impasse is declared, its main priority is to find an action that allows continuing the development of the story. MEXICA switches to the Reflective State and no evaluation process is executed; it just breaks the impasse and switches back to the Engaged State to start to retrieve actions. As a consequence the guidelines keep their initial default value.

Thus, the difference between setting MEXICA to start the story under the Engaged State or the Reflective State is the value assigned to the guidelines at the beginning of the process.

To observe the consequences of such difference an experiment is run; MEXICA is set to start the same story under the Reflective State. The process works as follows. The actions TLATOANI ACTOR and PRIEST KIDNAPPED TLATOANI are inserted to fulfil the preconditions of the initial action. MEXICA evaluates the tale and finds that frame two is the most alike to the Tensional Representation of the story in progress; so, it sets the Permanent Tension to Tendency Down. The novelty is classified as adequate and set to Low.

```

Reflective State
TLATOANI ACTOR
PRIEST KIDNAPPED TLATOANI
TLATOANI BECAME_FREE
Engaged State
PRIEST ATTACKED TLATOANI

```

MEXICA switches to the Engaged State and retrieves PRIEST ATTACKED TLATOANI. Although the action does not fulfil the guidelines it is not eliminated because there is one chance left; so, it is

added to the tale. So far there is no difference between this story and the one developed under the Engaged State as the initial state. Then MEXICA retrieves from long-term memory TLATOANI FOUGHT PRIEST; but this time the action is eliminated because it does not satisfy the guidelines. As a result, this story takes a different direction than the previous tale (the one developed under Engagement as the initial state).

The Kidnapped Tlatoani illustrates the impact that a selected (by the user) initial state can have on the progress of a story. In this case, MEXICA is set to start the story under the Engaged State but it is forced to switch to the Reflective due to an impasse. However, the outcome generated when the system is set to start the story under the Reflective State is different.

The consequences of choosing a particular initial state can be observed not only when an impasse is declared. If the first action in the story produces a context which can match an atom in long-term memory, but at the same time has preconditions to be satisfied, the initial state selected can guide the story towards completely different events. What makes the difference is the way the action(s) inserted modifies the characters' context. Such modifications can push MEXICA to match different atoms retrieving different possible next actions.

Nevertheless some times the initial state can be irrelevant in the fate of a tale even when actions to satisfy preconditions are added to the story in progress. The Story-Sample exemplifies this case where the actions inserted to justify the event where the princess cures the knight do not have any consequence in the development of the tale; i.e., the sets of possible next actions retrieved from long-term memory at the beginning of the development of the story do not change if the initial state is set to Reflective or Engaged.

5.5.2 Advantages of the ER1 (compared with ER2).

In previous sections it has been pointed out the benefits of the processes which verify the usefulness of actions under the ER2 operation mode (the verification that an action flows and fulfils the Novelty and Tensional Guidelines). Also, it has been mentioned how the lack of such processes under the ER1 operation mode makes MEXICA more vulnerable to produce stories with senseless sequences of actions.

This section attempts to show how in certain circumstances the ER1 can be the most convenient operation mode to try to develop a tale. Such circumstances are obviously those where MEXICA gets blocked under the ER2; i.e., when the guidelines become so hard to fulfil that few or none of the actions retrieved from long-term memory can satisfy them.

To simulate such conditions a new group of twelve tales is joined to the file of Previous Stories. All of them were created by MEXICA (most of the stories studied in this chapter are included); few actions have been added or eliminated from some stories to improve their quality.

Most of these new stories are variations of the original seven; they are very similar between them or share alike episodes. The idea is to saturate MEXICA with the same kind of information. In this way, the difficulty of producing novel stories is increased. That is, although the number of tales has increased by more than 100%, the amount of Primitive Actions is still the same and no different topics are introduced in the stories. As a consequence, the number of times actions in general have been used raises making more difficult to find actions which can fulfil strict requirements of novelty; also, due to the similarity between topics, no new alternatives or directions where to lead new tales are generated. MEXICA is given the task to develop a story which initial actions is TLATOANI BECAME_FREE. To trigger the strict requirements of novelty the story of *The Kidnapped Tlatoani* and a variation of it are also included in the new file of Previous Stories. That is, when MEXICA developed *The Kidnapped Tlatoani*, the seven tales in the old file of Previous Stories were just sufficient to generate some atoms that allow MEXICA to develop this tale. The tales added to the new file of Previous Stories do not improve this situation (as explained some lines earlier, they do not offer new options where to lead the story). So, including *The Kidnapped Tlatoani* and a variation of it makes more difficult for MEXICA to come with a novel story since the few alternatives available in long-term memory has been already used in those two tales.

The definable parameters are set as follows:

Initial State:RfS CtEg-Rf:1 ACAS-Constant:50% Guidelines.Chances:0
Forbidden Actors:Active Num_actions:40 times_used:234
Detection of end of cycle NO-active. Logical actions NO-active.
Novelty=> Strict 15%(2) High 50%(6) Medium 75%(9)

MEXICA is set to start in the Reflective State; in this way it goes straight to verify preconditions and evaluate the story. So, it can detect immediately the similarity between the story in progress and the tales in Previous Stories. The parameter CtEg-Rf is set to one to force MEXICA to evaluate the story each time an action is retrieved from long-term memory and added to the story.

The outcomes obtained under ER2 and ER1 are now presented.

A. Operation Mode: Engaged and Reflective States 2.

As expected, under the ER2 operation mode MEXICA cannot produce a story.

*** NEW STORY:
 TLATOANI ACTOR
 PRINCE KIDNAPPED TLATOANI
 TLATOANI BECAME_FREE

After three actions the story is abandoned. The steps followed to try to develop the story are now explained. MEXICA starts the process under the Reflective State; it inserts the events necessary to satisfy the preconditions of the action BECAME_FREE and evaluates the novelty. It detects that the story developed so far (i.e. the first three actions) is equal to two of the tales in the Previous Stories (to *The Kidnapped Tlatoani* and a variation of it). So, MEXICA sets the value of the Novelty Guideline to Strict.

It switches to the Engaged State and tries to retrieve possible next actions from long-term memory. However, none of the options available fulfils the requirements for novelty; so all they are eliminated. An impasse is declared and MEXICA switches to the Reflective State to try to break it.

However, all the options found by MEXICA to break the impasse also failed to satisfy the Novelty Guidelines. So, the story is abandoned.

In this way, following the guidelines established during the analytical process (the Reflective State) MEXICA is not able to produce anything.

B. Operation Mode: Engaged and Reflective States 1.

The following actions are part of the story produced under ER1 operation mode.

```
*** NEW STORY:
TLATOANI ACTOR
LADY KIDNAPPED TLATOANI
TLATOANI BECAME_FREE
EAGLE_KNIGHT ACTOR
EAGLE_KNIGHT WENT_FOREST
LADY LAUGH_AT EAGLE_KNIGHT
EAGLE_KNIGHT MADE_PRISONER LADY
LADY WOUNDED EAGLE_KNIGHT
TLATOANI EXILED LADY
```

The original story includes some redundant sequences of actions, which have been omitted in order to clearly show the best material produced. The whole story is analysed in the following section 5.6.

This example shows that under the ER1 operation mode MEXICA is not just able to avoid getting blocked but also to produce some novel material.

The process followed to generate the story is now explained. As in the previous case, MEXICA starts the development of the story in the Reflective State. So, it inserts the first two actions to justify BECAME_FREE and then it evaluates the story. Although it detects that the story is equal to two of the Previous Stories there is no communication between the Engaged and Reflective States, so that fact is ignored. MEXICA switches to Engagement and starts to retrieve actions from long-term memory.

One of those actions is EAGLE_KNIGHT MADE_PRISONER LADY, which is selected randomly as the next event in the tale.

This action has been used just in four occasions in Previous Stories; so, it is very close to the standards of novelty specified under the ER2 operation mode. This gives MEXICA the opportunity to develop a story with a high degree of originality.

MEXICA switches back to the Reflective State (the CtEg-Rf is set to one). It is necessary to satisfy the preconditions of EAGLE_KNIGHT MADE_PRISONER LADY. First, the actions EAGLE_KNIGHT ACTOR and EAGLE_KNIGHT WENT_FOREST are inserted to solve the location problem. Now, MEXICA looks for an event which justifies MADE_PRISONER; three actions are rejected because they do not reach the novelty requirement (remember that when MEXICA is verifying preconditions or breaking impasses, it always checks the novelty of the actions. That is, in the ER1 operation mode the guidelines are ignored during the Engaged State, but during the Reflective State they still being taken into account).

Finally LADY LAUGH_AT EAGLE_KNIGHT, which fulfils the novelty requirement and the preconditions, is found and inserted. (If to laugh at Eagle knight is enough reason to take the Lady prisoner is a relative question; in MEXICA the answer is linked to the preconditions and postconditions defined by the user in the Primitive Actions.)

When the novelty is evaluated MEXICA finds that just three of the sequences have been used in Previous Stories; so, the tale is classified as adequate and novelty set to Low.

R\$ Checking novelty: number of times a sequence happens in other stories

R\$ Seq:1x2 Seq:2x2 Seq:3x0 Seq:4x0 Seq:5x0 Seq:6x0 Seq:7x4

R\$ Adequate novelty: guideline set to LOW.

In the following actions MEXICA wanders around until it randomly selects LADY WOUNDED EAGLE_KNIGHT which leads to TLATOANI EXILED LADY. Then again it wanders around until the maximum number of actions allowed in a new tales is reached. The story then finishes.

As demonstrated in this example, the ER1 operation mode can be very useful when MEXICA gets blocked under ER2, or when the user wants to make some experiments in which the Engaged and Reflective States work independently.

Nevertheless, the production of senseless sequences of actions is still a problem. A possible solution is to include in the ER1 the flowing-verification routine which will help to improve the quality of the material generated; however, some of the lack-of-constraints characteristics will be lost. It seems a better idea to include a routine that could detect the junk-actions and eliminate them from the final tale.

5.6 Inadequate Stories.

In this section some inadequate stories developed by MEXICA are presented together with an explanation of the causes which led to the generation of such tales.

A. The following lines show the whole version of the story analysed in the previous section.

```
*** NEW STORY:
TLATOANI ACTOR
LADY KIDNAPPED TLATOANI
TLATOANI BECAME_FREE
EAGLE_KNIGHT ACTOR
EAGLE_KNIGHT WENT_FOREST
LADY LAUGH_AT EAGLE_KNIGHT
EAGLE_KNIGHT MADE_PRISONER LADY
FISHERMAN LOOKED_FOR_AND_FOUND EAGLE_KNIGHT
TRADER LOOKED_FOR_AND_FOUND EAGLE_KNIGHT
FISHERMAN LOOKED_FOR_AND_FOUND EAGLE_KNIGHT
TRADER LOOKED_FOR_AND_FOUND EAGLE_KNIGHT
FISHERMAN LOOKED_FOR_AND_FOUND EAGLE_KNIGHT
TRADER LOOKED_FOR_AND_FOUND EAGLE_KNIGHT
LADY WENT_FOREST
LADY WOUNDED EAGLE_KNIGHT
TLATOANI EXILED LADY
FISHERMAN WENT_FOREST
WARRIOR WENT_FOREST
TRADER WENT_FOREST
WARRIOR WENT_FOREST
```

This story exemplifies some of the problems that MEXICA finds when it develops stories under the ER1 operation mode.

The process that generated such a tale is now explained. After EAGLE_KNIGHT MADE_PRISONER LADY is selected as the next event in the story, MEXICA retrieves from memory a new set of possible next actions.

INDEXES ***

TLATOANI: 10,15 ASIII-0 LADY: 10,15 ASIII-0 EAGLE_KNIGHT: 4,2 ASI-50

TLATOANI possible next actions: ****

LADY possible next actions: ****

EAGLE_KNIGHT possible next actions: ****

**ANYONE LOOKED_FOR_AND_FOUND EAGLE_KNIGHT
LADY WOUNDED EAGLE_KNIGHT**

The action LOOKED_FOR_AND_FOUND does not flow; it just produces a change in the location. When it is selected randomly as the next action in the tale, the Emotional Links and Tensions in the characters' contexts are not modified. As a consequence the same set of possible next actions is retrieved again from Long-term Memory.

MEXICA keeps on selecting LOOKED_FOR_AND_FOUND as the next event in the tale; so, it falls in a kind of loop until LADY WOUNDED EAGLE_KNIGHT is chosen as the next action. The same situation occurs with the last part of the story.

As commented some lines earlier, probably the best solution is a routine that can detect and get rid of the junk-actions once the story is finished.

B. The following story has as first action PRINCESS CURED JAGUAR_KNIGHT:

```
*** NEW STORY:
JAGUAR_KNIGHT ACTOR
PRINCESS ACTOR
JAGUAR_KNIGHT HAD_AN_ACCIDENT
PRINCESS CURED JAGUAR_KNIGHT
JAGUAR_KNIGHT HAD_AN_ACCIDENT
PRINCESS ATTEMPTED_TO_TAKE_ADVANTAGE_OF JAGUAR_KNIGHT
JAGUAR_KNIGHT AFFRONTED PRINCESS
PRINCESS DID_NOT_CURE JAGUAR_KNIGHT
PRINCESS WENT_TENOCHTITLAN_CITY
JAGUAR_KNIGHT DIED_BY_INJURIES
```

The difficulty with this story is that it does not make very much sense: the knight has an accident, the princess cures him, and immediately after that the knight has another accident and, out of the blue, the princess tries to take advantage of him. Or in other words, the problem with this story can be divided in two parts: first an action puts the health of the knight in danger and although this situation is overcome, again the same action puts the health of the knight in risk; it does not make the story flow. And second, the princess's behaviour is incongruent.

The process that generated this tale is now explained. MEXICA starts the development of the story under the Engaged State; the following are the first actions retrieved and selected to be part of the tale:

```
PRINCESS CURED JAGUAR_KNIGHT
JAGUAR_KNIGHT HAD_AN_ACCIDENT
PRINCESS DID_NOT_CURE JAGUAR_KNIGHT
PRINCESS WENT_TENOCHTITLAN_CITY
```

After that MEXICA switches to the Reflective State to verify preconditions. MEXICA inserts the action to justify the event where the princess cures the knight and then the first problem arises. As a consequence of this process the same action, almost in a row, can be found twice in the tale. Thus, as a result of this situation, the flow of the story is damaged.

```
JAGUAR_KNIGHT HAD_AN_ACCIDENT
PRINCESS CURED JAGUAR_KNIGHT
JAGUAR_KNIGHT HAD_AN_ACCIDENT
```

This problem arises because during the Reflective State MEXICA does not analyse the story in progress to insert an action which does not just fulfil the preconditions, but also harmonise with the rest of the tale; e.g. if MEXICA had been able to detect that HAD_AN_ACCIDENT follows PRINCESS CURED JAGUAR_KNIGHT it could have chosen a different action to satisfy the preconditions of CURED.

This argument blames the routines in the Reflective State of the problem; however, something similar can be said about the Engaged State. Why does MEXICA select as the next event in the story, just after the princess cures the knight, an action where the knight has an accident? It does not make very much sense since, although the action itself flows, it does not help the story to move on. So, it is necessary to provide MEXICA with a routine that can detect this situations.

The second problem is why the princess suddenly tries to take advantage of the knight, when she has just helped him. In this case, the precondition of `ATTEMPTED_TO_TAKE_ADVANTAGE_OF` is responsible; some extra preconditions would have forced MEXICA to justify the episode more coherently. However, this solution (incrementing preconditions) presents the risk that the user might end predetermining sequences of actions which is against MEXICA's philosophy (c.f. TALE-SPIN in section 2.4.2).

A better solution is to combine the use of just the strictly-necessary preconditions to avoid the production of incoherent episodes, with more powerful analytical routines in the Reflective State; such routines must take into account the characters' context when they select the actions to satisfy preconditions.

C. The following story has as first action `TLATOANI BECAME_FREE`.

```
*** NEW STORY:
TLATOANI ACTOR
PRIEST KIDNAPPED TLATOANI
TLATOANI BECAME_FREE
TLATOANI AFFRONTED PRIEST
PRIEST ATTACKED TLATOANI
TLATOANI FOUGHT PRIEST
PRIEST KILLED TLATOANI
PRIEST WAS_FOND_OF PRIEST
PRIEST ATTEMPTED_TO_TAKE_ADVANTAGE_OF PRIEST
PRIEST AFFRONTED PRIEST
PRIEST ATTACKED PRIEST
PRIEST EXILED PRIEST
```

The problem with this story is the way MEXICA justifies the action `PRIEST EXILED PRIEST`. The tale was generated as follows. MEXICA starts to develop the story in the usual way. After `PRIEST KILLED TLATOANI` is chosen as the next event in the tale an impasse is declared. Such an impasse is broken with the action `PRIEST EXILED PRIEST`; i.e. from Previous Stories MEXICA knows that a coherent next action after the Priest kills the Tlatoani is that the Priest exiles himself. However, MEXICA is not able to link the murder with the exile; instead, it inserts actions which fulfil the preconditions but do not fix in the tale.

Again, better analytical routines would help to avoid this kind of problems. However, to be fair with the Reflective State the failure of this example is also due to the user of the system (i.e. the author of this thesis).

The precondition of the action A EXILED B is $A(-2,*):B$. To link the murder with the exile it is necessary that the Priest develops a negative Emotional Link towards himself, maybe due to regretfulness. However, that action (or a similar one) does not exist in the file of Primitive Actions. So, MEXICA did not really have the possibility to successfully end the story.

5.7 Summary.

This chapter has analysed in depth the way MEXICA develops stories. Examples that illustrate the similarities and differences between the four operation modes and some of the parameters definable by the user have been presented. Finally, some of the problems found while testing the system have also been shown to give a completely panorama of MEXICA. An evaluation of MEXICA is presented in the following chapter.