Chapter I

Introduction

The goal of this research is to develop a computational model of the creative process of writing in terms of engagement and reflection. It attempts to complement and extend previous models based on predefined story structures or problem solving techniques. The Engaged State can be described as a state in which the writer is intensely involved in the production of material related to the task. Such a production is guided by tacit constraints (e.g., cultural background), relies on previous experiences and stored mental schemas, and avoids the use of deliberate planning and explicit story-structures to develop the tale. The Reflective State can be described as a state where the writer analyses and/or evaluates the current work and also, as Boden (1992) points out, deliberately explores and transforms a conceptual [problem] space. In this work, the writing process consists in the production of coherent and interesting stories as a result of the interaction between engagement and reflection.

A computer program called MEXICA has been developed with this purpose. It writes (frameworks for) short stories about the Mexicas —the old inhabitants of what today is México City, also inaccurately known as Aztecs—. (This author believes that computerised story telling is far from producing stories similar to those created by human beings. Thus, although during this work MEXICA's outputs are referred as stories, what the system generates are frameworks for short stories). MEXICA's stories are represented as sequences of actions involving two characters (although actions involving one or three are also allowed). MEXICA has two main processes: the first creates all data structures in memory from information provided by the user. The second, based on such structures and as a result of a cycle between engagement and reflection, produces new stories.

The present work has the following goals. The development of a computer model that:

- Produces stories as result of a clear interaction between engagement and reflection.
- Produces material during engagement without the use of problem-solving techniques or predefined story-structures.
- Produces novel and interesting stories.
- Allows users to experiment with different parameters that constrain the writing process.

1.1 Writing as an Analytical Activity.

Torrance, Thomas & Robinson state that "The models of text production that currently dominate writing research (or, at least, currently are most cited in writing research articles) describe writing as the conscious and analytical application of specific cognitive strategies in pursuit of rhetorical goals"

(Torrance et al. 1996, p.189). However, Torrance et al. disagree with this position and believe that discovering what to say is part of the writing process. Other authors have expressed similar ideas. For example, the philosopher Monroe C. Beardsley writes: “In other words, as the poet moves from stage to stage, it is not that he is looking to see whether he is saying what he already meant, but that he is looking to see whether he wants to mean what he is saying.” (Beardsley 1965, cit. in Rothenberg & Hausman 1976, p.307). Carlos Fuentes[1] affirms that “The novel is a verbal search of what is waiting for to be written” (Fuentes 1993, p.28). In an interview, Aldous Huxley expresses similar ideas:

> Interviewer: Do you block out chapters or plan the over-all structure when you start out on a novel?
> Huxley: No, I work away a chapter at a time, finding my way as I go. I know very dimly when I start what's going to happen. I just have a very general idea, and then the thing develops as I write. Sometimes -it's happened to me more than once- I will write a great deal, then find it just doesn't work, and have to throw the whole thing away. I like to have a chapter finished before I begin the next one. But I’m never entirely certain what’s going to happen in the next chapter until I’ve worked it out. Things come to me in driblets, and when the driblets come I have to work hard to make them into something coherent. (Huxley, cited in Plimpton 1963, p.165)

However, even when this aspect of the writing process has been highlighted, most AI and psychological models fail to incorporate it. For example, computerised storytellers are mainly based on story grammars or problem solving methods. Story grammars provide a formal representation of plot’s structures. “A grammar consists of a set of production rules that re-write strings of symbols. Symbols that can be re-written are called non-terminals; those which cannot are terminals. Starting with a distinguished non-terminal, the rules are applied until a string of terminals is obtained.” (Rowe & Partridge 1993, p. 45). Problem solving techniques consist of “exploring the [problem] space to try to find some path from the current state to a goal state.” (Rich and Knight, 1991 p.31). None of these approaches explicitly represent this “discovering what to say” aspect of writing.
Thus, it is necessary to develop systems that include the advantages of problem-solving techniques and pre-defined story structures, but at the same permit modelling this discovering feature of writing.

1.2 The Approach: engagement and reflection.

Sharples’ (1994, 1996) account of the writing process offers a frame that can be used to develop a model that includes these characteristics. For him, writing consists of a cycle of engagement and reflection:

> An engaged writer [guided by tacit constraints] is devoting full attention to the task of creating text (whether it be notes or fully fleshed-out prose). Reflection consists of “sitting back” and reviewing all or part of the written material, conjuring up memories, generating ideas by association, forming and transforming ideas, and planning what new material to create and how to organize it. (Sharples, 1996 p.144)

[1] All quotes originally written in Spanish are free translations by the author.

This approach allows combining the view of writing as an analytical activity requiring evaluation and problem solving, and writing as a way to discover what to say. But furthermore, it offers a model where these two different aspects of the writing process interact and work together to produce novel written material.

How can a computer model of engagement and reflection contribute to the study of writing? Following Eglen (1997, p.2) computer models have three main uses:

- First, it allows us to verify that the theory works (at least at a computational level). That is, it can demonstrate that it is plausible to develop stories as a result of an engagement-reflection cycle. This is important since there is no other way to explicitly "observe" how the different elements in the theory work together to produce a text.
- Second, a computer model forces the modeller to think about all the details of a hypothesis rather than just concentrating on the cardinal components of it. Sharples' description of the writing process is very general; he does not include any detail of the cognitive processes involved in his account. Therefore, a computer model can provide valuable information in that respect.
- Third, and as a complement of the previous two points, a computer model allows easy testing of the hypothesis under different circumstances, which in some cases can be difficult or not feasible to perform in human subjects.

1.3 Outline of the Thesis.

Chapter II provides a literature review. It is organised in four sections:

- The first recapitulates different views about the creative process.
- The second discusses some of the writers' thoughts about writing.
- The third examines different theories of the writing process.
- The fourth describes and analyses computer models of story generation.

Chapter III provides a mapping between Sharples' account of writing and the computer model topic of this research. It includes:

- General description of Sharples' account of writing.
- A general introduction to MEXICA's architecture.

Chapter IV provides details of the way MEXICA works. The chapter clarifies in depth the processes followed to:

- Create all the structures in memory necessary to produce stories.
- Produce material during engagement (e.g. how to retrieve information from long-term memory, how to update working memory).
- Reflect on the material produced so far (e.g. how to break impasses, how to evaluate the story in progress).

Chapter V analyses some of the stories created by MEXICA. It includes:

- An example where the reader can trace step by step the story development.
- Examples to examine how outcomes change when different parameters in the system are modified.
- Examples of inadequate tales produced by the system.

Chapter VI provides an evaluation of MEXICA as a computer model. It includes an evaluation of:

- The stories produced by MEXICA.
- The interaction between engagement and reflection during the production of stories in MEXICA.
- The processes used to produce novel and interesting stories.
- The facilities offered by the system to experiment with the model.

Chapter VII presents the conclusions of this work: MEXICA demonstrates the plausibility of developing computer models of creativity in writing in terms of engagement and reflection. The chapter includes:

- A recapitulation of MEXICA.
- A section of future work. It describes how to improve the actual routines, which new routines can be added, and starting points for further research.