Participating in a Story

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EXPLORING AUDIENCE COGNITION

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To everyone who
participates in my story

CONTENTS

ACKNOWLEDGEMENTS

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West of House.
You are in an open field west of a big white
house with a boarded front door.
There is a small mailbox here.

>Open mailbox
Opening the mailbox reveals a dissertation.

>Read dissertation
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CHAPTER 1

Introduction

HUMAN COGNITION—the processes by which we acquire and use knowledge—enables us not only to act appropriately in the world, but also opens up doors to imaginary worlds. We can think about possible ways to solve a problem. We are captured by the fate of a character in a fictional story which is told to us. We can pretend that things in the world are other than what they actually are, and we can pretend to do things other than what we actually do. This book explores parts of the imaginative powers of the human mind, namely the cognition of *taking part* in a *fictional story*. The ability to conceive of perception and action as relating to something other than the immediate 'real world' is a general human cognitive ability. As shown by studies of children's pretence play, the ability spontaneously develops early in childhood. However, this phenomenon is not restricted to children; it is present also in adults, which is the study population in this book.

Traditionally, stories,[1] such as fairytales, printed books and cinema, do not let the audience influence the sequence of events in the story. The interpretation of these stories can vary among people and after multiple readings, and they can create a sense of involvement, but the audience is not a true participant. In contrast, in new media, such as computer games and other interactive multimedia (and also in non-computerised situations such as the older tradition of role-playing, and in children's pretence), the audience can become participants in the story. In this book, these stories are called

[1] The term 'story' is used as a synonym to the term 'narrative' in this book. For a discussion, see Chapter 2.

participatory stories.[2] Participatory stories allow the audience to influence which events take place in the story. A challenge for literary studies, film studies, narratology, media theory, computer game theory, and other similar fields which deal with the concept of story, is then to account for the differences between non-participatory stories and participatory stories. The argument in this book is that no such viable theory exists.

The main goal of this book is to argue that *cognition* is the best place in which to look for differences between participatory stories and non-participatory stories. The contribution can be divided into two parts. First, the book provides a *theoretical framework* for participatory stories. A cognitive perspective on stories and fiction is adopted. It is concluded that earlier work fails at successfully capturing the distinction between non-participatory and participatory stories. In order to uphold this distinction, it is argued, a definition of participatory stories must refer to cognition. The second type of contribution is findings from *empirical investigations* of cognition in actual participatory story situations, connecting the theoretical framework to authentic situations where people are involved in a computerised participatory story. Although the book deals specifically with cognition in connection to new technology, its framework is broader. It is the general cognitive ability of imagination (with its philosophical issues) that forms the basis for the book; more specifically, having beliefs about fictional entities and acting according to these beliefs. In the book, the theoretical framework and the empirical studies are constructed with a firm belief in interdisciplinarity. Research is drawn together from cognitive psychology, linguistics, developmental psychology, reading studies, literary studies, film studies, artificial intelligence, among others.

In this chapter, the purpose, the object of study, the scientific framework, the delimitations, and the contributions of the book

[2] The term 'participatory stories' is introduced in this book and is further discussed and justified in Chapter 4, where also a definition of the concept of participatory stories is given. The meaning of the term 'participatory' is similar to the meaning of the term 'interactive'. The phenomena go under other names in earlier research, such as *interactive stories*, *interactive narrative*, and *digital narrative*.

will be discussed. But first, the concept of participatory stories will be clarified through an example of an actual participatory story.

1.1 PARTICIPATORY STORIES

The very idea of stories is changing. Conceptions of stories, thousands of years old, originating with Aristotle (350 BC/1999), are being challenged by the technology of the late twentieth century. A story may no longer need a fixed beginning, middle, and end, as were some of Aristotle's defining features. Neither did he mention the possibility that the audience may influence the sequence of events in the story (in this book called *participation*), which is possible with computer technology. An example is computer games in which the user takes the role of a character in an unfolding story, influenced by what actions are taken (however, not all computer games are considered participatory stories; only those framed in a story context—see Chapter 4). But story participation is not uniquely a new thing and is not associated only with computers. Since the 1970s, people have been engaged in role-playing games (e.g., *Dungeons and Dragons*, and others) where a story emerges as a result of the participants' actions. More loosely structured role-playing has been exercised throughout history, and children's pretence play is surely as old as mankind itself. These forms of participatory stories are all expressions of a feature of the human mind: the ability to have pretence beliefs and act according to those beliefs, without confusing them with actual beliefs about the world.

Chapter 4 is devoted to a discussion and definition of participatory stories. Let us here just briefly consider an example of a participatory story. The example is a participatory story called *Anchorhead*, which is a type of computer game called *interactive fiction* (see, e.g., Costanzo, 1986; Aarseth, 1997; Murray, 1997; Wilhelmsson, 2001) (a full classification of participatory stories is presented in Chapter 4). This participatory story was used as stimuli in the empirical studies in Chapters 6–8. *Anchorhead* has a simulated world containing places, objects, and characters. Interaction with

Anchorhead is purely textual. The computer presents the current situation in text on the screen and the human user—the player—types commands to the system in near-natural language. The commands are carried out by the player character in the story world, such as moving around, picking up and manipulating objects, and interacting with other characters in the story. After each command, the simulated world is updated and the player is again asked to enter a command. Below is a transcript from *Anchorhead*, taken near the start of the story. The input from the player is shown after the '>' sign. Note that the system addresses the player as 'you'. (A longer transcript is available in the appendix.)

> Outside the Real Estate Office
> A grim little cul-de-sac, tucked away in a corner of the claustrophobic tangle of narrow, twisting avenues that largely constitute the older portion of Anchorhead. Like most of the streets in this city, it is ancient, shadowy, and leads essentially nowhere. The lane ends here at the real estate agent's office, which lies to the east, and winds its way back toward the center of town to the west. A narrow, garbage-choked alley opens to the southeast.
>
> *> look at alley*
> The alley lies southeast, and appears to lead around the side of the real-estate office.
>
> *> look at office*
> The door has a glass front with the name of the real estate company—Benson & Brackhurst—stenciled across it. The blinds are drawn, the lights are off inside, and no one appears to be home. Odd, since the agent knew you were coming today.
>
> *> look at street*
> The cobblestones are slick from the rain and worn with many centuries' passage.
>
> *> knock on door*
> You rap on the glass sharply, peering through it into the dark room inside. Nobody answers. Strange; you just talked to the real estate agent—Miss Benson, you think it was—yesterday. She was going to meet you here.

> *open door*
It seems to be locked.

> *inventory*
You are wearing your wedding ring, your trenchcoat and your clothes; in addition, you have in your hand your umbrella.
The pockets of your trenchcoat are empty.

> *look at umbrella*
Olive green, with a hook-shaped handle. It's a handy little thing, when it rains. It's currently open.

> *look at ring*
Staring at your wedding ring like that tends to make you sentimental.

1.1 THE PURPOSE OF THE BOOK

The book aims at supporting the following thesis: *The difference between traditional, non-participatory stories (such as books and films), and participatory stories (such as story-based computer games) is one of cognition*. The general aim of the book is reached by a theoretical and an empirical part, which are described in subsections below.

The book rests on three important foundations: cognitive theory, empirical studies, and authentic material and situations (Figure 1.1). First, cognition is considered an essential part of the account of participatory stories (further discussed below). Second—in contrast to many earlier studies of participatory stories—analysis, introspection, and speculation are not considered suitable methods for arriving at knowledge about participatory stories; empirical studies are needed. Finally, there is a conviction that these empirical studies should not be artificial, manipulated, and stripped of context, but must have high ecologic validity by including authentic stimuli (such as *Anchorhead* exemplified above) and authentic situations (such as that the study situation of using *Anchorhead* is similar to a real situation). Otherwise, the stimuli and situations may lead to unnatural cognitive processing strategies and unnatural mental rep-

resentations (Graesser, Millis, & Zwaan, 1997). The two latter points are discussed in Chapter 5.

Let us now consider the two parts of the book in more detail: the theoretical framework and the empirical studies, followed by a note on how the book may have consequences for research on cognition in general.

1.1.1 A theoretical framework for participatory stories

The theoretical framework, Part I of the book, comprises Chapters 2–4. The literature review and arguments are carried out in those chapters and are only summarised here.

The question answered in the theoretical framework is: *What are participatory stories?* In order to answer this question, the concepts of *story*, *fiction*, and *participation* are defined and discussed. Chapter 2 introduces the concept of story as a cognitive construct, while Chapter 3 does the same for the concept of fictionality. With these foundations in place, Chapter 4 provides a classification system of the concept of participatory stories and its related phenomena, end-

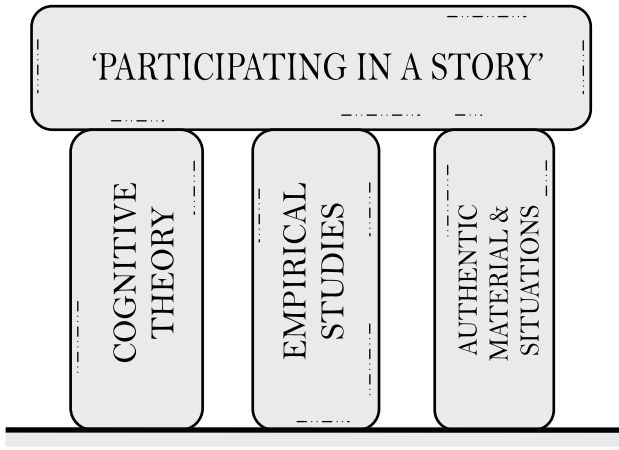

Figure 1.1. The three pillars of this book: cognitive theory, empirical studies, and authentic material and situations.

ing with a proposed definition. The main justification for the theoretical framework offered is that earlier work has not been successful in explaining the difference between participatory and non-participatory stories. The claim advanced here is that accounts that use differences in media, structure, or physical actions are insufficient for upholding the distinction between the two classes. Instead, the book makes a case for a cognitive perspective in the study of participatory stories. To apply a cognitive perspective here means to define the concepts in relation to human cognition. The importance of a cognitive perspective can be framed in a *weak* and a *strong* version:

Strong cognitive thesis: It is *necessary* to include cognitive aspects in order to show what differentiates participatory stories from non-participatory stories (cognition is a *necessary* part of the distinguishing criteria in order to maintain a separation of the two classes).

Weak cognitive thesis: It is *fruitful and enlightening* to account for cognitive mechanisms when characterising participatory stories.

Few other studies of participatory stories on a general level have concerned themselves with cognition—a rare case is Wilhelmsson (2001). Wilhelmsson embraced only the weak version of the cognitive thesis. It is argued that all other approaches to capturing the difference between traditional stories and participatory stories fail, and the only plausible solution is to adopt the strong version of the cognitive thesis.

1.1.2 Empirical studies of cognition in participatory stories

Part II of the book is the empirical studies, comprising Chapters 5–8. The details are given in those chapters, and only summarised here.

Arriving at the conclusion that a cognitive perspective is both fruitful and necessary in order to account for the difference between participatory stories and non-participatory stories, as the result of the theoretical framework, the next step is to ask more specific questions concerning cognitive differences. Many earlier studies of

what happens when playing computer games have been neither empirical nor concerned with cognition (e.g., Laurel, 1991; Aarseth, 1997; Murray, 1997; Ryan, 1997). The studies concerned with cognition of computer games have not been empirical (Wilhelmsson, 2001), and if they have been empirical, they have not been about cognition (e.g., Johansson, 2000; Linderoth, 2004). The second purpose of this book is to provide findings from empirical studies of cognition of participatory stories.

There are many methodological challenges when designing a study which compares cognition of non-participatory and participatory stories.[3] The potentially confounding factors are plentiful: there is the computer interface, the participants' computer skills and varying skills with participatory stories. Most importantly, a participatory story is a different thing from a non-participatory story—it does not have a fixed length, for instance. Time—how long a participant spends reading or using it—is not easily comparable across non-participatory and participatory stories (a textual non-participatory story can be read at a steady tempo from beginning to end, but a participatory story may halt, move slowly, or proceed depending on the actions of the participant). For these reasons and because little scientific knowledge has been collected about cognition of participatory stories, the empirical studies in this book are exploratory in nature, rather than experimental and hypothesis-testing. An effort in the empirical studies was to achieve a high ecological validity by including authentic stories and situations, as well as selecting participants with sufficient experience of participatory stories. The process of moving the phenomenon from its natural context to a study context was carried out with careful consideration.

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[3] Every investigation, including an empirical one, is based upon philosophical assumptions. This dissertation rests on a set of philosophical assumptions called *postpositivism* (Guba & Lincoln, 1994): ontologically, the view is that there exists a single, independent, external reality. Epistemologically, the view is that we can gain approximate knowledge of this reality. Methodologically, this should be done, at least ultimately, using empirical methods aimed at objectivity (manifested practically as intersubjectivity).

An overview of the empirical studies is shown in Figure 1.2. A single method for data collection was designed (Chapter 5), which incorporated exposure of participants to events from five sources with varying degrees of participation, fictionality, and authenticity: a computer game, a printed short story, personally experienced events, practical laboratory tasks, and a special, printed non-participatory version of the computer game. Afterwards, participants talked about events from these five source conditions in an interview while being audio-visually recorded. The idea was to get at how people *think* about participatory stories by analysing how they *talk* about participatory stories. In this way, language (speech and gesture) was used as a window to the mind. Computer logging of interaction with a participatory story was also used to some extent. The collected data allowed multiple analyses of cognition from three main viewpoints: spatial cognition (Chapter 6), memory qualities of events and actions (Chapter 7), and what perspective people adopt on events and actions (Chapter 8).

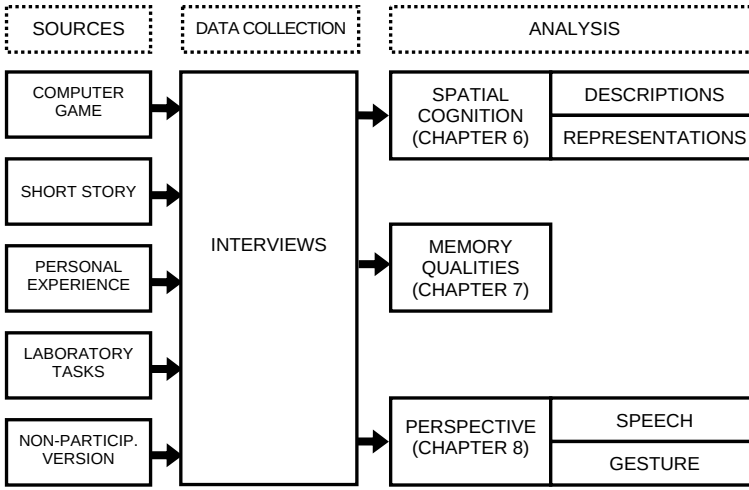

Figure 1.2. Overview of empirical studies in this book.

1.1.2.1 Spatial cognition (Chapter 6)

Spatial cognition, that is, how people acquire and use knowledge about the physical surroundings, was investigated in the first study (Chapter 6). Spatiality has been offered as a key feature of participatory stories (Murray, 1997). Studies of naturalistic reading (of non-participatory stories) have shown that readers do not spontaneously form representations[4] of the spatial layout of the story world in long-term memory (Zwaan & van Oostendorp, 1993; Hakala, 1999). Because of a navigational demand, unique to participatory stories, it was predicted that the audience form spatial mental representations in a way that readers of non-participatory stories do not. However, a notion of cognition as basically situated may deny the presence of such long-term memory representations and instead hold that people use cues in the current situation. The study investigated how people talked about space from a participatory story and what this tells us about their representations of space in long-term memory.

When analysing participants' verbal descriptions of spatiality from the participatory story, it was found that participants exclusively used a survey descriptive strategy (i.e., giving a description from above) using an extrinsic frame of reference (e.g., *north*, *south*). This was true for both the computer game and the non-participatory version. However, a marked difference was found regarding spatial mental representations. Participants who played the computer game revealed elaborate, relatively complete, accurate, and integrated representations of spatiality of the participatory story world in long-term memory. In contrast, participants who read the non-participatory version of the computer game provided little evidence to suggest that they formed spatial mental representations at all.

1.1.2.2 Memory qualities (Chapter 7)

Events that take place in a participatory story are fictional, but at the same time they occur as a consequence of the audience's actions. Are memories of events from participatory stories different from

[4] More is said on the issue of *representations* in Section 1.4 as well as in Chapter 6.

memories of real events?[5] Are memories of events from participatory stories more like events read about in a short story? In the second study (Chapter 7), differences between memories of events from the five sources are explored (see Figure 1.2) using the reality monitoring framework (Johnson & Raye, 1981; Johnson, Foley, Suengas, & Raye, 1988), which concerns memory qualities such as richness of perceptual, spatial and temporal details.

Results revealed no differences in reality monitoring memory qualities and were thus contrary to predictions from the reality monitoring framework. The proposed interpretation is that the reality monitoring framework is suited to explain differences between memories of events with external and internal origin, but not suited to explain differences between memories with varying degree of fictionality, as studied in this book.

1.1.2.3 Perspective on actions and events (Chapter 8)

Considering that the audience carries out actions in a participatory story, from what perspective are events and actions seen? Are events and actions seen from an 'outside' perspective, as if carried out by someone else, similar to events from a fictional short story? Or are events and actions seen from an 'inside' perspective, as if carried out by oneself in the real world? Theoretical studies of computer games suggest that the audience considers the agency in participatory stories as an extension of themselves (Wilhelmsson, 2001). Empirical studies have revealed that the audience often uses the pronoun 'I' when talking about agency in computer games (Johansson, 2000; Linderoth, 2004). In order to study perspective on actions and events, two separate analyses were carried out of the interviews: speech and gesture (Chapter 8).

The analysis of how perspective was revealed through *hand gestures* made by the participants while they were talking about events suggests that participants sometimes viewed themselves as being

[5] *Real* and *reality* are used in opposition to *fictional*—see Chapter 3 for a philosophical discussion and Chapter 7 for an empirically related discussion in relation to the reality monitoring framework.

outside the event, and sometimes as taking part inside the event. The analysis of perspective in *speech* offers the clearest picture of what perspectives were adopted when the participants were thinking and talking about events from the participatory story. Results from analyses of perspective as manifested in speech revealed two main groups. In the computer game, personal experience, and laboratory tasks, participants mainly used an inside perspective, but the common use of the indefinite pronoun *man* ('you'/'one'), especially when talking events and actions from the computer game, added distance to the perspective. In the other two conditions, participants mainly took an outside perspective. Thus, analysis of speech showed that participants adopted a perspective on actions and events of a participatory story that is similar to real, personally experienced events and not similar to fictional events read about in a short story.

There was a frequent perspective switching between 'I' and the indefinite pronoun *man* when participants talked about events from the computer game. The most frequent reason for switching from 'I' to *man* was to talk about events in the game that would happen to any player. In this way, the switch allowed the participants to be more general. The most common reason for switching in the other direction, from *man* to 'I', was to tell about specifics of what the participant did in the computer game. In this way, the use of 'I' expresses that what is being described from the game is something occurring because of an *action*—a conscious decision—on the part of the player.

The results of the empirical studies have consequences for the weak cognitive thesis. The weak cognitive thesis is substantiated by findings concerned with spatial cognition and perspective on memories of events and actions, but not by findings from phenomenal memory qualities. In other words, it is fruitful and enlightening to talk about differences in cognition in relation to spatial cognition and perspective on events and actions, but memory qualities is an area in which cognition does not seem to add to the account of participatory stories. However, it should be pointed out that no complete theory of the cognition involved when experi-

encing participatory stories is presented in this book. Rather, the empirical results of the book place constraints on what such a theory may look like.

1.1.3 Implications for theories of cognition

The investigations in the present book also have implications for theories of cognition not concerned specifically with participatory stories. Using participatory stories as a laboratory for studying the general human cognitive ability of imagination, conclusions can be compared against other theories of cognition, such as reality monitoring. Questions are also raised concerning the notion of 'self': Are actions carried out in a participatory story thought of as having happened to the self? If so, what is the difference, if any, between these memories and autobiographical memories? The phenomenon of participatory stories raises questions regarding the notion of the self in research on memory.

1.2 COGNITION

The object of study in this book is cognition. The view of the nature of cognition and mental events has shifted historically, so the assumptions on which the work in this book rests need to be discussed.

In this book, cognition is taken to mean the processing of information in the human mind.[6] Cognition is seen in contrast to *emotion* and *motivation*, which are assumed to be analytically separate

[6] Philosophically, this view is connected to *functionalism* (Block, 1980). However, the work in this book places few constraints on the concept of consciousness. As the concept is riddled with problems, it was considered wise to exclude it when it has no explanatory role. Thus, the book adheres particularly to *decompositional functionalism* and *computation-representation functionalism*, and not *metaphysical functionalism*. Further, the cognitive issues discussed in this book are mainly high-level issues. Thus, arguments and empirical findings are consistent with both *symbolic* and *connectionist* accounts of cognition, which are here regarded chiefly as a matter of low-level realisation.

phenomena. Cognition involves processes and mental representations which a person is aware of, as well as those of which a person is unaware. The former can usually be explicitly verbalised while the latter cannot—they emerge in behaviour (including non-conscious parts of language use). Both are included as objects of study in this book.

In this view, there is an assumption regarding generality of cognition. Although the content of cognitive processes and mental representations varies across individuals, the *form* and *functioning* of cognition are general and similar across individuals.[7] This assumption connects to the *nomothetic/ideographic disjunction* (Guba & Lincoln, 1994): What should be described: general laws or individuals' specific traits? The present work takes a nomothetic approach, in that it studies general processes, but allows for ideographic differences concerning the content of those processes.

A challenge to the view that cognition is information processing in the mind is the notion of situated/distributed cognition, as advanced by, for example, Hutchins (1995). The idea is that cognition does not primarily take part in the heads of people, but that cognition always involves the brain, body, and environment in which it is situated. The argument is that once this perspective is taken there is little need to postulate internal representations of the world. Why not adopt a situated-cognition view of participatory stories? In agreement with Hutchins (1995), an important assumption in the present book is that cognition ought to be studied 'in the wild', in the sense that what is of interest is cognition taking place in its natural context. But this does not necessarily lead to a view of cognition as fundamentally distributed. In some domains, natural cognition may still be non-distributed and internal. For instance, consider the case where a person is reading a fictional novel. Here, there is little of interest in terms of interaction with the environment. In

[7] However, there may be differences between specific groups, such as between novices and experts, and healthy versus pathological individuals. The factor of culture is not a concern in this book, and thus no assumptions regarding the universality of cognition need to be made.

fact, the things the novel is about are *not* present in the situation. A fictional story and its world are things in the head of the reader (see Chapter 3). Thus, it seems that a distributed perspective on cognition has little to offer to explain this phenomenon. Also, the thesis concerning the difference between participatory stories and non-participatory stories proposed in this book concerns internal, mental processes—and not behaviour such as physical actions—making an intra-mental perspective more suitable than a situated/distributed perspective (the argument is presented in Chapter 4).

Although what is studied in this book is a concrete, real situation, the approach is not applied research. The goal of the book is not to solve some specific, practical problem, but to obtain general knowledge about human cognition.

1.3 COGNITIVE SCIENCE AND INTERDISCIPLINARITY

Cognitive science, the interdisciplinary field of inquiry which started in the 1950s and received its separate status in the 1970s, has at its core the task of explaining cognition (Gardner, 1987). The present book joins this tradition, but not by adopting one key feature of cognitive science which is *computational modelling*. Rather, what makes the work in this book fall within cognitive science is, along the lines of Gardner (1987), its notion of a *philosophical focus*, the reliance on *mental representations*, *de-emphasis of emotion, history, and culture*, use of *empirical methods*, and adherence to *interdisciplinarity*. The four former features have already been taken up to some extent and what is left is a discussion of the interdisciplinary aspect of this book.

The view of cognition as information-processing and the notion of mental representations rest primarily on the framework of cognitive psychology. The cognitive phenomenon *comprehension*, as well as its more specific relative *narrative comprehension*, has traditionally been studied in cognitive psychology. Cognitive psychology provides the view that comprehension is cognitive processes operat-

ing on knowledge. In the book, the theoretical framework for participatory stories (Chapters 2–4) builds partly on results from cognitive psychology. Psychological methods were used in the analysis of memory qualities (Chapter 7), and to some extent the analysis of spatial mental representations (Chapter 6).

Besides psychology, much inspiration is taken from the area of linguistics. Linguistic methods and analyses were used in the present book as a means to get at cognition. Analysis of speech was done in order to get at people's spatial mental representations (Chapter 6) and to study what perspective people adopt on events from participatory stories (Chapter 8). Gesture research provided the framework for the analysis of perspective as revealed through gesture in Chapter 8.

The nature of fiction has been investigated for centuries in philosophy. Although sometimes highly speculative, philosophical theories of fiction can provide insight into and serve as a starting point for empirical studies of comprehension of fiction. In the present book, the theoretical framework (Chapters 2–4) and its constituent concepts are formulated partly using philosophical methods. But philosophy also permeates the empirical part of this book, in that the questions investigated concern philosophical questions about mind and reality.

In the area of artificial intelligence, there are implementations of systems for artificial, automatic comprehension of stories. These formalisations can give useful information on what a model of natural comprehension might look like. The present book does not however aim at formalising theory to the extent that it can be implemented computationally. The reason is mainly that too little is known about cognition of participatory stories, making explorative empirical studies more suitable.

In literary studies and narratology, the form and functioning of narrative is studied, mostly using humanistic methods. Literary studies and narratology provide theories of traditional narratives that help clarify how participatory stories can be characterised (Chapters 2–4). The work in present book also draws from earlier

discussions of the phenomena of participatory stories from literary studies, film studies, and media studies.

1.4 DELIMITATIONS

It can be very enlightening to state what something is *not*, so here follows a discussion of in what ways the work in this book was delimited.

This book is not concerned with *how* participatory stories *can* or *should be designed*. Thus, it has a *scientific* rather than an *artistic* perspective (see Mateas, 1997). Artistic and technological approaches often focus on the *future* and on the *potential* of participatory stories, while this book is concerned with the *present* forms of participatory stories. The reason for this is straightforward. In order to empirically study the use of actual participatory stories, they have to be available for use. The study is an empirical investigation, *descriptive* rather than *normative*. Consequently, there will be no elements of literary criticism, where one tries to find grounds for determining the value of cultural products.

This book does not contain discussions of what we learn from participatory stories, how they can help us in our lives, or what makes a good participatory story—what is studied is rather the cognition involved when understanding participatory stories and the outcomes of cognition in terms of mental representations.

Stories and symbols are not discussed from an ontological or semiotic perspective, but rather from a functionalist cognitive perspective.

Note that neither stories themselves (i.e., particular works, such as books or films) nor participatory stories themselves (such as computer games) are studied in this book, as is usually done (e.g., Buckles, 1985; Aarseth, 1997; Murray, 1997; Ryan, 1997; Wilhelmsson, 2001) (see Chapter 4 for an overview of research perspectives in the study of participatory stories). The study of media itself tells us little about cognition. In order to study cognition, we must obtain data about cognition, and that can only be produced by peo-

ple carrying out some cognitive activity, not by studying only the medium itself. The process of creating participatory stories is not studied. Rather than the production side, it is the *reception* side that is studied.

This book does not deal with issues of computer graphics, computer animation, speech technology, intelligent agents, interface technology, multi-modal interaction techniques, or other subjects primarily associated with the technology itself. Rather, in the discussions, it is disregarded to the extent possible whether the participatory stories are realised in text, images, or sound.

Questions are not investigated concerning biology, neurology, sociology, politics, or other areas which represent a different level from the primary study object, namely, cognition.

The emphasis is not on *how* people *use* participatory stories, but on how the *processing occurs* (Perfetti, 1996). The argument is that it does not matter for the present investigation whether they are used for education, entertainment, or something else. The application of participatory stories for educational purposes is not treated in this book. Indeed, the general question of the possible influence of fiction or participatory stories on cognition and behaviour is not discussed, regardless of whether this influence is considered detrimental (e.g., whether violent computer games increase violent behaviour) or beneficial (e.g., whether children can learn from computer games).

Finally, emotion and aesthetic experience are not considered in the present study. This is not because they are considered non-existent or unimportant in connection to the experience of either non-participatory or participatory stories. The reason is simply that they do not constitute a necessary part in order to account for the differences between non-participatory and participatory stories, as cognition does (see Chapter 4). Emotion and aesthetic experience are considered analytically separate from cognition and were neither discussed theoretically nor studied empirically in this book.

Part I

Theoretical framework

CHAPTER 2

Stories

STORIES ARE ubiquitous in human culture and history. Before the advent of writing systems, all human knowledge was passed on from generation to generation through oral stories, myths, and re-enactments or rituals and ceremonies. Also in writing cultures, knowledge and values are represented in stories, still through oral stories, but also in books, newspapers, film, television, and recently also through the computer and networks such as the Internet.

But what is a story? There have been theories about stories at least since 350 BC. In *Poetics* Aristotle (350 BC/1999) discussed the art forms of his time. However, he made no attempt to separate the abstract notion of story from specific art forms that in various way imitated life. Discussing comedy and tragedy in a mixture of a descriptive and a normative approach, he set out to define what a good plot is like. There should be unity—a beginning, middle, and an end—and the events in the plot should follow in probable or necessary sequence. At the beginning of the twentieth century, Propp (1928/1968) studied structures in Russian folktales, suggesting that they could be characterised by a limited set of basic functions. It is not until the middle of the twentieth century that the abstract concept of story (narrative) is described as present in various art forms and media. The most recent research area that studies stories is narratology. Narratology can be described as the study of the form and functioning of narrative, or narrative competence (that is, what knowledge a person must possess to be able to produce and understand narratives) (Prince, 1983). A common definition of narrative in narratology is that it is the *recounting of events by one or more*

narrators to one or more narratees (Prince, 1988). In narratology narrative is seen as transcending media, so that narrative can be present in books but also in other media, such as newspapers, television, and film. Up until the late twentieth century, stories have been seen mainly as an external phenomenon, existing out in the world, such as on the pages of a printed book. However, in parallel to the growth of the cognitive sciences, the notion of story as a mental phenomenon, existing in the minds of people, has started to spread.

Before continuing, there is a need to address some issues of terminology. The term *story* will be used throughout this book to refer to what is sometimes called story and sometimes called *narrative*. These terms usually refer to the same thing, but have backgrounds in different academic traditions. *Narrative* has been the preferred term in fields such as literary studies, cultural studies, and narratology. The term *story* has a background in research in psychology and artificial intelligence in the 1970s, such as research on *scripts* by Schank and Abelson (1977), and on *story grammars* (Mandler & Johnson, 1977). It should be pointed out that neither of these terms makes any assertions concerning the fictional status of events. Thus, there may be narratives and stories which are fictive and there may be narratives and stories that are non-fictive. Save a few special, theoretical meanings of *story*, there is no reason not to use it instead of *narrative*. *Story* is a simpler word which more easily connects to general understanding and is therefore preferred. Technical uses of *story* will be pointed out as needed.

Another issue is what to call the person or persons who experience a story, if one wants to use a general term for various kinds of media. Is it the *reader*, the *listener*, the *viewer*? When considering participatory stories, even more terms come up: Is it the *user*, the *interactor*, the *player*? The term *audience* is relatively neutral to these considerations, as well as to the number of persons who are involved. Keeping in mind that its passive connotations should be avoided, the term *audience* will be used as a general term to refer to a single person or several persons experiencing traditional as well as participatory stories.

2.1 A DEFINITION OF STORY AS A MENTAL ENTITY

The concept of story will here be given a definition in mental terms. It will be shown how a definition of story as a mental entity can handle some general problems pertaining to stories better than a definition as an external entity. A mental definition is also well suited to act as a building block when defining participatory stories, as will be seen in Chapter 4. The intention is not to examine how all the aspects of stories work, but rather to put forward a general, minimal account of the concept of story.

When theorising about stories, a basic assumption is that much is gained by being general and capturing what holds for *all* stories. The intention in this book is generality—the question of what makes one story different from another will not be pursued here.

Story is defined as follows:

A story is *a mental representation of at least two chronologically related events, including an actual or intended state change by an agent.*

Now let us look more closely at what the definition says.

2.1.1 A mental representation

A story is seen as a *mental representation*. This representation is constructed in a cognitive system (such as in the mind of a person). The mental representation can have both internal and external sources. The mental representation is constructed from any external stimuli together with cultural conventions of interpretation. The external stimuli are often constituted of smaller segments of static, external representations of events. The cultural conventions specify a way for the external stimuli to be perceived chronologically ('first this, then that'), or the stimuli inherently have a chronological order.

For instance, bunches of paper with characters written on them can serve as stimuli. These characters should be read according to specific cultural conventions: in Western cultures, left to right, top to bottom, starting at the top paper and then flipping the pages over

until the bottom one (certain things should be left out, such as publication details and page numbers). This is what we usually call a book. Note that the symbols on these papers could be read in *any* number of ways. There is no inherent chronology or natural linearity in a book. The use of a book is purely conventional. Another example is small drawings encompassed by squares, scattered across papers bound together in a bunch (this should be used with conventions similar to the earlier example)—these are comic books. One example of stimuli where the chronology is inherent is speech. Simply speaking about situations one after the other satisfies the chronological criteria, but listeners still need cultural conventions to turn this into a story. Films also have a physically determined chronology, but cultural conventions are necessary for what is shown on screen to make sense; that is, for it to be experienced as a story. For the native people of Australia, single paintings on rocks elicit stories, for instance, the telling of a hunting story. The paintings are interpreted according to cultural-specific rules, creating a story in the viewer's mind.

In psychology, complex mental representations called *schemas* and *scripts* have been proposed to account for knowledge in long-term memory. The concept of schema was introduced by Kant (1787/2004) to account for our general knowledge of the world. Bartlett (1932) used the schema concept when exploring how narrative comprehension relies on pre-existing background knowledge in his psychological studies of remembering. When Bartlett's English subjects retold an unfamiliar Native American folk tale, it was transformed according to their own cultural expectations. In the 1970s, *scripts* were proposed by Schank and Abelson (1977) as a kind of schemas that incorporate general knowledge about what typically constitutes common situations, such as the events, roles, and objects involved in eating at a restaurant. Scripts have been much used in studies of narrative comprehension, in that they explain how it is possible to understand both local situations in a narrative and a narrative as a global structure (Mandler & Johnson, 1977). Schemas and scripts consist of *general* knowledge, which help us understand the world by providing expectations for typically occurring items. In

contrast, story, as defined here, is a mental representation of a *specific* instance. Scripts provide the background knowledge needed when constructing a story.

2.1.2 Chronologically related events

A story is a mental representation of *events*. What is an event? Actually, the mental definition of story does not require an answer to this in an absolute ontological sense. The requirement is that the cognitive system represents events in some way. Zacks and Tversky (2001) base a psychological view of events on Quine's proposal to regard events ontologically as dynamic objects of bounded regions of space-time. Psychologically, events would be segments of time at a certain location that to an observer has a beginning and an end.

For a mental representation to be called a story, it needs to include at least two events. Intuitively, if we are dealing with a single event, we would call it an *event* rather than a story. We want a story to be a *sequence* of events, which means that there have to be at least two events. In order to have a sequence, we need to impose another restriction on the events; that they take place at different points in time and that the mental representation explicitly states which one comes before the other.

2.1.3 An agent

We could be content with this first part of the definition: *a story is a mental representation of at least two events related chronologically*. However, upon closer inspection, it allows for event sequences so simple and uninteresting that we would not want to call them stories. Consider the following case (assume it reflects someone's mental representation): 'A leaf blows in the wind. Then a leaf blows in the wind.' These are two events following each other. But the events are not related in any other way, and some further relation seems intuitively necessary for us to call it a story. It could be argued that a story needs the presence of at least one *agent*. An agent could be a person, but it need not be. Bruner (1990) claims that a story needs to include *people*, but it seems that an agent could also

be another animal, or even an inanimate object, as long as it is represented mentally as something that can perform actions. For instance, one could imagine a pedagogical story for children, where a natural force such as wind is given agenthood as it is described shaping the geographical landscape. However, it is not sufficient just to add an agent in order to have a story. An example building on our so-called story about blowing leaves above could be: 'A leaf blows in the wind. Then a leaf blows in the wind. William is a boy.' Although this so-called story contains an agent, there seem to be something missing. An additional requirement is that the agent must be related to the events.

2.1.4 An intended or actual state change

We may demand that the agent has some intention which involves one or both of the events. But this cannot be a requirement, because we would want to accept stories which do not include any intention. Consider this example: 'Zeki the Zombie lives in a grave during the day. During the nights he climbs out and aimlessly attacks people walking in the street. But one day he walked off a cliff and was washed out to sea.' This seems to be a story, although very short and somewhat strange. Moreover, it does not include any intentions. If we believe that Zeki is not conscious because zombies are not conscious,[8] and we believe that non-conscious entities do not have intentions, then the story does not contain intentions (the same case could be made with stories about robots, as long as we see them as not having intentions). Thus, intentions cannot be a necessary component of stories. However, if the story told about Zeki just standing still, doing nothing, we would not call it a proper story. If intention is missing, instead some sort of state change caused by actions seems necessary. So, a story could tell about Yuri, Zeki's brother, who is alive, pondering about how to rebuild his house. After the story has told us about these intentions in detail, we may learn that Yuri decided not to go ahead with his construc-

[8] Zeki is a zombie in the philosophical sense introduced by Kirk (1974).

tion work after all. Thus, no action was performed and no state change was made. In this case, the relation of the agent to the events is through the intention. What is considered an intention or a state change is up to the cognitive system. It need not correspond to conceptions of realistic or even possible phenomena in the world.

2.1.5 Minimal versus typical stories

It should be noted that the definition here gives a bare *minimum* of what it takes for something to be a story. Following the definition, we could end up with a story that is quite far from a *typical* story. A typical story would include many more events than two, and also usually several characters who act according to *goals* and *plans*. For example, the notion of *causality*—why things happen and why people do what they do—is completely missing from the present definition of story, but is usually incorporated to a high degree in understanding of typical stories. Of course, the issue of minimal versus typical accounts is a property of all definitions of real world phenomena. Thus, the problem of minimal versus typical accounts of stories is just as prevalent for non-mental definitions of stories.

2.1.6 The disappearance of the narrator

A noteworthy feature of the mental definition of story is that it does not give any specifics regarding the *narrator*. As is the case with Prince's (1988) definition of narrative above, the narrator has a central place in narratological definitions of narrative. The narrator may refer to the author, meaning the physical person who crafted the story, but can also mean the implied narrator whose voice is represented in the telling of the story. Does a story always have a physical person who authored it? Most of the time, but not always. Consider computer-generated randomly constructed stories (see Aarseth, 1997; Murray, 1997). In these cases, there simply is no author (in the sense of a person) and it seems meaningless to appoint

an implied narrator if we know that no such thing was put into the story.[9]

Instead, the author and the narrator are seen here as belonging to a different level from the story itself—the context of listening, reading, or watching a story. In the situation of experiencing a story, these elements may come into play, so that the construction of the story by the audience is altered by its assumptions about who the author and the narrator are.

2.2 DEFINITION OF STORY: MENTAL VERSUS EXTERNAL

Why not define story as something external, such as what is written in a book? This surely seems more intuitive and straightforward than the definition of story as a mental entity presented here. There are, however, several good reasons to have a mental definition.

First, with any external definition of stories comes the problem of demarcation. What is a story and what is not? Is the text in a book a story? One sentence from a book? What about a painting? A sculpture? Is any physical object a story? No matter how one defines story externally, one is always begging the question 'but what about *this*, is *this* a story?' A definition of story as a mental representation circumvents this difficulty, since it is not about physical objects. People can easily construct stories from seemingly non-narrative stimuli. There may be little to suggest a story from any physical traces in a medium. A story is created in the response of external objects only if there are cognitive mechanisms and cultural conventions together with which it can establish a mental representation of events (according to the definition given above), that is, a story.

[9] It cannot be argued in these cases that the *programmer* of the computer is the author. Although the programmer set up some general constraints on the form of the story, she does not know what the contents of the story will be. It seems equally meaningless to pick the *user* of the computer as author (when separate from the programmer), just because she initiated the execution of the program.

Second, a mental definition of story also allows for stories that are dreamed up in people's heads, existing only mentally. Before an author writes anything down, is it not possible for her to have thought up the story all in her head? The mental definition also allows fantasies to be stories. With a definition of story as something external, purely mental stories are not possible.

Third, a mental definition allows for the experience of *different* stories for different individuals in response to *the same* physical stimuli. In an external definition, there is the problem of establishing what the *true* story is (since it exists externally, it follows that it must have some fixed structure). With a mental definition, there is no need to postulate a *single and true* story. For instance, people read the same book but get a slightly different story out of it. The stories are different because the cultural conventions and each person's background knowledge vary. Yet the biological and cultural similarity of people has the result that the story, in most cases, ends up being roughly the same. If, on the other hand, story is seen as something external, it becomes difficult to account for individual interpretations of stories. After all, if there is *one and the same* story externally, why does everyone have different understandings of it?

Fourth, the mental definition also explains how *different media*—such as printed text, film, and speech—can convey (almost) the *same* story. The explanation is that a story can produce roughly the same mental representations, but through completely different physical structures. (This issue is further discussed in relation to participatory stories in Chapter 4 in Section 4.2.2.)

Fifth, the mental definition also explains how people can turn real life events they experienced into stories. With an external definition, we would need to say that every person's life story somehow exists out in the world, which seems odd. Rather, the mind imposes the narrative structure on events in the world, creating a story. Experiencing stories is a mode of thought, natural to the human mind (in this respect, the work in the present book is in accordance with Bruner, 1990).

One could argue that the mental definition of story is inappropriate because it does not match the general layman's understanding

of story as an external object. After all, our talk of stories most often implies that stories *exist* inside books, movies, etc. However, differences between everyday understandings and scientific definitions abound in science. Consider the physical definitions of time and space—hardly in accord with people's everyday understandings. The whole point of re-defining concepts scientifically is to show that it is possible to attach a better, more precise meaning to the term. So, the issue of scientific definitions different from everyday usage need not concern us, as long as the concepts bear fruit theoretically.

One reason why scholars have stayed away from a mental definition of story may be because it is thought, specifically by scholars from outside the cognitive sciences, to be difficult to approach methodologically. The argument goes: An external object is easier to study than something inside people's heads, because we can see and study a book or a movie, but we cannot look inside people's heads. However, there are two faults with this objection. First, 'looking into people's heads' is exactly what is the central theme of cognitive science, the study of what goes on inside the mind, and there are a variety of successful methods to choose from. This is not an impediment to a mental definition of stories. Second, external definitions of story are not secure and objective anyway. Our perception of any external object involves our cognitive processes, and we have conscious access only to a small number of these processes. It is vain to believe that one has access to some objective version of a story just because the stimulus is a physical object such as a book.

Another reason why a purely internal conception of stories may be resisted is that stories are argued to be social constructions. One line of argument is to say that stories are created in the act of storytelling. The meaning of the story may even become something other than what the narrator intended. However, that a story changes as it is told, perhaps as a result of the social context, is something that is handled well by the mental definition given here. For example, an audience listening to a narrator constructs its own internal story from the physical stimuli in an act of comprehension which includes background knowledge, partly consisting of social

and cultural factors. Even though the narrator starts with a story as a mental representation, this representation is itself reshaped by the act of telling. Selection and elaboration change the original memory, so that the story may become different from what it was, even for the original narrator.

Finally, an attractive quality of a mental definition of story is that it is suited for the study of participatory stories. The reason is that it explains how people can experience stories from seemingly shattered stimuli, such as the textual fragments of hypertexts or adventure games (further discussed in Chapter 4). In these cases, it is often difficult to find any coherent physical object that is the story. Stimuli with little narrative structure can still result in a well-formed story in the perceiver's mind (see Douglas, 1992, for empirical studies), maybe even fulfilling Aristotle's requirements of unity.

CHAPTER 3

Fiction

An aspect of stories not discussed in the preceding chapter is the notion of fictionality. The definition of story as a mental entity is neutral with respect to fictionality (as are indeed many external definitions). That is, a story could be fictional as well as nonfictional. (*Fiction* is not used in this book to denote a type of literature, but is used in its philosophical and cognitive sense—which will be developed below.) To further pin down the concept of participatory stories, the role of fiction needs to be clarified. This is important because people who experience participatory stories treat them as something that is not real. Participatory stories are fictional.

Fiction is generally held to be a contrast to reality. If something is fictional, it does not exist in the real world. Philosophers have been interested in giving ontological accounts of the nature of fiction. The basic philosophical problem is to explain what kind of things fictional objects are, and how it is possible to talk and think about them if one claims that they do not exist (e.g., Castañeda, 1989; Van Inwagen, 1977; Parsons, 1980).

Some (post-modern) researchers deny that there is a distinction between fiction and reality. For instance, Sørensen (1998), in addressing the question of whether computer games are real or fictional, states that the concept of fiction is a product of modernity and that it is illusionary. The ontological status of fiction aside, doing away with the distinction between fiction and reality in people's *understanding* of the world is clearly a mistake, because if this was true, it would lead to considerable behavioural effects in people. If people thought that a murder actually took place while watching a

thriller movie, or that they themselves actually killed someone while playing a computer game, they would indeed behave very differently from what can now be observed. The distinction between fiction and reality is a crucial element in how people comprehend the world.

The notion of fiction used in this book tries to avoid the philosophical issues and instead focuses on this functional role of fiction.

3.1 A DEFINITION OF FICTION AS COGNITION

Let us look at the definition of *fiction* for the purposes of this book:

The content of a mental representation R *is fiction to a cognitive system* C *if and only if* C *believes that* R *should not be evaluated in relation to the real world.*

A cognitive system is usually a person (but the definition is open for other entities, such as computer systems). That something *should not be evaluated* here means slightly different things depending on the content of the mental representation. If it is an *object* or an *event* (an event can be considered a type of object, as discussed in Section 2.1.2), the cognitive system attributes non-existence in the real world, that is, the object does not exist or the event did not occur. If it is a *proposition*, such as 'The tooth fairy works at a bank', the cognitive system does not attempt to determine the truth value in relation to the real world.[10]

Thus, *fiction* here does not have the usual ontological meaning. In other words, no attempt is made to define what the nature of fiction is. Instead, a relativistic notion of fiction is taken, establishing it as a binary predicate involving a cognitive agent and some mental content. This definition of fiction is similar to that of Rapaport and Shapiro (1995) who call it an *ontological epistemological notion of*

[10] Although this example also has several interpretations which have truth value in the real world, the intended interpretation is that it is about an imaginary character.

fiction to point out that what is concerned is a cognitive agent's understanding of fiction, not *fiction* as an absolute ontological concept. The same view is adopted by Chafe (1994), studying people's telling of stories. Making this move avoids much of the difficult ontological discussion about fictionality.

Fictionality is defined as a mode of thought. Something can be considered fictional or not, and the claim is that people know how to do this spontaneously. What is considered fictional or not is determined by pragmatic rules of usage. For instance, the covers of fiction books look systematically different from non-fiction books. Documentaries present content differently from drama. There are also linguistic clues to what should be interpreted as fiction, such as 'Once upon a time...' or 'Let me tell you a story...' in oral storytelling. Clues such as these and many more aid people to interpret something as fiction or non-fiction. Of course, the division can be blurred so that it is hard to determine if something is fiction or not. And of course, people do sometimes make mistakes, for example, so that they interpret something as non-fiction when it was intended to be fiction (e.g., the 1938 radio broadcast of *War of the worlds* which made people believe that Martians actually were invading Earth (Bartholomew, 1998)). Still, this is the exception rather than the usual case. The context usually leads people to the intended interpretation. Regardless of occasional misjudgements, there are mechanisms in the human cognitive system which work to keep reality and fiction apart.

Now it is possible again to raise ontological questions. But this time, the questions are about the *ability to experience fiction*, rather than questions about fiction itself. The issue can be approached from several viewpoints. From a Darwinist evolutionary perspective, one could ask: How did the ability to experience fiction evolve? Why did it evolve? When in the prehistory of humans did it evolve? Are humans the only animal with this ability? And from a developmental perspective, one could ask when the ability to separate fiction from reality develops in the child. Considering a neurological perspective, one could ask: Are there special neural mechanisms or brain regions which maintain the separation of fiction

from reality? From a pathological perspective, are there disorders where we lose this ability (schizophrenia appears to be one)? Even though these are highly interesting questions to ask, they will not be addressed in this book. Instead, the ability to experience fiction will be viewed from a functional perspective, which is more relevant with regard to the questions asked in this book. What does it do? How does it affect behaviour? How is the phenomenon of narrative understanding affected by the fact that the understander treats some information as fictional? What would happen if the distinction between fiction and non-fiction were not made?

3.2 SOME OBSERVATIONS ON THE COGNITION OF FICTION

A number of observations regarding the cognitive processing of fiction will now be introduced. These observations will subsequently be used as points to consider when discussing theories of the cognition of fiction. It is argued that any successful theory of cognition of fiction should be able to explain these observations. The first observation is that there is a transfer of background knowledge to the understanding of fiction. The second observation concerns the opposite: transfer of fictional information to background knowledge. The third observation is that there are not necessarily any perceptual or sensorimotor differences between fictional and real events and actions. Finally, the fourth observation is that the distinction between fiction and reality can sometimes be weakened in memory.

3.2.1 Transfer of background knowledge to understanding of fiction

In the understanding of fiction, people need to use existing background knowledge, including knowledge about cultural, social, and physical matters. For instance, a unicorn can be imagined given knowledge about horses and horns. However, it is not only exotic

cases of fiction where the audience needs to provide background knowledge. It comes into every part of understanding fiction. Basic things, such as that 'Sherlock Holmes is a human', demand general knowledge about what it means to be human. However, the problem is not to use *any* background knowledge, because then we would hastily conclude that the statement 'Sherlock Holmes is a human' is false, since there is no such thing as Sherlock Holmes in the real world (Rapaport & Shapiro, 1995).

3.2.2 Transfer of fictional information to background knowledge

A second observation is that the influence of information also may be in the direction *from* fictional information *to* general background knowledge about the world. For instance, clearly, things about medieval France can be learnt by reading a novel about medieval France, even though the novel is purely fictional. Real-world beliefs can be influenced by exposure to fiction (Prentice & Gerrig, 1999). However, as discussed above, the distinction between fiction and reality is still upheld at a general, conscious level. They are not treated equally. The question then is: When and how does fictional information enter background knowledge?

3.2.3 The absence of perceptual differences

A third observation concerns the conditions of making an attribution of something as fictional or real. The observation is that there need not be any perceptual or sensorimotorical differences between fictional and real events and actions.

Let us consider how fiction functions when an audience sees a play on stage. When someone is murdered in the story, the audience should recognise it as a murder. If they did not, they would not be able to understand what was going on in the story. But they should not believe that a murder *really* happened and rush out and call the police. Note that the physical stimuli, that is, the action on stage, might be perceptually *indistinguishable* from the real thing (a glis-

tening knife, fake blood, etc.). (What matters here is what is *perceived*, not what happens in any objective sense.) Fiction plays an important role, not only in perception, but in action as well. Let us consider an example of a video game arcade where there is a video game incorporating a gun. The game is played by firing the gun at characters on a video screen. The gun looks and feels very much like a real gun, and is handled in the same way. Now, not only is the performed action on a conceptual level identical to the real world ('shooting someone with a gun'), but the action is also *sensorimotorically* identical. The sensorimotor activity of holding the fake gun is identical to holding a real gun. The only thing that keeps the player from believing that she actually is shooting real people is a *belief* that it is not real, but fictional. One could give other examples with even more sensorimotor and physical similarities to the real world, such as when children are engaging in pretence play, or when participants are involved in a live role-playing game. In the same way as in the example with the murder on stage, these are cases where no perceptually noticeable physical differences exist[11].

3.2.4 Blurring the distinction between fiction and non-fiction in memory

People are generally good at remembering at a later stage which events and actions were fictional and which ones were non-fictional. For instance, in the play example they remember that the murder was fictional but that, say, the announcement of a pause was real. In the video gun example, they remember that they did not actually kill anybody, but they remember if they earned a position on the list of high scores.

Sometimes, however, the distinction between fiction and non-fiction can be obscured, especially as time passes between the event

[11] Whether a situation presents something fictive or real often leads to different objective *consequences*—such as that you are arrested for a real murder but not for a fictive one—but consequences cannot play a key role since they are not known at the time when the events are experienced.

and when it is later remembered. People may in some cases mistakenly believe that a fictional event was real. The distinction between fictional and real events is fallible.

3.3 THE COGNITION OF FICTIONALITY

It follows from the above discussion that there must be *some* difference represented in memory that allow people to separate fiction from reality. How is fictional information represented in the cognitive system? As the final part of this chapter, this question will be addressed by first looking at how the distinction may be approached conceptually. Then, candidates for a theory of the cognition of fiction will be discussed.

3.3.1 Possibilities for cognition of fictionality

There are several logically possible explanations for how people are able to remember which events were fictional and which events were non-fictional. Consider the following alternatives:

(i) It could be that the contents of the events themselves reveal whether they are fictional or not (e.g., fictional content is unrealistic or otherwise unique), such as unicorns, monsters, and mountains of gold.

(ii) With the mental representation of each event stored in memory there could be some kind of *marker* which flags the event as fictional or real.

(iii) A similar position to the one above is that there may be an *association* from the memory of the event to its *source*, for instance the memory of a certain car chase could have a link to a memory of a certain action movie.

(iv) The events are mentally represented in memory in conjunction with the *context* (e.g., time, space, sensorial) in which they occurred, which lets a person *deduce* at the time of recall

whether the event occurred in a typical fictional context (as when sitting in a theatre or while reading a book). This position would allow the highest number of errors separating reality from fiction, since there may sometimes be limited contextual information available, which could lead to a misjudgement.

(v) A combination of some or all of the above.

These possible explanations will be used in the following overview of theories of the cognition of fiction, and some associated cognitive theories. In surveying the literature, it is clear that the topic of fiction has received very little attention within cognitive psychology and cognitive science in general. For instance, all empirical studies that were found were dated 1989 or later, even though many other aspects of cognition have been studied extensively since the 1950s. The reason for this situation can only be speculated about. Possibly, cognition which concerns the organism's relation to the real world (such as perceiving, remembering, and reasoning about the world) has had precedence in research. Perhaps fiction has been considered to be merely recreational, play, something not useful. Perhaps the topic has been avoided because of its philosophical difficulties.

The following discussion of cognitive theories will involve reality monitoring, compartmentalisation, pretence, and computational modelling of the understanding of fiction.

3.3.2 Reality monitoring

A theory which addresses a phenomenon similar to fiction is *reality monitoring* (Johnson & Raye, 1981). The theory explains how the cognitive system works when separating memories of events that actually happened from events that were merely imagined. According to the theory, there are several types of processes at work, at both an unconscious and a conscious level. In part, the content of the memory influences the decision (which corresponds to position 1 in the list above). Mainly, there are processes which evaluate the context, in terms of the presence of spatial, temporal, perceptual,

emotional, and other details in the memory. Memories with a higher degree of contextual details are more likely to be attributed to a real event, and memories with a higher degree of mental operations, for example, thinking and reasoning, are more likely to be classified as an imagined event.

The theory does not address the question of fiction directly, but if a parallel is made between fiction and imagined events, it becomes a theory about how people can separate memories of fiction from memories of reality. It can be seen that the reality monitoring theory adheres to position 4 in the list presented of possible explanations of the cognition of fiction. Returning to the four observations discussed, the reality monitoring theory is well equipped to handle Observations Two and Four, since the reality monitoring processes work heuristically; some memories may be misclassified as real when they were actually fictional. The theory is neutral in relation to Observation One. However, the theory has problems accounting for Observation Three (the absence of perceptual differences). For a priori reasons, such as the video game gun and the live-role playing examples above, the theory does not seem to capture the cognitive aspects of fictionality. In general, the temporal, spatial, and perceptual context need not differ between the fictional and the real cases, which is central in the theory of how actual and imagined events are separated in memory. The application of reality monitoring theory to cognition of participatory stories is empirically explored in Chapter 7, where qualities of memories from participatory stories are investigated.

3.3.3 Experimental studies of compartmentalisation

Potts, St. John, and Kirson (1989) specifically studied representation of fictional information. They used Anderson's ACT* semantic network theory (although they stress that their discussion holds for any memory model), which in part consists of concepts nodes with associative links between nodes. According to Potts et al., fictional information is stored through *compartmentalisation*, which means that it is stored separate from, not linked to, general world knowl-

edge and instead has links to the fictional story source. Thus, the position proposed by Potts et al. corresponds to number 3 in the list of possible explanations above. Interpreting the theory literally, it cannot account for Observations One, Two, or Four. It is neutral with respect to Observation Three.

Marsh, Meade, and Roediger (2003), building on the work of Potts et al., investigated three hypotheses about the representation of fictional information using a series of experiments: (i) Fictional information is completely *integrated* into the person's world knowledge, or (ii) it is completely *compartmentalised*, or (iii) fictional information is represented according to a *hybrid* model, where fictional information is associated with *both* world knowledge and its fictional source. Marsh et al. also subscribe to position 3 in the list of possible explanations above. Evidence was found for the hybrid position. Marsh et al.'s theory allows all four observations (it is neutral with respect to Observation Three), but does not explain any of them.

There are some features of the method used that makes generalisation to authentic contexts difficult. Marsh et al., like Potts et al., used artificial texts and did not study reading for pleasure. Because of the experimental design, the participants most probably anticipated subsequent memory tests, which would affect how they monitor their reading and how much time is spent on rehearsal. This could potentially make the situation very different from a situation where they read for pleasure. Generalising to more authentic reading situations should be done very carefully. Another remaining problem is that despite clear experimental results, it is not known *why* associations are sometimes formed more strongly to world knowledge and sometimes more strongly to the fictional source. Also, very little is known about details of the actual representations (Marsh et al., 2003).

3.3.4 A cognitive theory of pretence

On a slightly different but related issue, Nichols and Stich (2000) proposed a theory of how beliefs are represented mentally when a

person engages in *pretence*. Pretence means acting as if something exists (which does not exist), or that an object is something other than what is actually is, such as that a banana is a telephone. Although pretence and fiction may appear to be two different things, they are closely related. A fiction is something that does not exist in the real world, but in the mind, such as 'this banana is a telephone', or 'there exists a world in which I am king'. This is exactly what pretence is. Nichols and Stich's theory is presented at a rather coarse level of detail and they simply assume that, in the cognitive system, there is a 'pretence box', just as there are 'belief' and 'desire' boxes, in which propositions can be put. Thus, they hold position 2 from the list above. A problem in this approach is that if the cognitive system generates inferences from beliefs in both the pretence box and the belief box, contradictions and false conclusions easily arise. For instance, although we pretend that a banana is a telephone, we should not make the inference that the banana could be used to call an ambulance in a real emergency. The possible contradictions that could arise when inferences are drawn from both the 'real world' and the 'pretence world' (such as 'this banana is a telephone') are handled in the theory by a filtering mechanism, which is not further specified. Nichols and Stich (2000) confess that very little is known about *how* inferences are filtered, but they note that there is empirical evidence *that* it works. Thus, Observations One, Two, and Four are acknowledged, but not explained, by the theory. It is neutral regarding Observation Three.

3.3.5 A computational model of understanding of fiction

There has been at least one preliminary proposal that goes into the details of representations and inferences of fictional information. Rapaport and Shapiro (1995) implemented a computational model of a story-understanding agent, Cassie, based on the SNePS semantic network belief representational and reasoning system. The agent read a fictional story and could use world knowledge in understanding the fictional content, and the fictional content could in some

cases become integrated with world knowledge. As a fictional story is read, Cassie sets up a story space by linking the contents of the story to a story operator. The story space is formally equivalent to Cassie's other belief spaces, such as representing 'Mary believes that John is a boy'. Two rules are used to control migration of facts and inferences inside and outside the story context. Related to Observation One is that propositions from outside the story context are assumed to hold when necessary for understanding the story and could be withdrawn at a later stage according to Cassie's belief revision system. Similarly, related to Observation Two, is that propositions from within the story are assumed to hold outside the story context when necessary for understanding the real world, and these propositions can in the same way be withdrawn at a later stage. One way of seeing it is that Rapaport and Shapiro (1995) add detail to what Nichols and Stich (2000) call the filtering mechanism. However, Rapaport and Shapiro note that their work is preliminary and needs further implementation. The theory is consistent with Observation Three. Although the theory does not address Observation Four, it does provide a mechanism which allows the distinction between fictional and real events to change.

In summary, the cognitive process of comprehending fiction is not well understood. Out of research on reality monitoring, pretence, and representation of fictional information in memory, the most promising attempt appears to be the computational approach of Rapaport and Shapiro (1995) which represents a story in a story context by linking the story facts to a story operator and gives some suggestions as to how information can both come from world background knowledge into story understanding, and transfer from stories to world knowledge. However, as can be seen from their approach, people's performance of handling fiction presents a complex computational problem.[12]

[12] Advances in the understanding of the cognition of fiction may take time—neither Nichols and Stich (personal communication, April 6, 2000) nor Rapaport and

Giving an account of fiction is important because people treat participatory stories as fictive. Instead of providing an ontological characterisation of fiction, the concept was approached here as something considered by a cognitive system as not relating to the real world. Distinguishing fiction from reality is by no means an immaculate process, but it works most of the time, as people's behaviour shows. Compared to traditional stories, fiction takes on additional importance when participatory stories are considered, because these not only *represent* but also invite to *action* in a fictional world. With cognitive notions of stories and fiction, the foundation has been laid for a cognitive approach to participatory stories—the focus of the next chapter.

Shapiro (personal communication, February 19, 2003) plan to continue their research on these issues.

CHAPTER 4

Participatory stories

STORIES THAT can in some way be altered by the one experiencing them are not a new phenomenon. A parent telling a child an invented bedtime story might receive input from the child about what is to happen as the story unfolds. Another example is that even very young children spontaneously engage in pretence play, by themselves and with other children. Since the 1970s, people have enjoyed role-playing board games (e.g., *Dungeons and dragons*, and many others that followed in its path). In a board role-playing game a story unfolds as a result of a so-called dungeon master, a person who keeps track of the story, and the players, who portray characters in the story. There are also other role-playing games, called *live role-playing*, where the participants act out and influence a story together, in real surroundings, such as a forest, often during extended periods of time such as for several days. These are all examples of stories being influenced by the ones experiencing them, which do not presuppose advanced technology. It is more recently, however, that participatory stories have spread to a wider audience, namely, with the introduction of the personal computer. The computer is at the heart of what is sometimes called interactive media. In the early 1980s, a form of computerised purely textual interactive narrative fiction known as *adventure games* was a commercial success. Adventure games build on the non-computerised role-playing games, with the difference that they involve a single player. These were eventually replaced on the market by graphical adventure

games in the late 1980s.[13] As graphics and audio technology developed, multimedia programs that combined stories and sound, image, and text became available. A way of organising information called *hypertext* was also promoted by the spread of the personal computer. Originally a way to structure information by tying together pieces of information with associative links, hypertext can be used to tell stories where the audience controls the order in which textual fragments are read. The accessibility of digital sources increases rapidly as the Internet continues to grow. On the Internet, stories are created by the actions of the participants in *MUDs* (multi-user dungeons), which are text-based multi-player fictive environments, and their graphical counterparts. There are also various applications of *virtual reality* that incorporate stories, both on the Internet and elsewhere. Participatory stories have also been used for various applications, for example, in education and as an evaluative tool in job application situations to obtain psychological profiles of the applicants. There are attempts to merge the television with the personal computer to produce a new medium for entertainment for the general public, which then holds the possibility for stories that the audience is able to influence.

This brief historical overview has introduced examples of stories which allow some kind of influence on the part of the audience. In this chapter, the concept of participatory stories will be considered in some detail. The two preceding chapters gave definitions of stories and fiction as cognitive phenomena. This is the foundation on which the concept of participatory stories is built. First comes an overview of how the phenomenon of participatory stories has been studied by researchers in various fields. Next, four fundamental questions for a theory of participatory stories will be addressed—a discussion that will conclude with a full definition of the concept of participatory stories: (i) the question of demarcation of participa-

[13] However, the creation and playing of textual games—referred to as *interactive fiction*—have not stopped with the advance of graphical adventure games, but have been and still are being created continuously. See, e.g., the *Interactive fiction archive* at http://www.ifarchive.org/.

tory stories from other kinds of stories; (ii) the role of fidelity and multimodality in participatory stories; (iii) the question of what it means to participate in a story; and (iv) in what sense participatory stories are fictional.

A note on terminology is in order. Since the term *participatory stories* is introduced here, it is not used by the other approaches discussed. Other approaches use other terms and often even use slightly different underlying concepts when discussing stories that can be influenced by the audience. Nevertheless, the term *participatory stories* will be used to talk about how various approaches handle the phenomenon.

4.1 THE STUDY OF PARTICIPATORY STORIES

Starting in the 1980s, researchers from many different areas have investigated stories in interactive media, from very different viewpoints. Few other phenomena display such a variety in how they are studied regarding goals, objects of study, and methods. Just glancing at the research literature, it may not be obvious that this is the case. It is most often the case that researchers do not state their goals, objects of study, and methods explicitly, which might lead to a view of the collective efforts as falsely homogeneous. For instance, the goal, the object of study, and the methods are all different in a cognitive perspective compared to a technological perspective, although both use 'interactive fiction' or 'interactive narrative' as keywords when describing their research.

One possible way of grouping earlier approaches will now be presented, divided into *technological*, *artistic*, *literary theoretical*, *social*, *psychological*, *pedagogical*, and *cognitive* perspectives. The purpose is to present the different perspectives held and to show how they are different, rather than to give an exhaustive survey of the area. Some researchers are mentioned to serve as examples of the perspectives. Often, researchers combine more than one perspective

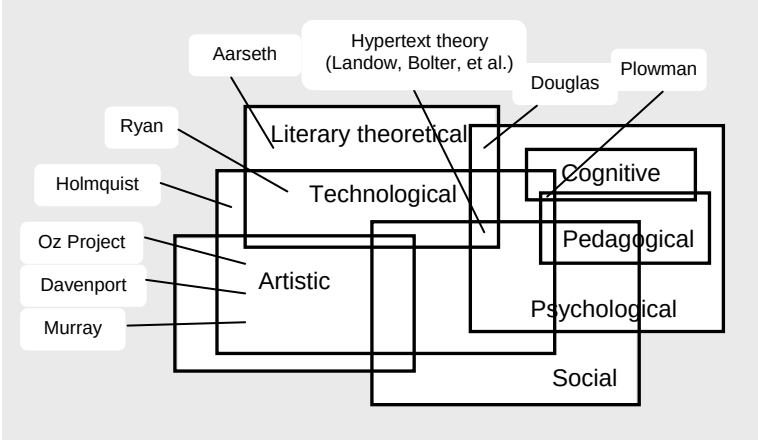

Figure 4.1. Perspectives on stories in interactive media. A possible grouping of approaches showing the most prominent overlaps. Selected researchers associated with the perspectives are also shown.

in their research. The purpose of this exercise is to specify the location of the approach taken in the present book among other approaches that have been made, and to see in what ways it is different. The various perspectives not adopted in this book will be presented briefly, followed by a more in-depth look at how a cognitive perspective differs and what has been done using this perspective. In Figure 4.1, the perspectives are presented graphically as sets, with some researchers working within them.

4.1.1 Research perspectives

Within a *technological perspective*, people design and develop technology, systems, architectures, and computer programs for stories in interactive media. The goal is to implement actual systems as well as to find general principles (e.g., Holmquist, 1997). Disciplines involved are mainly computer science, systems science, and engineering. In interaction design, a technological perspective is combined

with an artistic perspective. Researchers within the area of human-computer interaction are concerned with adapting the systems to human thinking, so that they become easy to use (e.g., Shneiderman, Kreitzberg, & Berk, 1991). Even if areas such as psychology are involved in such studies, the goal is still to develop systems or principles for developing systems, and therefore it is a technological perspective. The technological perspective is one of the dominant perspectives on stories in interactive media, probably because the computer is the medium, and computers have traditionally been studied within these disciplines.

Stories in interactive media can be investigated or produced as an art form, with the goal being either to learn their possibilities for artistic expression, or to produce an aesthetic experience in itself. This *artistic perspective* is often combined with a technological perspective. When it comes to theorising about using the computer to support such stories, an early approach is Laurel's (1991) book *Computers as theater*, in which she sketches an 'Interactive fantasy system' where the drama is affected in interaction with a user. The Oz Project at Carnegie Mellon University (Mateas, 1997) generated both theories and actual systems, mostly text-based, about what they call 'interactive fiction'. Other approaches in an artistic and technological perspective are the Interactive Cinema Group at MIT (Davenport & Murtaugh, 1997), and Janet Murray's (1997) research, presented in the book *Hamlet on the holodeck: the future of narrative in cyberspace*.

In a *literary theoretical perspective*, theories of literature (and, sometimes, cinema) are applied to narratives in interactive media, where questions are asked such as: Are they literature, and if so, what kind of literature? The main goal in the literary theoretical perspective is to give a systematic account of these narratives (e.g., Espen Aarseth's, 1997, book *Cybertext*). Within hypertext theory, literary theory is combined with artistic, technological, and (often speculative) psychological perspectives, often with political goals (e.g., Landow, 1997), or discussion of new aesthetic values (Moulthrop, 1991). Ryan (1997) combines literary theory with a technological perspective while discussing possible architectures for

stories in interactive media. The adventure game was studied early from a literary perspective by Buckles (1985) and Sloane (1991).

The relationship between stories in interactive media and society is the focus in a *social perspective*. Topics considered are, for instance, effects on politics (e.g., Landow, 1997), gender issues (e.g., Cassell & Jenkins, 1998), identity (e.g., Turkle, 1995), and mass media consumption (e.g., Whitaker, 2001). The disciplines involved are mainly sociology and cultural studies. The goal is to account for, and often to provoke change of, social structures in society.

From a *psychological perspective*, stories in interactive media can be studied concerning, for instance, what emotional effects they have and how their rhetoric works. The goal is to formulate general theories of reactions to narratives in interactive media. Two subordinate perspectives within a psychological perspective where research has been carried out are *pedagogical* and *cognitive perspectives*. A large study area is the educational use of interactive media, such as hypertext and interactive multimedia. The goal in a *pedagogical perspective* is to ascertain whether and how these new narratives improve learning, and to produce systems or guidelines for developing systems for learning (e.g., Plowman, 1996a).

After this sketchy overview of perspectives, the cognitive perspective will be considered in more detail.

4.1.2 A cognitive perspective

Within a *cognitive perspective*, it is the thinking that is studied. The disciplines involved are cognitive science (see Gardner, 1987, and also the discussion in Chapter 1) and discourse psychology (see Graesser, Swamer, & Hu, 1997 for discourse psychology of traditional stories). The goal is to give a general account of the thinking processes used in comprehension of stories in interactive media, for example, what kind of inferences are drawn by persons during comprehension, or how mental models may differ from traditional stories (e.g., Foltz, 1996). (Note that the cognitive perspective is not a *usability perspective*; the latter has as a goal to produce or improve

systems, while the former aims at formulating general theories of human cognition.)

4.1.2.1 A cognitive perspective compared to other perspectives

Let us first look at why a cognitive perspective presents a different approach from the other perspectives. A cognitive perspective differs from other perspectives in several ways, regarding research goal, study object, and methods. The goal differs from technological, artistic, and pedagogical perspectives in that there is an attempt to model a natural phenomenon, namely, comprehension. A cognitive perspective is not a technological perspective. Both perspectives rely on the understanding of the nature of stories in interactive media, but there the similarities end. In a technological perspective, one's models are not models of anything—they are simply built to be applied (to solve some problem or to entertain an audience). In a cognitive perspective, on the other hand, one's models are models of the comprehension as a natural phenomenon. Not only the goals, but also the object of study and methods are different in these two perspectives. The literary theoretical as well as the social perspective are both different from a cognitive perspective in that they do not share its object of study. The primary object of literary theory is literature or the text, while sociology studies the behaviour of groups. In contrast, the study object in a cognitive perspective is the process of comprehension on an individual level, that is, the thinking. In a cognitive perspective, there are no attempts to develop systems. Just as cognitive psychologists studying text comprehension are not novelists, research into interactive story comprehension is not about authoring participatory stories.

Concerning method, the cognitive perspective differs from most other perspectives in that it is about theory and model building, which are evaluated empirically, typically using experimental methods. Finally it is concerned mostly with basic science, in contrast with technological and pedagogical perspectives, which typically are applied sciences. It can be argued that the cognitive perspective sketched here is better than most other perspectives for methodological reasons, because it satisfies general criteria of a scientific ap-

proach better than the other approaches discussed. Describing the phenomenon of participatory stories is something a cognitive perspective shares with most other perspectives, but by including causal mechanisms, a cognitive model can provide explanation for *why* things happen. This is a feature lacking in most other perspectives, such as exploring the artistic potential of participatory stories, or collecting rules of thumb for how to build computer systems that support participatory stories. By explicitly stating elements of a model, it can be checked so that it does not contain contradictions, and that it is reasonably complete. Models in other perspectives, if they are formulated at all, rarely share these features. Unlike many other perspectives, cognitive theory involves the principle of falsifiability and can be evaluated by checking it for correspondence with empirical findings.

4.1.2.2 Earlier research in a cognitive perspective

There have been very few studies of comprehension of stories in interactive media. Douglas (1992) studied how lack of coherence in stories affects the audience. Her main results are that people strive for and see coherence even when someone has tried to remove all coherence in a narrative (for instance, by cutting out and *randomly* assembling all sentences in a story text). Although the study concerned printed stories, she particularly discusses the implication for hypertext stories. (This is another support for the mental definition of story given in Chapter 2.) Plowman (1998) studied cognition and learning in educational stories in interactive media. Her work aims at producing design guidelines for development of educational multimedia (such as that video sequences are a way of increasing narrative coherence; Plowman, 1996a), and accounting for what she calls *multimedia literacy* (which mostly concerns issues of usability of the user interface; Plowman, 1996b). She does not give a general explanation of comprehension of narrative in interactive media. Risden (1997) applied a theory from the study of traditional story understanding, called Causal Network Theory, in a small-scale explorative study using a hypertext story. The study, although too small

to provide a basis for any real conclusions, indicated that people use similar causal reasoning in hypertext stories as in traditional stories.

On the other hand, in a cognitive perspective on *traditional* stories, comprehension has been extensively investigated in the psychological study of the reading process. There is a lot of knowledge about what happens at a detailed level when a person experiences a traditional story (e.g., Kintsch, 1988). Why are general theories of comprehension of stories in interactive media almost non-existent? First, it could be that stories in interactive media simply have been overlooked—researchers have not been aware of their existence. Second, stories in interactive media could have been considered uninteresting or not worthy of serious study. Third, the methodological task of empirically comparing them with traditional stories could have been judged too difficult. Fourth, stories in interactive media might have been neglected because they are considered to fall within theories of traditional stories. In other words, stories in interactive media might have been viewed as just another instance of traditional stories, and therefore not in need of a separate explanation.

Let us see how these four points can be countered. The first and second reason can be argued against by noting that stories in interactive media exist and are widespread, especially, as is argued in this book, that they encompass a larger class of phenomena than considered by earlier approaches, and not only 'electronic' or 'digital' stories. Further, technological development is likely to spread participatory stories even more in the future. The methodological difficulties mentioned as the third point above are definitely real, but they constitute no real reason not to begin investigation. Even though it may not be possible to set up experimental studies with the sufficient level of control necessary to draw conclusions based on quantitative analysis, other methods can be used. Explorative methods of both on-line (while comprehension takes place) and off-line (after comprehension has taken place) aspects can be used. On-line aspects can be investigated by studying behaviour (observations or analysis of logged interactions) or speech (using think-aloud methods) when participating in a story. Off-line aspects can be stud-

ied by exploring people's long-term memory (e.g., via language) from a variety of viewpoints, such as perspective in episodic memory and spatial mental models. The fourth reason against studying comprehension of participatory stories—that they are just the same as traditional stories—is countered in this book from both a theoretical and an empirical viewpoint. The section below on what it means to participate in a story shows how traditional stories differ conceptually from participatory stories. Empirical findings that challenge the fourth reason are presented throughout the rest of the chapters in the book.

This overview of perspectives shows that participatory stories have been studied from many different perspectives, differing in goals, methods, and object of study. The cognitive perspective of participatory stories is well suited for the goals of the present book, and links naturally to the mental definitions of story and fiction from the preceding chapters. Only limited work has been done in a cognitive perspective, so that is an additional factor that motivates the present work. In the next section, the cognitive perspective will be further fleshed out and an important point will be made: When it comes to describing what makes some stories participatory and others not, it is necessary to adopt a cognitive perspective.

4.2 SOME FUNDAMENTAL QUESTIONS FOR A THEORY OF PARTICIPATORY STORIES

Any theory of stories that can be influenced by the audience (participatory stories, or whatever similar term is used) would need to address at least the following basic questions:

(i) How is the *demarcation* made between participatory stories and other stories? What criteria are used? What instances (i.e., individual works: books, films, computer programs, etc.) are considered participatory stories and which are not?

(ii) What is the role of fidelity (accuracy of the representation) and multimodality (combining several sense modalities, such

as vision, hearing, and touch) in participatory stories, for user input or for system output?

(iii) What does it mean to participate in a story? In terms of interaction, exactly *what* is it the audience interacts with?

(iv) Are participatory stories fictional? If so, in what way?

Each of these themes will now be discussed and it will be shown how some other researchers have approached them. The questions will be used to structure the discussion of other theories and work carried out concerning participatory stories. The discussion will result in a definition of participatory stories as used in the present book. Along the way, the key role of cognition will be evident in the answers provided to all these four questions.

4.2.1 Demarcation—drawing a line between participatory stories and other phenomena

4.2.1.1 To demarcate or not to demarcate

When approaching a number of instances, such as individual works of novels, short stories, movies, and computer games, there are two fundamental ways of doing the description. One way is to set up criteria for sorting the instances into categories based on some similarities and differences, such as the main concepts *participatory* and *non-participatory stories*, as is done in this book. The other way to approach the task is to claim that there really are no differences between instances, and that they all share the same qualities.

Concerning participatory stories, the latter way is adopted by Alexander (1999). In his book *Screen play*, he discusses how new as well as old media are constituted by *play* in the interpretative act of the audience. He does not make a distinction between participatory stories and non-participatory stories. Interacting with a computer game involves play. Watching a movie involves play. Listening to a story involves play. However, in stretching the concept of play to its limit to include all forms of media, there is a risk of losing its

meaning and usefulness. Also, Alexander misses one of the philosophically and cognitively most interesting things about play: how the organism can distinguish between play and the 'real world'. Another way to deny that there is a difference between participatory and non-participatory stories is to claim that all texts are interactive because meaning is created in an interactive process with the reader. Agreed, but *in addition* to the interpretative act, which is present for all texts (and for perception of all kinds, for that matter), participatory stories add another interactive process (more on this in section 4.2.3 below).

Most other approaches to participatory stories assume that there is a difference from traditional stories, as will be discussed. The question then is what criteria are used to draw the line of demarcation. Another issue concerns granularity. How fine a division does one want to make? How many categories does one use to sort instances into? If we use too few categories, we may miss ways in which instances differ. If we use too many categories, the classification does not provide enough overview, which would run counter to what we set out to do in the first place. In the following discussion it can be seen that researchers have chosen various sizes of granularity. A discussion now follows of the demarcations of participatory stories by Murray, Ryan, and Aarseth, in that order, and end with the demarcation introduced in this book.

4.2.1.2 Murray's demarcation

Janet Murray's (1997) book *Hamlet on the holodeck: the future of narrative in cyberspace* can be described as a hopeful vision of the future of various forms of what Murray calls 'cyberdrama' (and sometimes 'electronic narrative'). Murray points out that reading and viewing traditional narratives are not passive activities (she finds support in the reader response critics Holland, Iser, and Eco), so the distinguishing criteria could not be based on *passive* versus *active*. Nevertheless, she argues for a difference between traditional narrative and 'electronic narrative', although the argument is very brief and incomplete. All she says about the matter is:

> There is still a difference, however, between this emotional and cognitive activity and the external actions we take in a game or electronic narrative. Perhaps the most important difference is that in the latter we are conscious of our activity, which changes our relation to the story. (Murray, 1997, p. 294)

First Murray says that the difference is in the taking of action. But then she points out that we are conscious of our activity in 'electronic narrative', which we supposedly are not of our activities when reading or viewing a traditional narrative. There are at least three lines of criticism to this: First, what kind of 'actions' are we 'taking' in relation to the narrative? This point is unclear. Second, if an 'electronic narrative' is working well (that is, according to the aesthetic criteria Murray hints at in other places in the book), is it not because the audience performs most of its activity unconsciously? Finally, is not reading or watching a traditional narrative also conscious? Do we not ponder what will happen next, who a mysterious character is, and why things turned out the way they did, all on a conscious level? (See, e.g., Trabasso & Magliano, 1996.) In summary, Murray does not present clear criteria for categorising stories into participatory and non-participatory, but she advocates a difference, closely tied to the computer, judged by her choice of the term 'electronic narrative'.

4.2.1.3 Ryan's demarcation

Ryan classifies the 'new forms of discourse and literary genres born out of the computer' (Ryan, 1999, p. 2) in the three main categories of 'Computer as (co-)author', 'The computer as medium of transmission', and 'The computer as theater':

1. Computer as (co-)author
1a. AI story generation
1b. *Eliza*
1c. Non-meaningful processing of words in experimental literature

2. The computer as medium of transmission
2a. Digitized print texts

2b. E-mail and Usenet
2c. Tree fiction and collaborative literature (not hypertext)
2d. Electronic serials (soaps)

3. The computer as theater
3a. Hypertext
3b. MUDs and MOOs
3c. Interactive drama (virtual reality)
3d. Computer games (including *Pac-Man*, *Zork*, and *Myst*)
3e. CD-ROM multimedia works (children's living books, artist's works)
3f. Computer-modulated texts (poetry machines, cybertexts)

However, this classification has some odd features. Why is transferring an existing print text, such as a book, into a digital form, such as a CD-ROM, creating 'new forms of discourse and literary genres'? Is it not still the same thing no matter whether it is printed or presented digitally? It is only the third of these categories that resemble the concept of participatory stories as used in this book. As will be discussed later, categories 3b, 3c, and parts of 3d are included of the concept of participatory stories.

The final approach to be considered is Aarseth's demarcation, on which the demarcation used in this book will be based.

4.2.1.4 Aarseth's demarcation

Aarseth's (1997) book *Cybertext: perspectives on ergodic literature*—which builds on ideas from Aarseth (1994)—can be seen as an entry into the debate about differences between old and new media. However, Aarseth does not draw his border between printed and electronic media. Instead, his analysis focuses on structures in the media, resulting in the two categories *ergodic* texts and *nonergodic* texts. Ergodic texts are those which require special physical activities on the part of the reader or user. These two categories do not fit the categories *old/printed* and *new/electronic*. Indeed, Aarseth points out that there are old printed works of ergodic literature as well as new electronic works of nonergodic literature. Aarseth's book is one of the most systematic and clearly laid-out accounts of

the textuality of the new media. Aarseth shows great awareness of the history of the texts and what it is like to read (or use) them.

The categories of ergodic and nonergodic are useful, but there is a problem with Aarseth's way of defining the terms, or rather, the features he uses to separate them, that is, their distinguishing features. Especially, criticism will be offered on the notion that physical actions distinguish ergodic works from nonergodic ones. It will be argued that 'physical actions' should be replaced by 'mental actions'. This will move the focus from the work to the reader or user.

Before coming to the criticism, let us look closer at Aarseth's concept of ergodic text. In his discussion, Aarseth introduces the concept of *cybertext*, which together with hypertext (in its standard meaning) makes up the larger concept of *ergodic text*. To put it another way, cybertext and hypertext are subsets of ergodic text. Aarseth sometimes mixes the usage of the terms cybertext and ergodic in his book, so for the purposes of this section, *cybertext* can be taken to mean the same thing as *ergodic text*. Although there is no definition in the classical sense of ergodic text or cybertext in his book, this is what comes closest to it:

> The concept of cybertext [as well as ergodic text] focuses on the mechanical organization of the text, by positing the intricacies of the medium as an integral part of the literary exchange. However, it also centers attention on the consumer, or user, of the text, as a more integrated figure than even reader-response theorists would claim. The performance of their reader takes place all in his head, while the user of cybertext also performs in an extranoematic sense. During the cybertextual process, the user will have effectuated a semiotic sequence, and this selective movement is a work of physical construction that the various concepts of 'reading' do not account for. This phenomenon I call *ergodic,* using a term appropriated from physics that derives from the Greek words *ergon* and *hodos*, meaning 'work' and 'path.' In ergodic literature, nontrivial effort is required to allow the reader to traverse the text. If ergodic literature is to make sense as a concept, there must also be nonergodic literature, where the effort to traverse the text is trivial, with no extranoematic responsibilities placed on the reader except (for example) eye movement and the periodic or arbitrary turning of pages. (Aarseth, 1997, pp. 1–2, italics Aarseth's)

Some examples of ergodic literature that Aarseth mentions are the *I Ching* (an old Chinese ritual text), *Composition no. 1* by Marc Saporta (a 'novel' consisting of a box of loose pages to be shuffled in any order), *Adventure* by William Crowther and Don Woods (a text adventure game), and *Afternoon* by Michael Joyce (a digital hypertext).

On the difference between ergodic and nonergodic, Aarseth writes: 'If we are to define this difference as a dichotomy . . ., it would have to be located within the work rather than within the user' (Aarseth, 1997, p. 179). So, in Aarseth's view, ergodicity is a feature of the (literary) work itself, and this feature requires the user to carry out physical activities that are not necessary with nonergodic texts.

The problem with Aarseth's argument is that the features he uses to distinguish ergodic texts from nonergodic texts are not sufficient to do the job. He states the central role of physical actions by saying that 'the user of cybertext [and ergodic text] also performs in an extranoematic sense' (Aarseth, 1997, p. 1) and in 'nonergodic literature, . . . the effort to traverse the text is trivial, with no extranoematic responsibilities placed on the reader except (for example) eye movement and the periodic or arbitrary turning of pages' (Aarseth, 1997, pp. 1–2). But do ergodic texts really require physical actions that nonergodic texts do not? From a closer look, it appears that 'periodic or arbitrary turning of pages' is not only a feature of nonergodic texts, but of ergodic ones as well. For example, the works *Pale fire*, *Composition no. 1*, and *Hopscotch*, which Aarseth gives as examples of ergodic texts, require no more physical action than this. They are printed works and require no more than 'periodic or arbitrary turning of pages'. So, this feature cannot be used to separate ergodic from nonergodic. Further, does 'no extranoematic responsibilities . . . except . . . eye movement' distinguish nonergodic works? No, there are examples of gaze tracking technology used to control the unfolding of a drama in interactive multimedia (e.g., Hansen, Andersen, & Roed, 1995), clearly an example of an ergodic work. It appears that neither mere turning of pages nor eye movement distinguishes ergodic texts from nonergodic texts. These are

the only examples of physical actions supplied by Aarseth in the book.

If the argument is correct, then it follows that 'physical actions' is not a sufficient feature to distinguish ergodic texts from nonergodic texts. One could try to uphold the distinction by imagining other features, such as that only ergodic works require the pushing of buttons or otherwise manipulating a special user interface of the work. This does not help, however, because it is always possible to transfer a nonergodic work into the same technology that normally supports ergodic works. For instance, one could digitise a traditional, nonergodic novel and put it into a computer, but that would not turn it into an ergodic text. The argument is that there is *no* set of features that focuses on physical actions which will be sufficient to distinguish between ergodic and nonergodic, at least not which will be meaningful as a distinction. Instead, 'mental actions' can replace Aarseth's criterion, as it is arguably within the user's head that the activity actually takes place.

The result of the above discussion questions the idea that the difference between ergodic and nonergodic lies only in the work. If ergodic works partly require a different type of thinking, which systematically differs from the thinking required by nonergodic works, it would be fair to say that the difference is also in the user.

So, should we abandon the term *ergodic* altogether? No, the concepts of ergodic and nonergodic are still useful, but, as has been discussed, the distinguishing features are neither a difference in the physical actions required by the user, nor located only within the work itself. Rather, the difference is the mental activities a user carries out. To transfer the difference between ergodic and nonergodic from the physical to the mental does not go against Aarseth's original intention, which can be seen as showing that *electronic text* and *printed text* are simply inappropriate concepts to use when talking about differences between about new and old media. In other words, the criticism here has not changed which texts fall under ergodic and nonergodic, but only supplied other means by which the concepts may be separated. Taking this critique to its limit would mean that a mental perspective is *necessary* in the analysis of

the difference between ergodic and nonergodic literature. This supports the strong version of the cognitive thesis, as formulated in this book.

Another approach which bases the distinction of traditional stories and participatory stories on physical actions is put forward by Wilhelmsson (2001). Wilhelmsson views physical, bodily action as central to computer games, and also as the feature that distinguishes computer games from, for example, movies. However, he concedes that some games, such as *Zork* (classified as *interactive fiction*—see, e.g., Costanzo, 1986; Aarseth, 1997; Murray, 1997—in the categorisation used in the present book) is only loosely connected through such a 'tactile motor/kinesthetic link'. Even if it is reasonable to marginalise interactive fiction in a theory of computer games, it is not reasonable to do so in a theory of participatory stories. On the contrary, in a theory of participatory stories, interactive fiction is a prototypical instance. Wilhelmsson's suggestion may hold for *many* computer games, but it cannot be used as a *general* distinction between participatory stories and non-participatory stories, for the same reason discussed above in relation to Aarseth's approach.

4.2.1.5 The present demarcation

The demarcation of participatory stories used in this book builds on Aarseth (1997), with some extensions. Since Aarseth has a literary studies perspective, he mainly considers (verbal) texts, and consequently excludes other media from discussion. The membership of some phenomena is unspecified in his approach. He does not categorise children's pretence or live role-playing games. In the present book, the concept of participatory stories also encompasses these instances, since they are argued to involve the same general cognitive ability. It is unclear whether Aarseth considers all computer games to be cybertexts (probably he does not, on the same grounds that is given below to exclude some instances of computer games from the category of participatory stories). The extensions of the categories are shown as sets in Figure 4.2.

Figure 4.2 is rather complex, so let us consider what it says in some detail. The two main categories are *participatory stories* and

non-participatory stories. Participatory stories include pretence, live role-playing games, board role-playing games, most of Aarseth's concept cybertext, some computer games, interactive fiction, and adventure games. The categories computer games and interactive fiction partly overlap; there are computer games which are not interactive fiction, and there is interactive fiction that is not computer games (such as so called puzzle-less interactive fiction, e.g., *The space under the window* by Andrew Plotkin). There are also computer games that are not considered participatory stories (these are games with very little stimuli which could generate a narrative response, e.g., abstract games[14] such as *Tetris* (Pazhitnov, 1985)). Adventure games are a type of interactive fiction computer games. Some parts of Aarseth's category cybertext are excluded, for example, automatic story generators which do not involve the audience. The category of participatory stories excludes Aarseth's (and the general notion of) hypertext. Why are hypertext stories outside of the concept of participatory stories? Hypertext consists of texts and links. Links make reference to other (parts of) texts. But in participatory stories, such as interactive fiction, there is no question at all of references to other texts—there are consequences of the user's actions upon the story and the simulated story world. Hypertext is not procedural (Murray, 1997). Comprehension of hypertext is not like comprehension of participatory stories. Following links in hypertext is a navigational task, often performed without cues, and puts load on working-memory in that one needs to memorise part of the way one is taking in the navigational structure (Wenger & Payne, 1996). The difference between hypertext and participatory stories will be further discussed in the section 'What does it mean to participate in a story?'.

[14] Tetris is *abstract* in the sense that it contains geometrical figures, and not characters and natural objects. In another sense, Tetris is a very *concrete* game with a simple objective and a limited set of motor actions on part of the player.

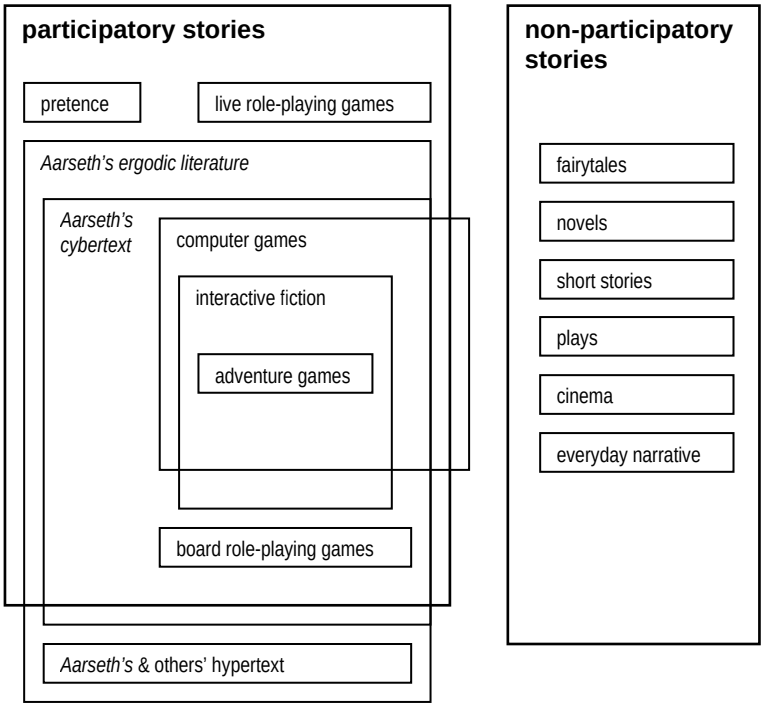

Figure 4.2. The classification of participatory stories and non-participatory stories as used in the present book, shown using sets. Aarseth's (1997) classification is shown for comparison.

The other main category is non-participatory stories, or traditional stories. Here we find, for example, fairytales, novels, short stories, plays, cinema, and everyday narrative.

The granularity of the present categorisation is in one sense very coarse, in that there is a dichotomy between participatory stories and non-participatory stories. Of course, it is relevant to ask whether it is reasonable to have two major categories. Are the instances within the category of participatory stories similar enough to warrant such a categorisation? Despite differences in appearance among the individual participatory stories in terms of text, sound,

video, and different physical ways in which to control them, the argument in the following sections is that it makes sense to apply such a generalisation. The argument, which will be expanded later, is basically that *story participation* is best defined as a cognitive process, independent of physical circumstances and sense modality.

The term 'participatory stories' was selected for the phenomena studied in this book. 'Participatory' is intended to mean the same thing as 'interactive', but it was chosen because it is not as over-used and is less loaded compared to the term 'interactive' (see Aarseth, 1997, for a discussion). 'Participatory' also leads associations away from the computer, which goes well with the broad view of participatory stories in this book (live role-playing, which has nothing to do with computers, is also an example of participatory stories in this classification).

Before coming to a definition of what it means to participate in a story, there is a need to consider two related factors that are often mentioned in the context of participatory stories: fidelity and multimodality.

4.2.2 The role of fidelity and multimodality

The issues of fidelity and multimodality are thought by some researchers to be central to the field of participatory stories, as will be seen later in this section. *Fidelity* is used to mean how accurately something is represented. In a computer game, for example, a player may be represented by a crude square, a line-drawing of a human, or a detailed three-dimensional figure with full facial features—three versions with increasing fidelity. Multimodality here means involving more than one sense modality at once. For convenience, one can think of modalities as the basic five senses of vision, hearing, touch, smell, and taste (although there are arguably others, e.g., pain, balance, and proprioception). Multimodality could be present either in terms of participation—interactivity—the manner in which the audience influences the story (multimodal input), or it could be in terms of how the participatory story presents information to the audience (multimodal output).

Are these features really fundamentally connected to participatory stories? The case for fidelity and multimodality in participatory stories will now be reviewed, looking at examples of participatory stories, considering arguments from researchers in the field, and assessing psychological theories which may support such a position. The final conclusion will be that fidelity and multimodality are in principle *unrelated* to participatory stories, and this is formulated as the *modality-independence assumption of participatory stories*.

4.2.2.1 Fidelity and multimodal output

Let us first consider the role of fidelity and multimodal output in participatory stories. The most common form of multimodality in participatory stories would be the presentation of the story to the audience utilising the senses of vision and hearing when presenting audio and video material.

Scholars discussing participatory stories often dwell on the feature of multimodality. Murray (1997) does not seem to be able to make up her mind about whether a multisensory interface is important to participatory stories or not. When discussing 'immersion' as a key property of the new medium, she describes it as 'the sensation of being surrounded by a completely other reality . . . that takes over all of our attention, our whole perceptual apparatus' (p. 98). Thus, Murray attaches importance to being able to experience the fictional world using as many senses as possible. She discusses the three-dimensional Sony IMAX Theater (non-participatory like traditional cinema), and says: 'The size of the film means an increase in information, offering a richer and therefore more persuasive visual illusion. It is not merely a larger image but a more present reality' (p. 45). Also, in relation to computer games, Murray expresses a view of 'more is better'—she calls the shift from text-based interfaces to graphic-based ones (or at least ones with spatiality) 'progress' (p. 190), so apparently, she views the latter more positive than the former. But when discussing MUDs and the adventure game *Zork* (both consisting of text only), Murray notes that multisensory interaction is not apparently necessary to obtain a successful experience in a participatory story, as the success of these works shows: 'It

demonstrates that the potential for compelling stories does not depend on high-tech animation or expensively produced video footage but on the shaping of such dramatic moments' (p. 53), and 'narrative beauty is independent of medium' (p. 273).

Laurel (1993) also stresses the importance of multimodality for immersion in interactive media: 'Tight linkage between visual, kinaesthetic, and auditory modalities is the key to the sense of immersion that is created by many computer games, simulations, and virtual-reality systems' (p. 161). However, it is unclear whether Laurel specifically addresses qualities of experiencing a *story*, as opposed to having any experience of a surrounding.

It is easy to be swept away by the thought that a higher degree of fidelity and multimodality, such as higher screen resolutions, more colours, force-feedback hand-controllers, and five-channel surround sound, are essential in creating a truly participatory story. But one must distinguish between commercial factors such as what types of games sell the best, and what the true possibilities of interactive media are (for discussions of this from a game design perspective see, e.g., Crawford, 1993; 1994). Besides marketing reasons, the underlying, implicit argument in claims of 'more is better' is this: rewarding participatory stories should be multimodal because real life is multimodal. However, this argument is faulty. Drama is not like real life. In drama, things are condensed and intensified, all to maximise the audience's experience. Consider instead the typical storytelling situation in a historical perspective. The most common situation has undoubtedly been when a storyteller captures the imagination of an audience by telling a story *using words only*. Other common rewarding story experiencing situations include the novel, such as *War and peace* (no pictures). Multimodality is not central to participatory stories because a story is comprehended at a more abstract level, which is separate from how it is represented.

Multimodality may be present in many participatory stories, but it cannot be used as a feature to tell participatory stories apart from non-participatory stories. There are many examples of works, which we would consider to be typical participatory stories, that involve textual input and output only, for instance, text adventure

games. Therefore, multimodality cannot be a necessary feature of participatory stories. It is even highly questionable whether multimodality at all adds to the experience of immersion in stories (see Gander, 1999 for an extended argument and overview of the literature).

Is there psychological evidence that multimodality is important for story comprehension? Let us first turn to laboratory research on memory. Paivio's (1991) dual-coding hypothesis suggests that multimodality may affect comprehension. If some content is presented as both pictures and verbal material this may result in two codes in memory, which leads to a higher degree of recall because there are more retrieval cues. But this holds only if the *same* information is presented in both modalities. The usual case for participatory stories would be that *different* information is presented simultaneously in several sense modalities. Thus, the dual-coding hypothesis would play a small role in these cases. Even if recall were facilitated by two codes, what does this tell us about experiencing a story? The dependent variable in most memory studies is memory performance, usually on lists of words, or sometimes single actions in isolation. It is very unclear whether research on unrelated words can be generalised to story comprehension, which involves larger units of meaningful material.

How is the case for multimodality in studies dealing specifically with story comprehension? Contents of news stories from print and television are remembered equally well by adults (Furnham, De Siena, & Gunter, 2002). Story comprehension seems to work in the same way regardless of whether the story is presented audio-visually or as text, for predictive inferences (Magliano, Dijkstra, & Zwaan, 1996), and comprehension of events (Magliano, Miller, & Zwaan, 2001): 'The pattern of results was similar for narrative film as they are for narrative text. This finding suggests that there are general mechanisms for event understanding that operate independently of medium or mode of experience' (Magliano, Miller, & Zwaan, 2001, p. 533). And: 'This finding bolsters the claim that the higher-level processes involved in situation understanding are generalisable across experiences, whether they occur in text, film, or in real life'

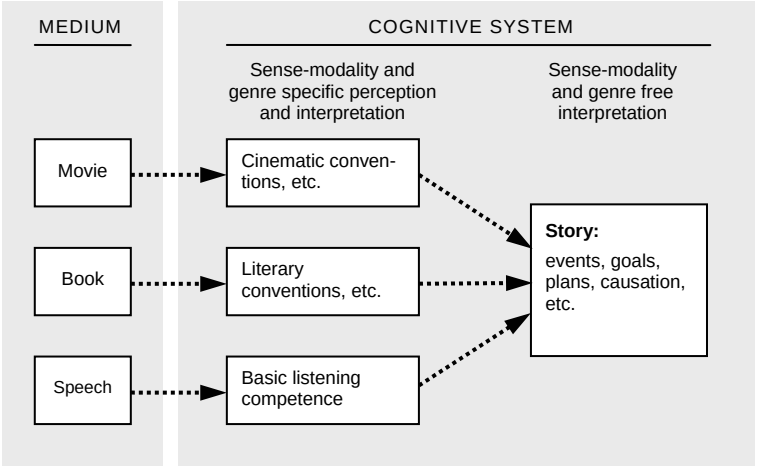

Figure 4.3. A schematic view of the sense-modality independence of story understanding.

(Magliano, Miller, & Zwaan, 2001, p. 543). On the whole, the psychological evidence points to the conclusion that the medium *does not matter* when it comes to story comprehension. Figure 4.3 illustrates the idea of a modality-independent view of story comprehension.

4.2.2.2 Multimodal input

Do participatory stories depend on the manner in which participation is performed, for instance, typing an action as a textual command compared to motorically carrying out an action? That is, is multimodal input an important consideration when theorising about participatory stories?

Aarseth (1997) and Wilhelmsson (2001), emphasise the importance of physical, motor actions when describing the essence of participatory stories. Wilhelmsson also expresses the view that the visual modality (and to some extent also the auditive modality) is an

integral part of participatory stories, because motor actions are linked to visual results in the game. The view that the body is involved in cognitive activity has become popular in cognitive science and related fields (Wilson, 2002). Wilhelmsson makes a strong claim when he states that 'sensorimotor experiences are what structure subjective experiences' (Wilhelmsson, 2001, p. 149) and pays homage to researchers such as Lakoff, Johnson, C. Johnson, Grady, Narayanan, Fauconnier, and Turner.

In an attempt to capture the general features of computer games, Wilhelmsson (2001) refers not to specific concepts such as Avatar or player character, but to 'visual container' and 'sound-scape' (Wilhelmsson, 2001, p. 150). However, in the use of these terms, he implies that there is generally something visual about computer games and that they inherently have sound. This is not the case with many computer games and participatory stories, such as *Anchorhead* which was used in the empirical studies in the present book. Further, Wilhelmsson draws heavily on Gibson's ecological theory of perception when discussing features of computer games, such as space. However, Gibson's approach may only be applicable for cases where there is a visual field. When considering computer games without a visual field, there can be only metaphorical uses of Gibson's approach, through mental representations, and this is clearly not how it ought to be understood.

There seem to be two ways in which one may attempt to rescue the view that motor-kinesthetic features are fundamental to computer games in general, given that also interactive fiction (e.g., *Anchorhead*)—which does not have direct control and does not include any visual features beyond text—is a kind of computer game.

First, one may say that in playing interactive fiction, there are no visual or motor actions directly related to the game, but via mental representations, the actions in the game are translated into a motor-kinesthetic code, in the end creating the same kind of subjective experience that would be obtained with a visual computer game of direct control. But why would textual interactive fiction be translated into motor-kinesthetic actions of manipulating the interface (such as those which are available for computer games controlled

with, e.g., a joystick)? And even if one held this view, one has already rejected the importance of motor-kinesthetic features and accepted the importance of the mental dimension, in claiming that mental representations of the participatory story are formed.

Second, one may say that motor actions are not integral to computer games but that they are merely circumstantial. Agency may be instantiated in many forms, such as motor action in direct control, through keyboard commands, via speech commands, or merely by directing one's gaze to various locations. Then, any of these instantiations would be translated into a more general, conceptual—mental—level where the player is 'doing things in the game'. The experience of playing computer games (and we would say, participating in any story) would then be an experience based on a mental process rather than on a motor-kinesthetic process.

There is psychological research which investigates the impact on memory of motor actions. Within the *enactment paradigm*, sometimes called *subject performed task paradigm*, results show that actions actually performed by participants are better remembered than actions that are merely read or heard (Nilsson, 2000). Although there are conflicting results within the field, the explanation for the effect seems to be that the action facilitates encoding of the verb and the noun in the action, but the action is represented similarly in memory regardless of whether it was read, heard, or enacted—there does not seem to be a motor component in the memory trace (Nilsson, 2000) (see also the note in the last section on generalisation from memories of single unrelated actions to stories).

4.2.2.3 Modality-independence assumption of participatory stories

From the above discussion the following conclusions are drawn: (i) there are examples of prototypical participatory stories which do not utilise multimodal input or output, (ii) psychological research on traditional story comprehension shows that stimuli in various modalities are processed in a similar way, (iii) psychological research on action shows that there does not seem to be a motor component in memory of enacted actions compared to actions that were merely imagined or observed. This leads us to state the *modality-*

independence assumption of participatory stories: Multimodality is not a necessary criterion in order to maintain a difference between the classes of participatory stories and non-participatory stories. That is, still images, moving images, text, and sound, as well as the features of the senses used for reception, such as vision, hearing, and touch, are all ultimately not an essential part of the concept of participatory stories. Nor has the range of input devices used, such as joysticks, virtual-reality goggles, eye and gesture tracking devices, any relevance. Rather, the concept of participatory stories can, and should be, generalised from its *manifestation* in discourse (that is, how it actually appears in any media), and *how* interaction is achieved. Dwelling on technical issues of multimodal interaction will only confuse the investigation and lead away from the core of the phenomenon of participatory stories.

The assumption that the cognition of story understanding is similar across media in participatory stories has methodological implications. If the assumption holds, it gives us greater possibility to generalise from empirical findings obtained in the study of one type of participatory story, for example, text adventure games, to other types, such as graphical adventure games, and beyond.

Having concluded the independence of multimodality from the concept of participatory stories, the discussion can now proceed to the heart of the matter: What does story participation really mean?

4.2.3 What does it mean to participate in a story?

It was claimed above that it is meaningful to divide individual story works into the categories participatory and non-participatory. In order to give substance to such a division, we need to specify in detail what it means to participate in a story. As was discussed earlier, the term 'participatory' is similar to the term 'interactive', which is more commonly used when talking about these issues. In this section, these terms will be used interchangeably. First, a series of suggestions as to what participation might be will be considered, arguing against these as characterisations of real participation, and finally arriving at a definition of story participation used in this book.

4.2.3.1 Approaches to participation

Interaction can generally be viewed as information exchange between at least two systems. Concerning stories, interaction means that there must be some kind of information exchange both to the audience from the story, and from the audience to the story: a feedback loop, influencing both audience and story. However, this characterisation is very vague and places only mild constraints on what participation might be in the context of participatory stories, a fact that has generated several views on the matter.

It is possible to claim that all storytelling is participatory, using at least two separate arguments. First, if meaning is created in interaction between text and reader, does this not mean that all stories are therefore participatory? This argument has already been countered above and will not be further discussed here. The second argument is that in stories (at least in some of them), the audience imagines the story world and experiences themselves as being 'inside' the story and taking part in it. Therefore, all stories are participatory. There is no reason to doubt that these experiences are real, but they are not examples of true story participation because they fail to satisfy the general requirement of interaction above: no information is fed back from the audience to the story.

Another argument claims that perhaps not all, but much of storytelling is participatory because of the social nature of storytelling. When observing everyday storytelling, such as people gathering around a dinner table and talking about the day's events, one notices that it is common that several people take part in the telling of a story (Norrick, 2000). Someone may begin to tell a story, which is then filled in, embellished, or rejected by the utterances of other people. Is this a case of participatory stories? A closer analysis shows that it is rather the shaping of the *telling* of the story that is participatory. It is not a case where the audience participates and changes the events and the outcome of the story.[15]

[15] Social situations which would be included in the concept of participatory stories, as discussed above, are the activities of board and live role-playing. However, even

There is another argument according to which any book or movie is participatory. It is possible to read the pages of a novel in an order different from the order in which they are numbered. That way the unusual situation may occur, for instance, that the hero of the story first is dead and then comes alive. With a video cassette recorder, the audience can achieve similar effects with a movie by interacting through controlling playback: stopping, rewinding, and using fast forward.[16] Yet a typical novel and a typical movie do not belong to the category of participatory stories, for two reasons. First, even though it is possible for the audience to use them in the ways described, it is not the intended way. As was discussed in Chapter 2, there are conventions for how various storytelling media should be interpreted. Going too far beyond these conventions, such as reading the pages of a typical novel by arbitrarily jumping from one page to another, *makes it something other than a traditional novel*. As was discussed in the section on ergodic literature, although it consists of text printed on paper, it is no longer a linear text, but rather a hypertext, in this case. The second reason why interaction in the choice of how a story is presented is not participation in the sense intended in this book, is that it is merely changing the presentation of the story, and not the order of the events themselves or the contents of the events themselves. In the terminology of Chatman (1993), it is possible to change the discourse while keeping the story intact. For instance, a traditional movie may start by showing the end of the story, and the rest of the movie is really a flashback of the main character. An alternative version of the movie may start at the beginning of the story and end with the main character shown in the storytelling situation. In these two examples the discourse is different but the story remains the same.

Two strong candidates for story participation will now be discussed: hypertext stories and multiple viewpoint stories. Both are

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though these situations could theoretically be carried out around a dinner table, they are highly specialised and do not occur in everyday storytelling.

[16] Of course, the same goes for several other audiovisual media, such as digital versatile discs (DVDs).

examples of interactive media, but are they cases of story participation?

Is story participation of the same kind in hypertext stories, compared to participatory stories? If we compare the user interaction in a hypertext story, such as *Afternoon* (Joyce, 1987), to an adventure game, such as *Deadline* (Blank, 1982), we find a major difference. In *Afternoon*, which is about a man who may have witnessed the car wreck of his former wife and the death of his son, it is again the order of presentation (Chatman's discourse) that is influenced by our participation, but not the story itself. The audience can learn new things about the story by using it several times and following the links in different order, but it cannot change the basic storyline. There is no flow of information from the audience to the story. In contrast, *Deadline*, which is about investigating a supposed suicide-turned-into-murder, the outcome of the story itself depends on which actions the audience performs. Whether the murder will be solved, whether there will be more murders, and whether the player character will survive to the end of the investigation, is all up to the audience of *Deadline*.

Another case where there seems to be story participation is in multiple viewpoint stories. Here, the audience can choose from whose character's perspective the story should be told. Murray (1997) discusses 'Mobile Viewer Movies', and talks about the ability to 'branch through a story'. But that cannot be what she really means, because all she discusses is the ability to 'choose who to follow' in a given story. As can be seen from the earlier discussion, again, that is not a branching on the *story* level; that is branching on the *discourse* level, that is, a difference in how the story is *presented*, but not how it is *constituted*.

Murray (1997) holds the feature of *agency* as central to stories of the future. By *agency* she means the feeling of being able to influence elements of the story. Her concept appears to be a promising component on which to build story participation. However, the concept is vague in two ways. First, Murray does not say whether it is necessary that there is an *actual* influence in order for a medium or story to have the property of agency, or if *perceived* agency—an

illusion of agency—is sufficient. Second, Murray is not specific as to *what* is influenced. Does a story have agency if the audience, for instance, is able to change the colour of the protagonist's clothes, or is a more fundamental influence required? If so, what kind of influence?

The issue of *authorship* is sometimes discussed in relation to interaction. Does interaction mean that the interactors in a story become authors of that story? Buckles (1985) argued that the players of adventure games became authors. However, this seems to be an illusion resulting from the fact that the game *Adventure* which Buckles studied was textual. In *Adventure*, the player writes text, so she appears to become an author. But if we consider a version of the same game (which is isomorphic), converted into a graphical point-and-click interface, we see that textual input is not needed, making it seem less plausible to call the player an author. Proponents of hypertext often claim that interactivity enables readers to free themselves from the less powerful situation as readers and become authors, with political implications (Landow, 1997). However, when looking more closely at what happens with participatory stories as well as with hypertext stories, this seems not to be the case. Instead, the audience interacts with a structure created by *someone else*, a designer or author. Murray (1997) is one who differentiates authors from interactors: 'The interactor is not the author of the digital narrative, although the interactor can experience one of the most exciting aspects of artistic creation—the thrill of exerting power over enticing and plastic materials. This is not authorship but agency' (Murray, 1997, p. 153).[17]

[17] Although not considered by Murray, perhaps a way to see interactors in 'digital narrative' along the lines of traditional drama, might be more like *actors* than like *audience*, with the difference that they can influence the story.

4.2.3.2 The present definition of story participation

Having discussed and criticised various attempts to define what it means to participate in a story, the definition used in this book can now be presented:

> *Participation in a story means perceiving at least two different potential event sequences of a story, and causing one of them to occur by controlling the actions of an agent in the story.*

This definition of participation has several consequences.

For a cognitive system (such as a person) to participate in a story, potential event sequences must be able to be perceived and be judged concerning similarity. If there is no way to compare them, they could be one and the same event sequence (in which case we could be dealing with a story from a traditional novel, and we would not say that it is participatory).

Besides perceiving the event sequences, the one who participates in a story needs to cause one of them to occur. Here we are faced with a problem. How can the audience, part of the real world, influence a story world, which is fictive? The audience (one or more persons) *is not part of the story*. To perform actions in the story, the audience needs an agent that is part of the story world. Luckily, as the concept of *story* was defined in Chapter 2, an agent is an essential component. By controlling an agent, actions can be performed on the story world, which in turn causes one event sequence to occur rather than another. The agent is sometimes called 'player character' (in adventure games). Even if no player character is assumed (the audience is 'playing themselves') there is some representation of the audience in the story. If the agent is hindered (imagine a story where the player character is being tied up by some kidnappers), the audience also (temporarily) loses the ability to influence the game. If the player character dies, the possibility to interact with the story also ceases (usually). This view of an agent is similar to Wilhelmsson's (2001) 'Game Ego', proposed as a component of computer games in general: 'The Game Ego is an extension of the human body container. The Game Ego is a function that affords and

exerts action onto and within the game environment' (Wilhelmsson, 2001, p. 247). The audience may try to force themselves onto the story and try to change it, such as modifying the software or hardware which runs the participatory story (i.e., we would call it 'cheating'). Although this is some sense is participation (with the hardware or the program), it would not be *story participation*. Another similar case is when a person flips the pages of a traditional book novel open at various places and reads. For the same reasons, this is not story participation because it is not participation with the story, which can only be through an agent, but with the book as a physical object.

Another consequence is that the interaction needs to be brought about through a *choice*. It is not sufficient for a story to change as a result of mindless, random interaction. Neither is it sufficient to influence how the story is presented, Chatman's *discourse* level, but the influence is on Chatman's *story* level.

According to the definition, no physical manifestations of participation of any kind are necessary. Consequently, one could participate in a story all in one's head. This could be a weakness or a strength of the definition, depending on how liberal one wants to be concerning the concept of story participation. Two cases of purely mental story participation that we perhaps would want to include, and that are now included, are the activities of dreaming during sleep and having fantasies while awake.

Another consequence of the definition is that it does not address the fictional status of the story. This means that real world situations qualify as story participation. An example of story participation would be the situation of you sitting at a restaurant ordering food. You are participating in your life's story.

Note that changing the sequence of events demands a way for the audience to influence, but the manner in which this is done is left unspecified, in accordance with the modality-independence assumption made earlier (be it by pulling a joystick, by typing text on a keyboard, by changing one's gaze using an eye-tracking system, or through some other means).

One problem with the definition that seems inevitable is that it allows for very trivial cases of choice, that is, the potential event sequences may differ only slightly and in a trivial way. For example, we are forced to call it story participation even if the only choice in the entire story is between moving a piece of dust on the floor and letting it stay where it is. Not a very exciting example of story participation.

The definition here is similar to other approaches, though somewhat more restrictive about what is considered participation. For instance, it excludes the mere ability to choose viewpoint, as discussed above.

4.2.3.3 Definition of participatory stories

Now participatory stories can be defined by building on the definition of story participation:

A participatory story is a physical system separate from the audience allowing participation in a fictive story.

Let us look at the features making up a participatory story.

In Chapter 2, *story* was defined as a mental entity. However, as can be seen in the definition, participatory stories are not mental, but refer to *physical systems* with which the audience is interacting. This allows us to talk about individual works, such as computer games, as participatory stories. It follows from this that participatory stories are not stories themselves. Instead, they are the physical stimuli which generate narrative response. In some cases, these systems are computer hardware running the appropriate software. But it can also consist of the collection of people, props, and environment as in live role-playing games.

Another requirement made for the same reason is that a participatory story should be *separate* from the audience. This excludes cases of participatory stories completely inside the head of a person, but it adds the convenience of being able to talk about participatory stories and by this mean separate, physical works, such as computer games.

It is only the *possibility* of participation that is necessary for something to be called a participatory story. If we were to require actual participation, then we would have the peculiar case when the same physical system *is not*, and then suddenly, *becomes* a participatory story, as the audience's activity changes over time. What happens in an actual situation depends on the audience; it may do nothing, and even though the experience probably will be less full, we will still call such a system a participatory story.

Finally, the notion of *fiction* is integrated into the concept of participatory stories. Participatory stories are about fictive worlds, not the actual real world. This last point may need some clarification, which brings us to the fourth question that challenges any theory of participatory stories: the question of whether participatory stories are fictional.

4.2.4 Are participatory stories fictional?

The question of whether participatory stories are fictional or not is interesting for several reasons. Compared to non-participatory stories, such as novels and movies, participatory stories not only represent, but also involve physical actions. How can participatory stories be fictional when the audience carries out actions when experiencing them? The answer to this question may have implications also for our general notion of fiction. If this notion is based on only non-participatory stories, the discussion could also influence our view of what fiction in general is. Researchers such as Aarseth (1997) and Wilhelmsson (2001) can be interpreted as giving the answer that participatory stories are not fictional. But if participatory stories are not fictional, then what are they? The proposals of Aarseth (1997) and Wilhelmsson (2001) will be argued against with the aim of showing that participatory stories are indeed fictional. Let us first consider the arguments of Aarseth (1997).

4.2.4.1 Can fiction involve testing causal relationships?

Fiction, to Aarseth (1997), is 'a portrayal of invented events or characters, usually in the form of prose (short stories, novels, etc.),

constructed in a way that invites rather than dispels belief.' (p. 50). Aarseth notes that the term 'interactive fiction' is used in the literature, but that no researcher tells in what sense interactive fiction is fiction (up until 1997, when Aarseth's book was published). In interactive fiction 'the user can explore the simulated world and establish causal relationships between the encountered objects in a way denied to the readers of *Moby Dick*' (p. 50). This is indeed a feature of interactive fiction, and also of participatory stories in general. However, Aarseth views *action* as the stumbling block to fiction: 'a fiction that must be tested to be consumed is no longer a pure fiction; it is a construction of a different kind' (pp. 50–51). Since the role of fiction is unclear, Aarseth claims that the term 'interactive fiction' is meaningless and suggests that it should not be used.

There seem, however, to be steps missing in Aarseth's argument. There is nothing in his definition of fiction that does not allow exploration and testing of causal relationships. It should be unproblematic to view the characters, objects, places, etc. in a work of interactive fiction to be fictional in Aarseth's sense; they are invented. But can a causal relationship be fictional, for example, that you need to find a certain (fictional) key in order to unlock a (fictional) door? Since keys unlock doors also in the real world, we may be confused and regard this as an actual causal relationship that holds in the real world too. But another example makes it clear that the causal relationship is actually fictional (*invented* in Aarseth's terms), for instance that giving cheese to an (anthropomorphic) mouse makes it whisper the location of a secret door. Here, the causal relationship is fictional because giving cheese to a real mouse will not have this effect. Indeed, the causal relationship cannot be real for another reason: the objects or characters which are causally related are fictional (*invented*). How can a *real* causal relationship hold between objects that do not exist? The causal relationships tested in a work of interactive fiction are fictional. (If we do not want to make any ontological claims, we can say, in parallel to the definition of fiction from Chapter 3, that the audience will consider that the causal relationship should not be evaluated in the real world.) Furthermore, causal relationships seem to exist in non-participatory stories as

well, such as in a novel. The actions of fictional characters have effects in the world of the novel. So, fictional causal relationships do not seem to be such a strange thought.

In summary, Aarseth's argument that interactive fiction is not fiction because it contains elements of testing causal relationships is not valid. Indeed, the view that something can be fiction and still allow exploration on the part of the audience is consistent with Aarseth's definition of fiction, as well as with the definition of fiction in this book (Chapter 3).

4.2.4.2 Do computer games use representations?

Addressing the question of whether participatory stories are fictional is uncommon in the literature, but Wilhelmsson (2001) touches on the issue while arguing against Laurel's use of *theatre* as a metaphor for computer games (since Wilhelmsson discusses interactive fiction as computer games, his analysis is relevant to the question of the fictional status of participatory stories):

> I would say that there is not representation of something in some (maybe even most) computer games when it comes to the core of subject matter of a game and its manifestations. Consider Pac-Man for instance. The maze in Pac-Man making up the game board and the game environment really is a maze. The hunt is a hunt. The actions performed are performed. It is a real hunt, not a fake one. The way it is performed with a Game Ego is in some respects different from running around being hunted by ghosts in real life (if now there are ghosts in real life that is). Nevertheless the experience is quite similar and uses to a large extent the same motor based cognitive schemas. (Wilhelmsson, 2001, p. 135)

Wilhelmsson is making two claims here: first, that some computer games (where *Pac-Man* is an example) do not *represent* real things—the 'things' in the computer games are what they are by virtue of their intrinsic properties. This claim is logically separate from his second claim, which is that the 'things' (at least those mentioned) found in *Pac-Man* are 'real'. Now, regardless of which definition of fiction one uses, the last claim must reasonably be using 'real' in

opposition to 'fictional'. Under this interpretation, the claim is that *Pac-Man* is not fictional. The claims are logically separate because a representation could be either fictional or non-fictional: A movie may represent some real events, or it may represent some invented, fictive events. However, there is a one-way dependency between the two claims: For something to be fictional, it must be a representation (real things are non-fictional). If we agree with Wilhelmsson that *Pac-Man* does not contain representations of the things he mentions in the quotation above, then it follows that they cannot be fictional either.

First, we may question that some things in *Pac-Man* are not representations. Take the ghosts, for instance. If we consider the ghosts to be fictional—which would be hard to argue against—then they are also representations. Indeed, are not all elements in *Pac-Man* representations? Surely the fluorescent dots of light on the screen represent a maze, much in the same way as a painting of a maze or a shot of a maze in a movie represent a maze. It looks like a real maze but it is not. Next, consider actions in *Pac-Man*. Is the hunt really a hunt? This depends of course on our definition of *hunt*. But it seems reasonable to demand that a real hunt involves real objects (or agents). Since we do not have that in *Pac-Man*, it appears strange to call it a real hunt. What about other actions? In some sense, the audience's actions have actually been performed, also in the real world. However, what they mean in the real world is different from what they mean in *Pac-Man*. In the game, the action 'eating a ghost' may have been performed, but in the real world, the action amounts to, for instance, pulling the joystick to the right.

Wilhelmsson's claim that the *experience* is similar does not add to the argument, since the experience of a hunt while, for example, watching a fictional movie—a representation of a hunt—could also be similar to the experience of a real hunt. Further, the motor actions in *Pac-Man* do not seem to resemble those in a real hunt: pulling a joystick forward, backward, left, and right (in the game), compared to running by moving your legs (in real life). Even if the actions of the computer game interface were similar to real actions,

this is rather a special case and not something that is either common or necessary for computer games in general.

The conclusion is that Wilhelmsson presents no convincing argument that *Pac-Man* (or computer games in general) is real and not fictional. Indeed, he states a few pages later that 'the player is able to activate, through cues from the interface of the computer game, a simulation of a fictious[sic] world inside the computer' (p. 145). The view Wilhelmsson expresses here is consistent with the view of participatory stories held in the present book (under the assumption that he does not really mean a simulation of a fictitious world, but rather intends to say 'a simulation of a world, which is fictitious').

4.2.4.3 Exactly in what sense are participatory stories fictional?

A claim that participatory stories are fictional must be followed by an account of *how* they are fictional. As mentioned before, the main reason for considering them to be fictional is the observation that people who experience participatory stories treat what happens in a participatory story as something that is not real.

A way to go beyond the real/fictional dichotomy may be to introduce a third option between fictional and real, *indeterminate*. We could say that the audience is *unsure* whether the events in a participatory story are real or not. Reality is *real*, novels are *fictional*, and participatory stories are *indeterminate*. But this is clearly not what is happening—the audience experiencing a participatory story is not in doubt. Instead, the audience seems to have exactly the same relation to a participatory story as to a non-participatory story, such as a fictional novel—the world they are experiencing is imaginary. Thus, the only reasonable conclusion is to call participatory stories fictional. However, there is still a need to lay out in detail in what way they are fictional, considering that the (real) audience carries out (real) actions in participatory stories.

Let us look more closely at what it means to say that participatory stories are fictional, by examining the relation of fiction to the components of participatory stories. The world in a participatory story includes, for example, *characters*, *objects*, and *places*. It seems to be uncontroversial to claim that these elements are fictional in ex-

actly the same way as the story world of a novel is fictional. The *events* that take place in the participatory story, for example, that a king was killed, can also be said to be fictional in the same way. However, when we come to the *actions* carried out by the audience, there seems to be something more than fiction going on. However, actions carried out by the audience *within* the story, such as *killing the king*, can be said to be fictional. Clearly, no real killing was performed and no real king was involved. (If the audience was questioned in a court of law, it would rightfully deny having killed *anyone*.)

The action of killing the king (in the story) was performed in some way by the audience, for example, by pressing a button, which shot an arrow at the king (in the story). This part of the action is real (pressing a button)—this works since a real body was used to press a real button. In contrast, the part of the action that relates to the game world is fictional (shooting an arrow and killing the king). The part of the action that is carried out by the audience in the real world—working the interface, such as pressing a button—can rightfully be said not to be a part of the participatory story (since it does not contain reference to any elements in the story world). This amounts to a view of action in relation to participatory stories as consisting of two domains: a fictional game world domain, and a real life domain. One nagging question still lingers, with apparent similarities to the mind-body problem as formulated by Descartes: If these are two domains of a different kind, how can they causally interact? How is it possible for a real audience to influence a fictional world? The answer is straightforward: The causal influence of the (physical) audience is on (physical) matter, nothing else. However, the physical matter—such as electrical currents through a computer system—is the basis of an *experience of a game world in the audience*. Speaking of a fictional world as opposed to a real world is just a convenient shorthand.

The clear distinction between representation and represented holds nicely in personal computer-based participatory stories. But what about other participatory stories, such as live role-playing? As soon the objects, characters, places, events, and actions have a causal

connection to the real world, or when fictional and real objects share physical substrate, there are effects on the real world as well. For instance, if a stone is thrown through a closed window during a live-role playing session, not only did the stone break the window in the story, but it also did so in the real world. However, this is not an essential property but is contingent upon the situation that the story world and real world share physical substrates and actions are attributed the same meaning in both the story world and the real world. Throwing a stone at a window in the real world may represent something else in the participatory story, such as killing a king (however peculiar this interpretation may be). Even though there is a causal connection between an action in the fictional world and the real world, it does not necessarily mean that the actions carried out in the participatory story world mean that they are also carried out in the real world.

In conclusion, participatory stories are fictional, unless they are set up so that the fictional story world has causal connections to the real world, and the elements of the fictional story world are interpreted in the same way as in the real world. However, this requirement is rarely fulfilled in practice (actually, one can argue that if it is, we are no longer dealing with a participatory story, but with the real world). Thus, the conclusion is that participatory stories are fictional.

In summary, this chapter has presented a demarcation of participatory stories from non-participatory stories, building on a classification of Aarseth (1997) which was extended beyond cases of literature and re-formulated in terms of cognition. Among others, the category of participatory stories includes adventure games, interactive fiction, some computer games, role-playing games, and pretence. Typical non-participatory stories are novels, movies, fairytales, and everyday narrative. Participatory stories were characterised as physical systems separate from the audience allowing the audience to choose between different potential events sequences in a fictive story. The choice is made through some influence although

the manner in which the choice is made (in terms of fidelity or multimodality) was seen as immaterial.

Part I formulated a conceptual framework for participatory stories by defining story (narrative) and fiction in cognitive terms. These were then used as building blocks for participatory stories, also defined with cognition as the central component: *choice*. Having formulated the distinction between participatory stories and non-participatory stories in cognitive terms, the next step is to look more closely at these differences. Part II of this book deals with empirical studies of audience cognition.

Part II

Empirical studies

CHAPTER 5

A method for generating data for exploring off-line cognition

THE PURPOSE of this chapter is to present and discuss an explorative method to empirically study cognition in relation to participatory stories. As an instance of participatory studies, a work of *interactive fiction* was used (see Chapter 4 for a classification of participatory stories). The reasons for this choice are accounted for in the method section below, but in summary it can be said that interactive fiction is a prototypical example of participatory stories. The study was designed to provide rich data for off-line cognition, that is, the *results* of previously having experienced a participatory story.[18] The data consisted of speech and gesture when participants talked about a participatory story (and other sources as comparison) after having experienced it. To some extent, logged interaction with the participatory story in the form of transcripts was used. The analyses themselves are present in subsequent chapters: spatial memory (Chapter 6), memory qualities (Chapter 7), and perspective (Chapter 8). In this chapter, what is common to the method of these analyses is accounted for: selecting, collecting, transcribing, and coding data are described, motivated, and discussed.

Before the details of the method are presented, the natural context of using interactive fiction will be discussed.

[18] *Off-line* is contrasted with *on-line* and is used in the sense it has in research on reading comprehension, see, e.g., Trabasso and Suh (1993) and van den Broek, Lorch, Linderholm, and Gustafson (2001).

5.1 A CONTEXT ANALYSIS OF USING INTERACTIVE FICTION

Before beginning any laboratory study, particularly ones dealing with people, it is wise to ask the following question: What does the phenomenon that one is trying to study look like when it occurs naturally? This is a question that needs an answer before one starts to constrain the problem, remove influencing factors, and make the situation into an artificial one more controlled and suitable for study. This is important to consider because one does not want to distort the situation too much and make it too artificial, and thereby perhaps change the phenomenon itself. Methodological considerations are crucially determined by the nature of the phenomenon.

There has been criticism of methods where certain variables of interest are selected and studied in isolation, usually referred to as laboratory studies. The argument is that in order to study some factors one has to exclude other factors that might have an influence if they were allowed. This exclusion would make the result applicable only to the constrained study situation, and not to normal, everyday situations (e.g., Guba & Lincoln, 1994). However, this need not be a problem with laboratory studies per se, only with careless application of them. The problem can be remedied by being careful when making the transfer from natural to laboratory setting, or 'context stripping' as Guba and Lincoln (1994) call the process. For instance, in research on narrative comprehension, it has been demonstrated that the type of task affects the extent to which people construct mental models of the narrative (Wilson, Rinck, McNamara, Bower, & Morrow, 1993). So it is important to carefully consider what kind of instructions is given to the participants in an experiment.

What is the typical situation when a person is using a work of interactive fiction? Which factors are important and which are not? In this section some important influencing factors of the phenomenon to be studied will be identified—as it typically occurs. These factors constitute the *context* and will be divided into the subgroups *physical*

context, *temporal context*, *personal and social context*, and *stimulus context*. The issues of this discussion come from informal sources: talks with people who have experience with interactive fiction as well as from the author's personal background. Despite their informal sources, these points can generate important and fruitful discussion of context stripping in the case of interactive fiction.

In the following discussion, the term 'session' is used to refer to the uninterrupted period in which a user interacts with an interactive fiction system.

5.1.1 Contexts

5.1.1.1 Physical context

The immediate physical context is constituted by the user sitting in front of a personal computer, running the interactive fiction system. The phenomenon is likely to occur in a room in a home environment where the overall feeling is probably one of relaxation and very low stress, although occasional disturbances such as phone calls and nearby people may cause interruption. The user who normally uses interactive fiction probably has a positive attitude toward the computer as well as sufficient knowledge of how to operate it. If the user is running several programs at once on the computer, there might be an element of split attention. For example, if the user is browsing files on the Internet at the same time as using interactive fiction, there are likely to be effects on attention.

As the content of the work of interactive fiction can be quite complex, the user might need to take notes. This could be, for instance, drawing a map of the landscape, writing down secret codes or what character was where at what time. Without the possibility of memory aids, the user might 'get stuck' in a certain position in the work, or might wander about aimlessly.

Since interactive fiction usually is in English, persons with Swedish as their first language may look up unknown English words in a dictionary.

5.1.1.2 Temporal context

The user selects which work to use. Information about the work may be obtained from mass media, the product packaging, and material included with the work (such as a manual). The user's choice leads to high intrinsic motivation. The user is expecting a pleasant and exciting experience.

The typical consecutive period of use of a work of interactive fiction is several hours. It is used in this way during a period of several days or weeks. Longer pauses (months or years) might also happen, after which the work is used again. There is transfer of knowledge between sessions, perhaps much the same as when a reader of a traditional book picks up the book again after some time and continues to read.

5.1.1.3 Personal and social context

It is proposed that the typical user of interactive fiction is characterised by being a young adult or adult, having Western cultural background, being literate, experienced with computers, literature, films, and interactive fiction.

Why do people use interactive fiction? Even though there could be some educational applications of interactive fiction (such as learning a second language), the main reason is that people enjoy the experience. People use interactive fiction for reasons similar to those why people read novels for pleasure.

It is assumed that it is most common for a user to be alone while using a work of interactive fiction, even if situations of two or more people also occur. In earlier empirical research on computer games, often two or more persons have been playing the game (e.g., Johansson, 2000; Linderoth, 2004). There could be at least two reasons for this. First, it is a convenient way of obtaining data by recording the conversation between the participants. Second, the choice of more than one participant at a time may have been made because the research questions concerned more than one participant, such as how children can learn collaboratively by playing computer games together.

In situations of two or more people, collaboration on how to make progress in the work of interactive fiction would be a common element.

In a single-user situation, and possibly also in multiple-user situations, the user is free to perform actions without the usual social moral rules, which may influence the interaction by the use of socially inappropriate actions in relation to the work of interactive fiction (such as trying to kill, abuse, or perform sexual acts on the characters). These actions are likely to be absent in a study situation where the user is aware that her actions are being recorded.

5.1.1.4 Stimulus context

An authentic work of interactive fiction is complex; it is authored to captivate the user and be interesting and enjoying, both in content and in form. This makes it very doubtful to abstract any part or feature of such a system to construct artificial stimulus material. An authentic system constitutes an important factor in a study. Which interactive fiction work is used in a study is important to consider because works are associated with values. For instance, a work where the user plays, say, a murderer rather than, say, an anti-nuclear activist could be considered negative by some people. The number of existing interactive fiction works can be estimated to range between a few hundred and a thousand.[19] The majority of these would however probably be judged to be of poor quality by most users of interactive fiction. By choosing a work that has proved to be popular, user motivation should be higher. The study results can also be of more interest to the group of people who normally use this kind of works (this is what Guba & Lincoln, 1994, call 'the etic/emic dilemma' of research).

[19] No prior attempts to estimate the number of interactive fiction works in existence were found. To arrive at this informal estimate, the World Wide Web was browsed for information about commercial and non-commercial works, starting at the *Interactive fiction archive*, http://www.ifarchive.org.

5.1.2 Moving from natural setting to study setting

Which factors are most affected when the natural context is removed, and what influence will this have on a study? Most important are those factors that might alter the phenomenon in a study situation.

Concerning the physical context, the most important factor that is considered to influence the study is the fact that the user is no longer in a familiar home environment, but in a laboratory. This might make the user nervous, and at least make the enjoyment less than what is possible in a home environment. The solution was to keep the study environment as close to a home environment as possible.

Another major difference between the natural situation and the study situation is that the user is no longer permitted to choose what work she will experience (and possibly also at an inconvenient time). One possibility is to let the user (at a time convenient for the user) choose the work, among a few alternatives. This of course leads to methodological problems when comparing the results from users who have chosen different works, which makes comparison difficult. The solution was to use a single work of interactive fiction, but to carefully choose an interesting work, thereby maintaining a high level of user interest.

A final factor, which perhaps is the most influential one of all, is that the user is being observed by a researcher. The researcher could leave the room, but the user's awareness of the study context can be distracting and lead to unnatural behaviour. Also, for any study of on-line cognition (such as what is taking place *while using* the work of interactive fiction), some recording needs to be made (such as computer activity logging or audiovisual recording). To the extent possible, unobtrusive methods of recording should be used. For studies of off-line cognition (the results of having used a work of interactive fiction), recording is not necessary, and distraction from recording is not an issue (unless the user suspects her behaviour is being secretly recorded).

The conclusion of the context analysis for the purpose of study design is that the study situation should be as natural as possible and the task should be to use a work of interactive fiction in a manner normally done. The study should include an actual work of interactive fiction, even if this leads to a more methodologically difficult design.

5.2 LANGUAGE AS DATA FOR OFF-LINE COGNITION

Studying *off-line* cognition means looking at what happens *after* the process of comprehension has taken place. It is the study of the results of comprehension, for example, mental representations in long-term memory of people who have experienced a participatory story. This is contrasted with *on-line* aspects which are dynamic and take place at the time of comprehension, such as attention, working memory and the dynamic activation and deactivation of inferences.

One way to study thought is through language. What a person says and how she says it can show us much about what is going on in that person's mind. Speech can tell us about the content of memories, accuracy, as well as whether certain kinds of details are remembered better than others. The choice of lexical items can reveal conceptualisations. The choice of pronouns can reveal what perspective a person adopts on some event described. Besides speech, the spontaneous gestural activity that routinely accompanies language production is highly systematic and gives insights into a person's cognitive processes (McNeill, 1992).[20] Note that the reference to gesture here is not to typically symbolic gestures, such as making a 'V' sign with your fingers to signal victory, but rather gestures that are generated mostly in an automatic, not conscious manner during speech. For instance, speech can show what people consider important in an episode they are talking about, and ges-

[20] This holds regardless of whether one assumes, like McNeill, a single underlying speech-gesture system, or separate systems for speech and gesture.

tures can show how they mentally spatially locate themselves in relation to things being described; as an observer looking at the scene from the outside, or within the scene, as a character performing some action. Gesture is particularly interesting as a window to cognition because it is mostly non-conscious, thus minimising conscious factors such as elaboration and inhibition. Conscious elaboration of memories can lead to a result that is not so much about the original memory, but a product of conscious inferences, guesses, and expectations. Inhibition can act to suppress overt behaviour which would otherwise serve as evidence of some cognitive process. The study of gesture enables a view of cognition that is in this way more primary.

These are the reasons for carrying out a study of language when people talk about remembered events. It is a fruitful way to learn about many aspects of off-line cognition. Particularly, we can learn what constitutes cognition involved in thinking about participatory stories, and how it may differ from cases with non-participatory stories.

In order to obtain speech and gesture as a basis for study, informal interviews were carried out with eight persons. The participants were asked about events from five different sources which they had experienced earlier (details are given in the methods section below). The goal was to make the interview situation as close as possible to an authentic conversational situation. Participants would talk as freely and naturally as possible, in order to provide a rich base for analysis of conceptualisations and memories. Audiovisual recordings of participants' verbal and non-verbal behaviour were made and transcribed. This allowed careful analysis of speech and gesture. The data were analysed from a variety of viewpoints, which is described in chapters 6 to 8. The nature of participants' spatial memory of a participatory story is the focus of Chapter 6. In Chapter 7, the phenomenal qualities of memories from participatory studies and other sources are compared, as they surface in the verbal accounts of events given by the participants. Finally, in Chapter 8, the perspectives that participants adopt in relation to the events and actions performed in a participatory story are investigated. Who

carries out actions—the participant herself, the participant's agent in the participatory story, or a character viewed in a third-person perspective? Here, expressions in speech and gesture are studied as indications of perspective.

One has to keep in mind that the data about memory generated by this method of investigating language may differ from how memory is manifested in an authentic situation. In this book the parts of memory that are visible through language are studied. Although this can reveal both conscious and non-conscious parts of memory, it does not reveal how memory is *used* in a natural situation. There may be parts of memory that are behaviour-based, such as procedural and implicit memory, which would only show in a situation that includes action. However, this is a methodological trade-off that was selected in favour of language as data on off-line cognition.

The following section presents and discusses the empirical method used to collect data for the analyses carried out in this book.

5.3 METHOD

5.3.1 Material

5.3.1.1 Overview

This study starts with the assumption that a fruitful way to investigate how people remember and think about participatory stories is to study speech and gesture when people talk about participatory stories. In order to know what is particular about talk about participatory stories, these are contrasted with non-participatory stories. As a case of comparison, a traditional short story was used in the study. But since there are some inevitable differences between any given short story and any given participatory story, besides the feature of participation—such as the subject matter and style—a special non-participatory version of the work of interactive fiction was

also prepared (and this appeared similar to a short story). The types of stories discussed so far could be said to be fictional, so a type of narrative that is non-fictional is useful as a third contrast. A personally experienced episode is an example of this third kind. However, these events could have happened a long time ago and could have been retold and reshaped in memory many times. Thus, an additional set of laboratory tasks was used as a way of gaining more control over the events experienced. In summary, the source conditions used were the following:

- *Game:* Events from a computer game which the participants played.
- *Story:* Events from a short story which the participants read.
- *Personal:* Events that took place earlier in the participant's life.
- *Tasks:* Events from three tasks carried out in a laboratory setting.
- *Non-participatory:* Events from a special, adapted non-participatory version of the computer game, printed on sheets of paper, which the participants read.

Table 5.1 shows a summary of the factors of the five source conditions used in the study. The possible impact on memory of the five source conditions is discussed in Section 5.5.1.

Early research on reading often used short experimenter-created texts as stimuli. These texts were highly artificial and lacked many aspects of texts found in naturally occurring situations, such as being aesthetically enjoyable, interesting, and motivating. It has been widely recognised within the field of reading research and discourse processing that research should rather include authentic texts, such as published novels and short stories, even if this means a decrease in control of influencing factors (Graesser, Swamer, & Hu, 1997).

Consequently, for the collection of language data here, a real interactive fiction computer game and a real short story were used.

Table 5.1. Summary of factors of the five conditions in the study.

Source condition	Source condition factor			
	Fictive or not	Participatory or not	Approx. time spent	Elapsed time since encoding in memory
Game	fictive	participatory	1–2 hours	recent (0–2 hours)
Story	fictive	not particip.	20 min	recent (0–2 hours)
Personal	non-fictive	participatory	unknown	1 day to several years
Tasks	non-fictive	participatory	30 min	recent (20 min)
Non-particip.	fictive	not particip.	20 min	recent (5 min)

Note: *Fictive* refers to whether the events should be evaluated in relation to the real world or not (see Chapter 3), *Participatory* means that the participant had the ability to make choices in relation to event sequences (see Chapter 4), *Time spent* means how long the encoding situation lasts, *Elapsed time since encoding* gives the time between encoding (i.e., experiencing or reading about the events) and retrieval (i.e., talking about the events).

The general requirements for the stimuli for the five types of sources are that they should be as similar as possible regarding content, complexity, elapsed time since encoding in memory, degree of elaboration, and rehearsal. However, all these requirements could not, for various reasons, be fulfilled. Also, given the explorative nature of this study, it was not crucial that all of them were fulfilled. Details are given below.

5.3.1.2 Interactive fiction

A work of interactive fiction entitled *Anchorhead* (Gentry, 1998) was used in the study (in the following, this title will be used to refer to the work of interactive fiction used in the study). *Anchorhead* simulates a world in which the player can control the main character to move around, and interact with objects and other characters. It can be classified as typical piece of interactive fiction (sometimes

referred to as an 'adventure game'), see, for instance, Aarseth (1997). It is a single-player game and does not connect to any computer network. Figure 5.1 shows the location of *Anchorhead* in the general classification of participatory stories from Chapter 4.

Anchorhead consists entirely of English language text. It outputs descriptions of locations, objects, persons, and events, and the player types commands using close-to-natural English sentences on the computer keyboard. *Anchorhead* contains places to explore, people to interact with, objects to manipulate, and an underlying plot that drives the action and sets goals for the player. See the appendix for a transcript of interaction with *Anchorhead*.

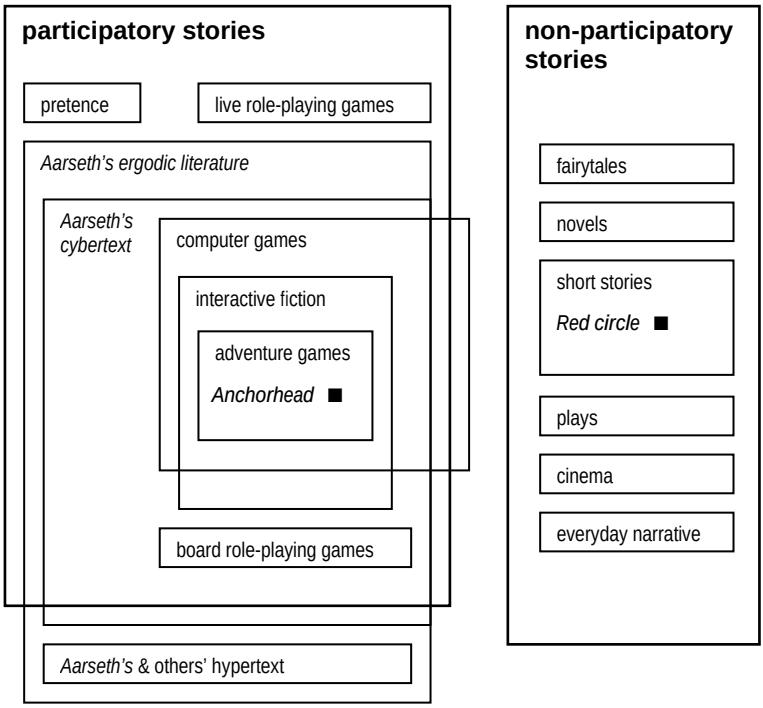

Figure 5.1. Location of the work of interactive fiction, *Anchorhead*, and the short story, *Red circle*, in the general scheme of participatory stories as defined in Chapter 4.

Anchorhead ran on a standard personal computer (Intel Pentium III CPU, Microsoft Windows 98, 17 inch screen, and standard PC keyboard) using the WinFrotz Z-machine interpreter software (Lawrence, 1999). The text size was set to larger than the usual text size on the system (such as for menus and window titles) in order to be clear and easily readable. The colour of the background and the text could be set to the personal preferences of the participant. Figure 5.2 shows a screen dump from the WinFrotz software running *Anchorhead*.

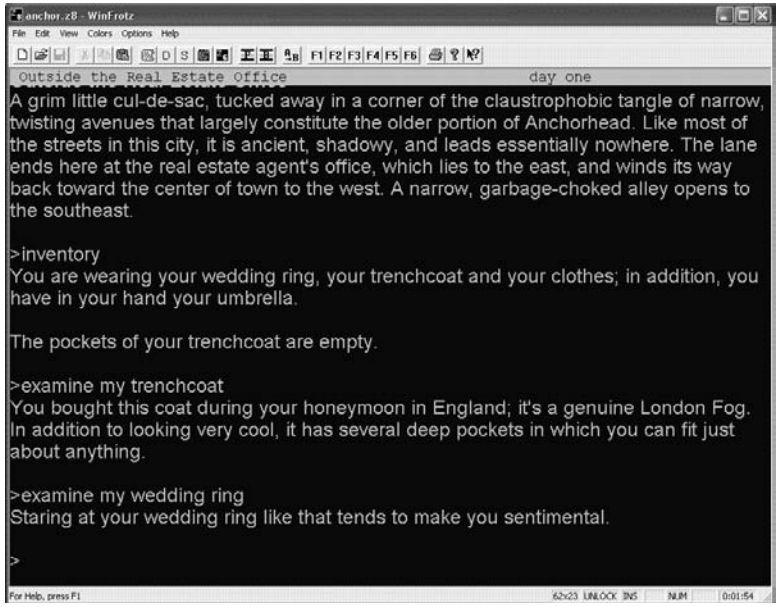

Figure 5.2. A screen dump from the WinFrotz software running *Anchorhead*.

When the work of interactive fiction was selected for the study, these were the main requirements:

- The work of interactive fiction should have a strong narrative element and plot, in order to be comparable to a short story.
- It was desirable that the work should be considered good within its genre. The work used was considered excellent by a vote of the interactive fiction community.[21]
- It should be recent, because more recent works of this type are technically better than old ones at handling the user input, thereby making the interaction smoother and the work more enjoyable. It is also more likely that participants have not already been exposed to a new work than an old one.
- It should be text only, and not contain images, audio, or video, to be similar to the short story and make them easier to compare. Any differences found would be easier to attribute to content because both interactive fiction and short story are text only.
- The content of the work should be realistic and not too fantastic, so that the events could be compared to people's own personal experiences.
- It should include at least one other character, besides the main character, in order to compare with short stories, which typically contain several characters.
- Participants should be able to finish a relatively autonomous part (comparable to a chapter in a book) of the work within 1–2 hours (longer time could tire the participants and would make the study unmanageable).

[21] In the Xyzzy Awards of 1998, winner of Best Setting, and finalist in the following categories: Best Individual NPC, Best Puzzles, Best Writing, Best Game, Best Story (Mullin, 1999a,b).

- Participants should not have experienced the work before.
- The contents should be neutral in that it should not contain arguably charged matters such as politics, gender issues, eroticism, etc., which could offend participants.
- The language used should be easy to read and understand, so as to maximise memory encoding, and also make the participant able to make progress in the work.

Anchorhead was seen to fulfil most of these requirements; however, some aspects of this work were less than optimal:

- It is somewhat slow and the plot does not advance by itself (there are other works where the plot advances by itself, even if the player does not perform actions to advance the plot).
- It had many locations to visit—this could be confusing and difficult to remember.
- The main character is female, so the player controls a female character. Could that make it difficult when the participant is male?

However, the interview revealed that all participants enjoyed playing *Anchorhead* and thought it was exciting. They did not have much difficulty finding their way around and (the male participants) were not bothered by the fact that the main character was a woman.

No other material, such as dictionaries or paper and pencil, was provided in order to reduce the complexity of the study. Possible consequences of this are discussed below in Section 5.5.3.

One artificial constraint was that only the first part of the *Anchorhead* was used in the study, because of time limitations (the full work typically takes dozens of hours to complete).

It is difficult to simply state the length of *Anchorhead*, say, in a measure such as the number of words. The length of *Anchorhead* is relative to how it is used. To get a rough estimate of the textual

length, one can look at the length of the log files that were generated while participants interacted with *Anchorhead*, which shows all textual activity from *Anchorhead* as well as from the participant, although this includes a large portion of repeated text output by the game. Another measure of the length of *Anchorhead* is the amount of time spent using it. Time spent on *Anchorhead* and length of the resulting log file are presented below in the section 'Overview of data' (Table 5.5). Thus, regardless of the measure used, the length of *Anchorhead* varies among participants. This is an inevitable consequence of what participatory stories are (see Chapter 4).

5.3.1.3 Short story

The short story used in the study was the first part of a Sherlock Holmes tale written by Arthur Conan Doyle (1911/2000) called *The adventure of the red circle* (in the following referred to as *Red circle*). It consisted of 5,702 words and was printed in 15-point Times New Roman typeface on 14 white sheets of A4-sized paper, stapled together. The title of the short story was presented at the top of the first page. The complete original short story consisted of 7,409 words. It was judged to be unnecessarily long for the study and was cut off at a place that was judged to be a natural end-point. In that respect, it had a parallel with the computer game, of which again only the first part was used.

In Figure 5.1, the location of *Red circle* can be seen in the general classification of participatory stories from Chapter 4.

These were the main requirements when selecting the short story:

- It should be text only (no pictures), to be similar to the game.
- It should include at least two characters.
- It should tell about events in grammatical past tense (or perhaps present tense)—future tense makes it too different from the other source conditions.

- It should not have very unusual or bizarre contents, because it might make it stand out in memory too much in comparison to the other two conditions.
- It should include some events that could make the participants use narrative spatial gestures (because this was an area that was planned to be explored in the analyses later), for instance, someone going somewhere, spatial relationships between objects, and positions of characters that are important to the story.
- It should be in English, because the game was in English.
- It should be easy to read and understand.
- It should take about 15–30 minutes to read in order not to make the total study session too long and tiring for the participants.
- It should not be well-known; participants should not have read it or heard about it before.
- It should not contain arguably charged matters such as politics, gender issues, eroticism, etc., that could offend participants.

Many stories are available both as a printed text and as a computer game, such as J. R. R. Tolkien's *The lord of the rings* and Douglas Adam's *The hitchhiker's guide to the galaxy*, which seems to present ideal cases of stimuli on which to base a comparison. However, these were considered unsuitable because they are well known and are likely to have been read or played by the participants. The uncontrolled elaborations and reading and talking about these stories would introduce a major bias in the study. The chosen work, *Red circle*, was similar to *Anchorhead* in that both contained problems and puzzles to be worked out.

5.3.1.4 Non-participatory version of the work of interactive fiction

Because of differences between *Anchorhead* and *Red circle*, besides participation, such as contents, style, description of spatial arrangements, etc., a special, non-participatory version of *Anchorhead* was prepared. In this way, it was possible to make a closer comparison of how participants talked about spatiality and character perspective as influenced by the factor of participation. The text output of a standard session with *Anchorhead* was captured (it was compared to actual sessions from participants 1–4). Some minor changes were made to the text in order to make it readable as a short story:

- Repeated descriptions of environments (a standard feature of the work of interactive fiction) were removed.
- Some minor stylistic modifications were made, such as summarising some repetitions and joining some passages using small phrases.

At the top of the first page was written 'Anchorhead' followed by 'A gothic by Michael S. Gentry'. The text was 5,885 words long, printed in 16-point Times New Roman typeface on 19 white sheets of A4-sized paper, stapled together.

5.3.1.5 Laboratory tasks

In order to elicit talk about real, personally experienced events, questions were put in the interview about things that had happened to the participants. However, personally experienced events may have been thought about and retold before, and therefore reshaped in memory (Labov & Waletzky, 1967; Schank, 1990; Tversky & Marsh, 2000; Niedźwieńska, 2003). It is also the case that events which took place more than a day or two ago differ in how they are represented neurologically compared to very recent memories (Conway, 2002). These two reasons made it unsuitable to rely on personal experience as the sole case of comparison. To balance this situation, a number of laboratory tasks were devised. These tasks were designed to produce personal experience in a more controlled manner.

The requirements for selecting tasks were the following:

- Tasks should include as many sensory modalities as possible and not just be paper-and-pencil tasks, in order to be comparable to prior personal experience.
- Tasks should not be fictional in nature or be experienced through any media such as text, images or video, in order to ensure self-experience.
- Tasks should involve a variety of skills: visual, mathematical, artistic, etc., although no expert skills.
- Tasks should be motivating and fun.
- Tasks should be manageable, that is, not take too long, and be possible to carry out inside one room.

In order to increase motivation and make it possible for participants to perform the tasks that they have an interest in, participants were allowed to select three out of five tasks to carry out. A large number of tasks were pilot-tested, and reduced to a list of five that worked practically:

- Determine the size of the room, given a paper, pencil, a piece of string, and a ruler.
- Arrange five small metal objects from lightest to heaviest.
- Guess the contents of five sealed opaque plastic jars (containing sugar, rice, etc.).
- Tie three types of knots on three pieces of rope from pictorial instructions.
- Make an abstract collage out of magazines using glue, paper, and scissors.

5.3.1.6 Interview questions

The idea of the interview questions was to bring out as much as possible of the participants' memories, for instance, what they re-

membered about events, how they viewed events, and about the spatial details of the events. This was done by guiding them as little as possible and allowing them to speak freely.

The following criteria were used for selecting interview questions. The questions should

- elicit talk by the participant which includes gesture, especially spatial gestures
- make the participant want to tell about events in the five conditions
- be informal and make the participant as relaxed as possible
- focus on content (not meta-work features, i.e., how the game was programmed or how the short story was written)
- not reveal or help participants guess the actual research questions
- not influence the participants with regard to the research questions—questions should not contain pronouns or perspective (e.g., 'Did *you*...' or 'Did *the character*...').

The interview questions were formulated to be as neutral as possible. The participants were asked 'to tell what happened in the game' and 'what happened in the short story'. The interview questions about the participants' personal experience were linked to events from the computer game or the short story, asking whether a similar event had happened to them personally. This way, the conversation moved on naturally, and material suitable for comparison was obtained.

5.3.1.7 Study locations

The study was carried out in rooms which all were arranged to be neutral and home-like, so that the participants would feel as relaxed as possible, in order not to distort natural use of interactive fiction, reading, or conversational behaviour.

For the participants who played *Anchorhead*, the initial briefing and using *Anchorhead* took place in a laboratory with a personal computer. Participants had the option to close the door to be alone while using *Anchorhead*. Lights were dim and it was ensured that they did not reflect in the computer monitor. Reading of the short story took place in a room with normal lighting. Participants had the option of closing the door to be alone while reading.

The participants who carried out laboratory tasks had the briefing, the tasks, and the reading in the same room. The room had normal lighting, closed door and a window to a control room.

The interview was conducted in a room usually used for video recordings. Two soft chairs were arranged facing each other on opposite sides of a small coffee table, where glasses of water were available. The room had normal lighting conditions.

All rooms had normal indoor temperature and ventilation.

5.3.1.8 Recording equipment

The participant's actions in the computer game were logged on the computer as text files with a built-in function in the WinFrotz Z-machine interpreter software (Lawrence, 1999).

For recording the interviews, a mini-DV digital video camera with built-in stereo microphone, placed on a stand, was used.

5.3.2 Participants

Eight persons, four males and four females, aged between 20 and 36 participated for pay. The participants were students recruited at Göteborg University, Sweden.

The general requirements for selecting the participants were the following:

- They should be adults. Cognitive functioning should be fully developed and they should have normal Western cultural background knowledge.
- They should have Swedish as their first language.
- They should have reading and writing skills in English.

- They should not have any physical disability that stops them from moving their arms and upper body.
- They should not have been exposed to the work of interactive fiction or the short story prior to the study.

For the first four participants, who used *Anchorhead*, the additional requirement was that they should have some experience with other works of interactive fiction similar to the one used in the study, so that they would not need to be trained before participating in the study (this requirement was mentioned during recruitment). All of the above requirements were checked, either at recruitment, through the main interview, or through a questionnaire. Table 5.2 summarises the variables of the participants in the study.

A design of two groups of four participants each was used because the same eight participants could not participate under all conditions. This would reveal the underlying study idea and make the situation unnatural, and in some cases confound the effects of the conditions (e.g., having participants play the game *and* read the non-participatory version of the game).

Most participants had Swedish as their first language, and the remaining two who did not were judged to have an excellent knowledge of Swedish as determined from the interviews. The English proficiency of the participants was good or excellent (as judged from the interview). (If a participant commented about at least one problem in understanding the English in the game or the short story, they were rated 'good' and if they did not report any problems with the English, they were rated 'excellent'.) A further indication of sufficient background knowledge of both English and works of interactive fiction was the fact that all four participants were able to successfully finish the required part of *Anchorhead*.

It turned out that participant 3 had played the computer game prior to the study. However, his data were treated in the same way as the others' data. Discussion of and arguments for this may be found in Section 5.5.4 below.

Table 5.2. Participants' variables.

Participant	Participant variables					
	Gender	First language	English proficiency	Unknowing interviewer	IF experience	
1	male	Polish	good	no	a few works	
2	female	Swedish	excellent	yes	many works	
3	male	Swedish	good	yes	many works	
4	male	Swedish	good	yes	a few works	
Participant	Participant variables					
	Gender	First language	English proficien.	Unknowing interviewer	Reads fiction	Difficulty of text
5	female	Russian	good	yes	1/week	medium
6	female	Swedish	excellent	yes	>1/week	medium
7	female	Swedish	good	yes	>1/week	medium
8	male	Swedish	excellent	yes	>1/week	medium

Note: *Unknowing interviewer* refers to whether the participants believed that the interviewer did not know about the game or story they were asked about (this was a consequence of the study design). *IF experience* refers to how extensive experience of interactive fiction the participant had. *Difficulty of text* refers to how the participants rated the difficulty level of the text. *Reads fiction* refers to how often the participants read fiction. These two last factors were self-rated on a questionnaire.

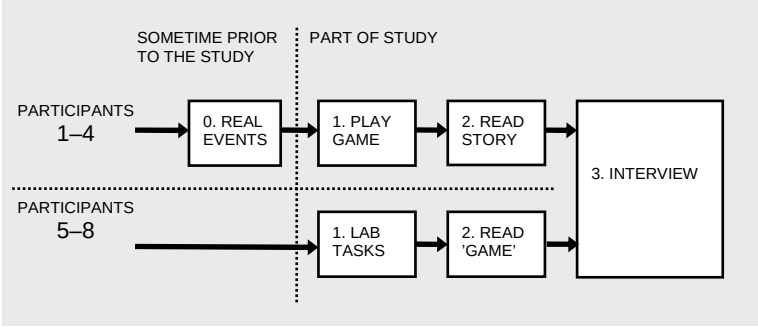

Figure 5.3. Overview of the study procedure.

5.3.3 Procedure

The procedure differed for the first four participants and the last four participants. Figure 5.3 shows an overview of the procedure.

The first four participants, one at a time, were taken through the following steps of the study:

1. The participant was given a brief introduction to the study. The participant was told she were going to use (the first part of) a work of interactive fiction, then read a short story, followed by a talk where she was going to be asked about her opinions on the work of interactive fiction and the short story. She was told that the experimenter did not know the contents of the work or the story.[22] The words *memory*, *gesture*, *spatiality*, or *perspective* were not mentioned during the study in order not to influence the participants.
2. The participant was instructed to use the work of interactive fiction as she would if she were doing it alone, at home. The participant began and the starting time was noted. Every 15 minutes, a check was made by the experimenter on the participant's

[22] For participant 1, the experimenter was not told to be unknowing of the contents (due to experimenter error).

progress. Hints, in the form of keywords, one by one from a list, were given if needed to help the participant make progress. This elaborate setup was used so that the participant would still believe that the experimenter did not know the contents. When the participant reached the end of the first part of *Anchorhead*, the time was noted. The amount of time each participant spent with *Anchorhead* is presented below in the section 'Overview of data'. All participants were able to finish the required part of *Anchorhead*.

3. The participant was taken to another room and given a short story to read silently. Starting and finishing times were noted.

4. The participant was informed that the main part of the study was over and that she now was going to be asked about her opinions on the work of interactive fiction and the short story. A semi-structured interview followed in another room. Questions guided the interview, but if a new topic was introduced by the participant, there was room to pursue it. A video camera, filming the participant, placed at an angle from the participant not directly in front of her or him (in accordance with McNeill, 1992), was turned on. The participant was told that the video camera was used for convenience, instead of the interviewer taking written notes. The participant was not told that the interview would be transcribed. The interview was conducted in a conversation-like manner. The order of questions was fixed, but some improvisation was done to move between or skip questions, in order for the conversation to be more natural (see section 'Interview questions' above). The interview questions were arranged so that talk about events from the five conditions would be mixed. This was to avoid the situation where the participant would become more relaxed as the interview proceeded and perhaps talk more and gesture more frequently, which otherwise could introduce a systematic influence on how the participant talked about the conditions.

5. After the interview, participants received pay and were fully debriefed. Participants were told not to discuss the study with other people.

For the remaining four participants (nos. 5–8), the following steps were carried out for each participant in turn:

1. The participant was welcomed by an assistant and seated in a separate room which had a window to where the assistant was sitting. A paper with written instructions introduced the study and requested the participant to select three out of five available tasks, by looking at a descriptive keyword of each task.
2. The assistant provided the participant with four boxes, three containing the tasks and the fourth containing the non-participatory version of the work of interactive fiction.
3. The tasks were dealt with in order, the non-participatory story coming last.

Steps 4 and 5 were the same as for the first four participants. The exception was that the interview was carried out by a new person, not present in the first part of the study. The arrangement of an unknowing interviewer was chosen in order to make the interview situation closer to a real conversational situation. The participant would find it more natural to talk about what happened when he or she believed that the interviewer did not know about it.

The procedure ensured that a sufficient amount of time passed between encoding and retrieval. Information about the game or the story was lost from short-term memory, and could only be accessed from long-term memory at the time of the interview.

The ordering of *first Anchorhead*, *then* reading the story (for the first four participants) and *first* carrying out tasks, *then* reading the non-participatory version of *Anchorhead* (for the last four participants) was fixed for all participants. This ordering was used because it removes any risk that the participants might think that clues from the short story should be used while solving problems in *An-*

chorhead, or that clues from the non-participatory version should be used for solving the laboratory tasks.

The entire procedure was carried out in one sequence, rather than being split up across two or more days. This minimises several risks: First, rehearsal leading to biased strengthening of certain parts of memory is minimised. Second, there is no risk that the participant finds *Anchorhead* on the Internet and plays it in an uncontrolled manner. Last, the participant is stopped from discussing *Anchorhead* with other people. There are at least two risks with the procedure used in the study (without pauses): fatigue, affecting attention and memory encoding, and interference, leading to confusion between *Anchorhead* and the short story. However, no evidence of these two drawbacks was seen in the data.

An important design choice was to instruct participants that they were going to talk about *how they liked* the game and the short story. This makes it unlikely that they anticipated a memory test, and the playing and reading could take place in a way close to an authentic situation.

5.3.4 Transcription and coding

The transcription of speech and coding of source condition segments are presented here. More detailed coding of speech for various analyses is described in Chapters 6–8, together with the relevant analysis. The transcription and coding of gesture are described in Chapter 8.

5.3.4.1 Transcription of speech

Speech and non-verbal communication of the interviewer and the participants in the auditory channel, such as emphasis, some intonation, laughing, smacks, and inhalations were transcribed. Other non-verbal communication was considered to lack theoretical relevance to the research questions and was therefore ignored. Speech was transcribed in Swedish standard written orthography using an adapted Conversation Analysis standard. See Table 5.3 for a transcription key.

Table 5.3. Transcription key for speech.

Element	Meaning	Description
(.)	pause	If a clearly perceptible pause is present. Pauses are only transcribed as present or not, and no time is given.
(unclear)	uncertain transcription	If speech is unclear, but still probably accurate, this is placed within parentheses.
()	speech left out	If the speech is unintelligible.
under	emphasis	If a word or phrase is emphasised, it is underlined.
a[a] [b]b	overlapping speech	If speakers speak simultaneously, their speech is shown left-justified in a column within brackets.
:	prolongation	Colons are used to indicate prolongation of the sound just preceding them.
-	interruption	A hyphen directly after a word or part of a word indicate an interruption (often self-interruption)
!	exclamation	An exclamation mark at the end of a word indicates that it is uttered louder than surrounding speech.
?	rising intonation	A question mark at the end of a word indicates a rising intonation (not necessarily a question).
=	connected speech	If the speech is connected (without pauses) with speech on an earlier line, the two lines are ended and started with an equal sign.
((a))	non-speech	Text within two parentheses indicates non-speech activity, e.g., ((smack)) for smacking with the lips, ((laugh)) for laughing.
°h	inhalation	A ring followed by a number of h's indicates audible inhalation. The number of h's shows the length.

5.3.4.2 Coding: Segmentation of discourse

The transcriptions were coded into five types of segments according to which type of events or conditions they were referring to: Game, Story, Personal, Tasks, and Non-participatory (see Table 5.1). Almost always, a segment was demarcated by the interviewer changing the topic with a question or a request, such as 'now let's talk

about the short story'. The sum of the segment lengths for each participant and condition is presented in the section 'Overview of data' (Table 5.7).

5.4 OVERVIEW OF COLLECTED DATA

A general overview of the collected data is presented here (results of separate analyses are presented in Chapters 6–8). First, times and log files for *Anchorhead* are presented, then transcriptions and coding of the interviews.

5.4.1 Times and log files for *Anchorhead*

Table 5.5 shows the time spent using *Anchorhead* for each participant, as well as the length of the resulting log file. An excerpt from a log file created while using *Anchorhead* can be found in the appendix.

5.4.2 Interviews

5.4.2.1 Transcriptions

Table 5.6 shows the total and individual lengths of the transcriptions for the participants.

5.4.2.2 Coding

Table 5.7 shows the sum of the segment lengths for the five conditions and the eight participants. The segments for a source condition were rarely consecutive. As discussed, the methodological aim was to mix conditions temporally—to the extent it was natural to the conversational situation—in order to avoid 'warm-up' effects.

Table 5.5. The time participants spent on *Anchorhead* and the length of the generated log files.

Participant	Length (hour:min)	Length of log file (words)
1	2:16	14,910
2	1:04	26,104
3	0:22	10,288
4	1:24	26,518

Table 5.6. Length of transcribed material for the eight participants.

Participant	Transcribed length (min:sec)
1	23:14
2	15:10
3	16:57
4	32:10
5	13:50
6	6:04
7	8:12
8	7:28
TOTAL	123:08

Table 5.7. Sum of segment lengths of audiovisual recordings for the five source conditions and the eight participants.

	Source condition				
Participant	Game	Story	Personal	Tasks	Non-participatory
1	11:24	07:45	03:57		
2	07:06	05:53	02:11		
3	07:32	06:31	01:53		
4	13:23	10:59	07:47		
5				04:34	09:16
6				01:03	05:01
7				02:43	05:29
8				01:40	05:48

Note: Times shown in minutes:seconds.

5.5 DISCUSSION OF METHODOLOGICAL ISSUES

In this section, various methodological issues will be discussed. First, a detailed investigation is made of how memory is influenced by the design of the study. Since memory is the central object of study, it is crucial that no unwanted distortions introduce bias that affects the issues under study. After that, ecological validity is discussed related to the naturalness of the playing, reading, and conversational situations. Further, a note is given on re-playing *Anchorhead*, and the possible effects it might have on the study. Finally, the issue of generalisability is addressed.

5.5.1 The implications of the study design for memory

Since the study taps into participants' memories, it is of concern how the study deals with various factors affecting their memory. At what stages in the study is information encoded into memory, and at what stages is it retrieved, and what possible pitfalls concerning memory need to be guarded against?

The present study examines what happens *after* participants have used *Anchorhead*, read the non-participatory version of *Anchorhead*, read a short story, carried out laboratory tasks, and experienced personal experiences. Within the participant's cognitive system, it can be said to be the last step in the chain, which starts with encoding in memory—in the playing or reading situation—and ends with retrieval of information from memory—in the interview situation. In this section follows a discussion of the information's path from start to finish, originating with stimuli outside the cognitive system, which is encoded by the participant and ending with the data coding procedure (see Figure 5.4).[23] This sequence is used in the following to structure the discussion of memory factors which could introduce bias in the study.

[23] It is also reasonable to say that information flows in the other direction, *from* the participant's memory *to* the stimuli, as the participant carries out actions.

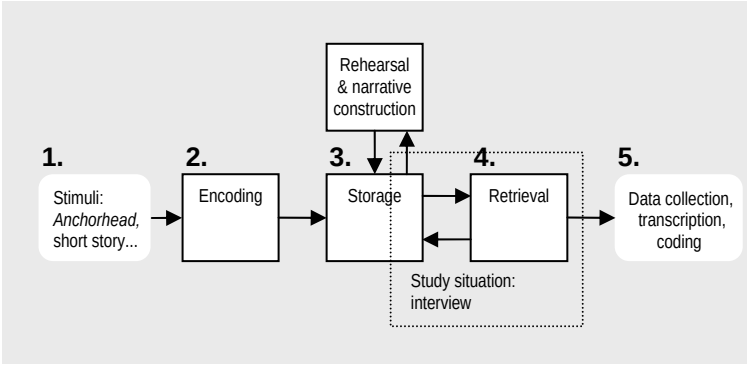

Figure 5.4. An overview of the flow of information in the present study. Information (1), enters the memory system (2–4), and is finally captured through recording, transcription, and coding (5).

The point of this discussion is that *either* the design of the study minimises any relevant memory distortions successfully, *or* the alterations of information play no significant role in relation to the subsequent studies in Chapters 6–8.

5.5.1.1 Stimuli

Although much of the information is created in the interaction with the participants, some portion of the information could be said to exist outside the participants at this stage. The stimuli in the five conditions have some notable differences. The computer game *Anchorhead*, the short story *Red circle*, and the non-participatory version of the computer game all consist of English text. The last two of these are presented as printed text on paper, while the computer game is text on a computer screen. The stimuli in the game condition also consist of a computer keyboard for typing text. The other two conditions, the personally experienced events and the laboratory tasks, share the property that they occurred in the real world and thus potentially involved the full perceptual repertoire, in terms in sense modalities, of the participants.

Nevertheless, the five conditions are similar in that they all can be said to contain various actions in time (which in later cognitive processing stages become represented as discrete *events*). 'Action' here means that someone is doing something. The conditions are also similar in that they all consist of elements of these actions that have various spatial relationships. A special spatial position, which is present in all five conditions, is that of the experiencing self in relation to other elements of the actions.

5.5.1.2 Encoding

The participant plays the computer game, or reads the short story. Stimuli are encoded in memory through a constructive process, depending on the attention, goals, and background knowledge of the participant. Another way of putting it is that meaning is created in this stage. Stimuli not attended to are not encoded (save for subliminal perception, which is judged to be highly marginal in this context). Purpose determines how attention is controlled, but also how stimuli will be encoded (van den Broek, Lorch, Linderholm, & Gustafson, 2001). In the current study, the purpose of reading or playing for entertainment or interest was induced (as opposed to a purpose of memorising details for a subsequent memory test). Background knowledge is what makes the participant able to understand the stimuli, by relating it to earlier knowledge, for instance, using memory schemas (Graesser, 1981), including expectations on narrative organisation (Bartlett, 1932). The participants had the required background knowledge to understand the game, the short story, and the laboratory tasks.

The time for encoding differed across the conditions. This is a natural consequence of the nature of participatory stories, and a consequence of letting participants read the short story at their own pace. Since experiencing a participatory story depends on participation, this inevitably results in variation in encoding times among participants. Again, this is nothing we should control, since it would detract from the authenticity of the participatory story situation. Unless we design a study to incorporate a very high number of participants so that we can match those with similar times, we are

left with the variation in encoding times. The same is the case for the short story and the non-participatory version of the computer game. Reading should be at the participant's own pace. Participants were instructed to read through the texts once, thus minimising the risk that repetition would be the cause of variation in encoding times. Nor is it reasonable to control the time taken for participants to carry out the laboratory tasks. The differences in encoding times have consequences for what we can meaningfully study and for the conclusions we can draw. Longer encoding times generally lead to more successful retrieval, so comparing memory for details across conditions would not be sound. On the other hand, if the natural mode of experiencing participatory stories as compared to non-participatory stories entails different encoding times, and this in turn leads to differences in retrieval, it would still be an empirical finding worth showing.

As was discussed in Chapter 4, it is likely that the process of event comprehension is similar across sense modalities, such as listening, reading, or watching, and also similar when comparing real life events and events presented in a medium such as text.

5.5.1.3 Storage

Knowledge is held in long-term memory in the storage phase. Possible influences on memory at this stage are interference, rehearsal, narrative construction, and fading. These will now be considered in turn.

Interference from similar material encoded afterwards could occur so that material from the computer game interferes with material from the short story, for instance, mixing details up. Any of these could also interfere with material already encoded by the participant at an earlier stage, such as other games played or other short stories read. However, no evidence of such interference was found in the collected data, which makes it plausible to assume that interference did not play a role in the present study.

Rehearsal can strengthen memory, but may do so differently so that some parts of the information are emphasised more than others. Together with other background knowledge, rehearsal can also

construct new or alter details from the original memory. One type of rehearsal, narrative construction, could affect memory in major ways (Schank, 1990). By thinking, using a narrative schema, about something that was experienced, the material could be reshaped according to features of the narrative schema. More prominently, if the experience is talked about with other persons, it is reshaped and repackaged through a constructive narrative process, not only through production, but also through features of the conversation as a whole, for instance, what other persons are saying. In this study, the personal experiences are the type of material that is most likely to have undergone these processes. For the other four conditions in the study, retelling experience to other people was not possible, and elaboration through thinking was kept at a minimum and controlled by keeping the time between encoding and retrieval short and roughly equal between conditions.

Fading could occur in the case of personal experience, but for the other four conditions, it is unlikely to occur since the time between encoding and retrieval is at most a couple of hours.

It should be stressed, however, since the veridicality of memory is not central to the study, these processes are likely to play a small role. It is argued that even if memory is altered and details are remembered incorrectly, the general manner of conceptualisation will not be altered, at least not in a way that will affect the analyses carried out in Chapters 6–8.

5.5.1.4 Retrieval and language

During the retrieval phase, information is brought from memory and the participant remembers. What memories are retrieved depends on the presence of cues (internal or external) as well as physiological factors, such as the level of stress.

The study was designed to minimise stress. A high level of stress might lead to poorer retrieval of details. Even if some participants did feel uneasy, it is not likely to have affected their conceptualisations.

The framing of the interview questions could act as cues for specific memories. However, a biased retrieval of details is not likely

to influence conceptualisations. The interview questions could affect conceptualisation, but were carefully constructed not to (by not mentioning pronouns, perspective, etc.).

The interview situation invokes a set of conversational codes, which might affect retrieval in various ways. First of all, the purpose of the talk, that is, knowledge of the research questions, may influence retrieval. This was not the case since the participants were unaware of the purpose of the talk (as checked in the debriefing after the interview). Further, knowledge of who the participants were talking to guided what information was recalled. How conceptualisations were verbalised by the participants may depend on their beliefs about the knowledge of the interviewer. If they think the interviewer is someone who knows a lot about computer games, they might choose to express a different verbalisation than if they think they are talking to a novice. Participants knew that the experimenter know about both computer games and short stories. Importantly, the participants all believed that the interviewer did not know the contents of the game, short story, laboratory tasks, or non-participatory version, and this was the same across all conditions (with one exception, participant 1). This not only gives a more natural conversation, but it is also likely to influence what context and details are verbalised. But again, this does not arguably affect the conceptualisations made by the participant.

As already discussed above, the present study investigates how memory is retrieved for use in language. There may be differences compared to how memory is retrieved for action, as would happen in a naturally occurring situation when a person is using a work of interactive fiction. The reason for choosing in favour of retrieval via language is that it provides data that are interesting enough for a study of off-line cognition.

5.5.1.5 Data collection procedures

The stages described above (2 to 4) all take place inside the cognitive system of the participants (i.e., inside the head). The final step occurs outside and comprises the data collection procedure. Information is recorded, transcribed, and coded. Alterations of information

in these stages is of course hoped to be minimal (discussions can be found at separate sections on transcription and coding in this chapter).

5.5.1.6 Summary of the influence of the study on memory

To summarise, the five conditions can be considered to consist of actions (someone is doing something), taking place in a spatial arrangement, which are interpreted by the participants through their background knowledge and then memorised. Memory is later retrieved in the conversational situation as a result of the interviewer's questions. Although there are some differences across conditions, such as time for encoding and retention time, as far as can be seen, memory seems to be equally influenced in relation to the subsequent analyses carried out in Chapters 6–8.

5.5.2 Language and culture

There were several languages involved in the study, which may be a complication. The participants were Swedish (or fluent in Swedish). The instructions, given in speech as well as written in the case of the laboratory tasks, as well as the interview, were in Swedish. This was the most natural choice of language. The computer game was in English because no works of interactive fiction that fulfilled the study requirements were available in Swedish (English is the standard language for interactive fiction). The short story was in English in order to match the computer game. By checking English language proficiency, sufficient comprehension of the computer game and the short story were ensured. The switch from English to Swedish was not considered to be a problem for the participants.

Spatial gestures and spatial thinking are culturally determined (Levinson, 2003). In the present study, the stimuli were in English, but the interviews were carried out in Swedish. However, there should be no problem, since both languages utilise the same linguistic frame of references (Levinson contrasts languages with absolute linguistic frame of references with languages with a relative linguistic frame of references, such as European languages). The same

holds for the cultural backgrounds of the participants. It turned out that two participants had non-Swedish cultural backgrounds. However, these were considered to be sufficiently similar not to influence the study.

5.5.3 On the naturalness of the study

The study aimed to investigate playing the computer game and reading the short story, as well as talking about these, under naturalistic conditions. Thus, it was important that the situation was as natural as possible. The following discussion addresses the naturalness of the playing situation, the reading situation, and the interview situation.

5.5.3.1 The naturalness of the computer game situation

Effort was expended to make the playing situation as authentic as possible. First, the computer game was a real work of interactive fiction. Second, participants were instructed to play as they normally do in order to say how they liked the game afterwards. Third, the participants were experienced players of interactive fiction. Fourth, the playing was carried out in a neutral room, so that the participants would feel as relaxed as possible, in order not to distort natural use of interactive fiction. Fifth, for the same reason, the participants were left alone in the room while playing. Finally, there was no time pressure.

A few study design choices were made that may result in a situation different from an authentic playing situation. To begin with, the participants were not allowed to choose which game to play. This could have caused lowered motivation. However, as seen in the interviews, all participants highly enjoyed playing the game. Moreover, no other material, such as dictionaries or paper and pencil, were provided. This could have lowered comprehension and memory somewhat, in that participants could not look up difficult words in a dictionary. Neither could they support their memory by drawing maps. However, again, as seen in the interviews, partici-

pants seemed to have no problem understanding the language or remembering the spatial layout.

5.5.3.2 The naturalness of the reading situation

Several design decisions were made in order to increase the naturalness of the reading situation (holding for both the short story and the non-participatory version of *Anchorhead*). First, participants were not instructed to memorise the text. They were simply asked to read the text and afterwards discuss their opinion about it. Second, an authentic short story was used. Third, participants were left alone while reading, so that they would feel more relaxed. Fourth, participants could read at their own speed. Fifth, reading was done from text printed on paper (and not presented on, e.g., a computer screen). Finally, participants read the text once, since it was considered the most usual way to read a text in a real situation.

5.5.3.3 The naturalness of the interview situation

Of importance to the study was that the interview situation was reasonably natural and that the participants talked as they do usually. This is not only a result of the general psychological, social, and physical context, but also a result of whom they are talking to. The conversational partner needs to give proper feedback in order for the conversation to run smoothly, and this was done.

The influence of camera anxiety is a factor that could detract from the naturalness of the situation. It could make participants remember fewer details. Camera anxiety could lower the number of gestures participants use. However, this effect would be expected to influence across all conditions equally, and is therefore not a problem.

There are indications that the situation was natural. All participants used gestures. Indeed, it was found that all participants used every type of gesture from the coding scheme, except a type of gesture called emblems, which is relatively uncommon anyway when talking about past events (McNeill, 1992). None of the participants commented on their own gestures.

5.5.4 Possible effects of re-playing the game

It turned out that participant 3 had already played *Anchorhead* some years before. What possible influences may the fact have that he was re-playing the game? His motivation could be lower, because he was not as curious about the game. This could in turn lead to lower encoding in memory. The consequences would be less memory for detail, but would not likely affect conceptualisations. Low motivation could also make him fail to complete the required part. However, he completed it. Indeed, his motivation may be higher because he got to re-experience something he knew he liked before. As an indication of high motivation, he stated at the beginning of the study that he wished to play it again. He spent considerably less time than the other participants completing the required part (see Table 5.5). In the interview, he made some statements that suggest he knew details of the game from earlier sessions, as shown in examples 5.1 and 5.2.

(5.1) Participant 3 remembers details from an earlier session (Interviewer, Pierre):
Paul: *där det låg en madrass*
where there was a mattress
Pierre: *mm*
Paul: *så den var mystisk*
so it was mysterious
Pierre: *mm*
Paul: *den tänkte man att man skulle ha till nånting*
you thought that you would use it for something
fast det skulle man inte (.) *det kommer sen*
but that was not the case (.) that comes later

(5.2) Participant 3 remembers details from an earlier session:
det fanns en en liten gränd också vid stadshuset som
there was a small alley too at the courthouse that
var bara en dead end (.) *å den vet jag vad man har till*
was just a dead end (.) and I know what that is for
fast det vet jag för att jag spelat det förut
but I know that because I have played it before

Another effect could be that he remembered the spatial layout of the game world better. However, from the interview data, he shows signs of considerable loss of memory for places, which suggests his memory from when he played it earlier could not have helped him much when re-playing, as shown in example 5.3.

(5.3) Participant 3 (Paul), Interviewer (Pierre)
Paul: *e jag gick inte omkring i huset*
eh I did not walk around in the house
Pierre: *okej*
okay
Paul: *utan jag följde med michael upp för trappan direkt* (.) *så det var* (.) *foajé trappa upp och sen rakt fram var*
instead I went up the stairs with michael right away so it was (.) foyer staircase up and then straight ahead was the
masters bedroom
master bedroom
[*så att*] (.) *det gjorde jag direkt* (.) *så jag vet ingenting*
[so that] (.) that I did right away (.) so I know nothing
Pierre: [*mm*]
Paul: *om huset i övrigt* (.) *jag kommer inte ihåg faktiskt*
about the rest of the house (.) I don't remember actually
hur det såg ut ()
what it looked like ()
Pierre: *mm*
Paul *från när jag spelade förut*
from when I played before

In summary, the fact that participant 3 had played the computer game before does not seem to have had substantial effects. It could lead to better memory for details, although there was an indication that the spatial knowledge may not be affected. His data were kept and analysed in the same way as the other participants' data.

5.5.5 Generalisability

A final point in this chapter is the question to what extent the data collected in this study can be generalised to other people, stories,

and situations. This depends on what kind of analysis is made and not much can be said on a general level. There is nothing, however, that would stop generalisation from the participants to the population in mind for this study: narrative-experienced and interactive-fiction-experienced adults in a Western culture. When it comes to the work of interactive fiction used in the study, it is representative, and results should apply directly to other works of text-based interactive fiction. Considering other types of computerised participatory stories, such as those with audio and video, generalisation could be affected (for instance, participants' strategies for giving spatial descriptions may depend on the viewpoint used in the representation of space in the participatory story). This depends on what analysis is carried out, and the possibilities for generalisation will consequently be discussed in the appropriate chapter. The case is similar when considering even more different types of participatory stories, such as live role-playing.

This chapter sketched the context of interactive fiction and discussed and justified the methodological decisions made for the collection of data. Chapters 6–8 are concerned with various analyses of the collected data, starting with spatial cognition.

CHAPTER 6

Long-term memory representations of spatiality[24]

When humans, as well as many other species in the animal kingdom, move around in the world they gather information about the spatial layout of their surroundings and construct a mental representation of the spatial world (Tolman, 1948; Taylor & Tversky 1996). This knowledge is sometimes called a *cognitive map* (Kitchin & Freundschuh, 2000). The scale of such spatial relations is that of large-scale, geographical space (Mark, Freksa, Hirtle, Lloyd, & Tversky, 1999), or environmental space (Freundschuh, 2000), as opposed to other spaces, such as the much smaller space around the body, or very large spaces like astronomical spaces. Here, the term *spatial mental representation* will be used for the knowledge a person has, in long-term memory, about spatial relations (knowledge refers to information believed to be true by the person, not necessarily actually being true). It is not only from direct experience of surroundings that people form spatial mental representations, but also from viewing maps and listening to and reading verbal descriptions.

How do people remember and think about space in a participatory story? A piece of interactive fiction such as *Anchorhead* can be said to contain a fictive spatial world, a *game world*, that is, locations which are related spatially, much in the same way as the fictive spatial world in a traditional novel, for instance, a town where the story is set. Research on reading has shown that readers normally do not construct mental representations in long-term memory of

[24] Parts of this chapter have been published in Gander (2004).

spatial relations described in text unless the task demands it (Zwaan & van Oostendorp, 1993; Hakala, 1999). Reading a novel for entertainment would be a case where readers normally do not construct spatial mental representations in long-term memory. The reader's task determines what kind of inferences are made on-line during reading (van der Broek et al, 2001) and what kind of mental representations are created (Wilson, Rinck, McNamara, Bower, & Morrow, 1993).

The results obtained in studies of reading of ordinary texts raise the question: Is spatiality spontaneously encoded in long-term memory by players of interactive fiction? Spatiality is sometimes noted to be a central property of participatory stories (Murray, 1997). Considering the nature of interactive fiction such as *Anchorhead*, there is reason to believe that the construction of spatial representations differs from traditional texts. In these works it is necessary for the player to move around in the game world in order to make progress (to 'consume' the work). This navigational demand may drive players to construct spatial mental representations. On the other hand, it could be that players move around in the game world randomly, without forming any global spatial mental representation. Or, a more situated scenario may be the case: Players could read descriptions of directions available in the text at each place locally, and use this information to navigate, avoiding the need for any global spatial mental representation. Research on reading of traditional texts also shows that readers are unlikely to construct spatial mental representations when the narrative is indeterminate, poorly organised, or has overly difficult descriptions (Denis & Denhière, 1990; Mani & Johnson-Laird, 1982; Perrig & Kintsch, 1985). Interactive fiction has often been described as an indeterminate and fragmented narrative. It often seems that coherence is missing in the textual fragments that make up the physical object of a work of interactive fiction. If this is the case, it would be another reason to suggest that players perhaps do not form spatial mental representations.

The question of spatial mental representations in interactive fiction has not been thoroughly investigated. Tromp (1993) studied

the experience of spatiality and performance of users of MUDs (multi-user dungeons). MUDs are very similar to a typical work of interactive fiction, the main difference being that many players are active at the same time in the game world. Using an electronic questionnaire, she concluded that MUD players construct elaborate and highly accurate spatial mental representations. Dieberger (1994) interviewed users of a MUD about their opinions on how spatiality was designed in the MUD. However, both studies relied on players introspecting on their abilities and memories, and it would be desirable to further study the question of spatial mental representations using more valid methods.

The present study of spatial cognition is outlined as follows. Parts of the interview data collected from eight participants (see Chapter 5) concerned spatiality. Participants who played the computer game were asked if they could tell which places were present in the game world, and what the relative locations of these places were. To give an opportunity for comparison, the same questions were put to four other participants about the spatiality of a non-participatory version of the computer game. The non-participatory version was an adapted version of an actual game session (see Chapter 5). The spatial game world was the same as the one in the game. The printout of the non-participatory version made it in some sense similar to a traditional short story. In one sense, it functions as a direct case of comparison against the computer game. However, the non-participatory version was somewhat artificial. For instance, the text was written from the unusual perspective of second-person singular—*you*—a property that sets it apart from most authentic short stories. Since only the computer game and the non-participatory version contained similar spatial descriptions, the analysis in this chapter is limited to these two conditions. Participants 1–4, who played the computer game, will be referenced in the following as *players*, and participants 5–8, who read the non-participatory version will be called *readers*.

During the collection of data for the present study, no instructions to memorise the spatial layout of the game were given, and it is unlikely that participants suspecting a memory test memorised

the spatial layout. The first four participants simply played the computer game in the way they would normally do it (see Chapter 5 for details). In contrast, the non-participatory version was somewhat artificial, and the other four participants could have been prepared for a memory test. However, as was seen from the data, readers remembered less of the spatial layout than the players, which makes it unlikely that readers anticipated a memory test.

The data on spatiality were analysed with regard to two separate but connected themes. First, an analysis was made of how people talked about space from interactive fiction. To study speech is one way of approaching the question of spatial mental representations. A series of questions guided the analysis of the interview data of players of the computer game and readers of the non-participatory version of the computer game: What terms—*referents* and *verbs*—are used when talking about space? How are *spatial references* made? What *perspectives* are used when giving descriptions of spatiality from the game?

In the second theme on spatiality, the focus is shifted from the descriptions of spatiality to the spatial mental representations themselves. The first question to be considered is what the order in which participants describe places can tell us about the spatial mental representations. Second, to what extent do players' and readers' spatial mental representations reflect the true state of affairs? This question is examined by looking at the completeness, accuracy, consistency, and integration of the spatial mental representations. The property of hierarchical organisation of the spatial mental representations is also investigated. Finally, to the extent that the participants make mistakes, the question whether these errors are systematic is explored. For instance, is there evidence for distortions that are common in memory for graphical maps, such as alignment and rotation?

Next, an analysis of how the participants talk about space in the game world is presented.

6.1 TALKING ABOUT SPACE FROM INTERACTIVE FICTION

How do we express in language our recollection of some objects located in space? In Levelt's (1996) model, describing a spatial scene requires selecting a referent, a relatum (what it is to be related to), their spatial relation and also applying some perspective system that will map spatial relations onto lexical concepts. Information that resides in the mind's many representational systems, for instance, the spatial representational system, needs to be translated into a semantic code that can be formulated in the language. Levelt identifies three perspective systems: *relative*, *intrinsic*, and *extrinsic*. The relative system is deictic and relative to the describer's current position and orientation, for example, 'the pig is to the left of the tree'. The intrinsic perspective system relies on the relatum's intrinsic axes, for example, 'the cow is in front of the horse', where the horse has an intrinsic front. Finally, the extrinsic perspective system is an absolute system, for example, 'the cat is north of the house'. The choice of perspective system is linguistically free (Levelt, 1996); that is, there is no unique or fundamental choice. It is not biologically determined and cultures have ended up using just one or a mix of the perspective systems. For instance, on the island of Vava'u in Polynesia, the inhabitants mainly use an absolute frame of reference (Bennardo, 2002). English uses all three perspective systems, although the relative perspective system is favoured (Li & Gleitman, 2002). The choice of perspective system can also depend on individual factors as well as on the task at hand.

When giving verbal descriptions of a spatial arrangement of landmarks, such as a landscape, a town, or a building, people can use any of three descriptive strategies, called *route*, *gaze*, and *survey* (Taylor & Tversky, 1996). These descriptive strategies are linked to Levelt's perspective systems. A route description takes the addressee on a mental tour of the surroundings, commonly using a relative reference system, such as 'if you turn left and walk two blocks, you have a big red house on your right'. A gaze description is given from a fixed position outside the scene and usually describes a small

sized area, for example, 'the bed is to the left of the window'. Finally, a survey description is made from above, using an extrinsic reference system, for example, 'the church is north of the forest'. Although it was first claimed that people select one descriptive strategy and keep it fixed throughout the description, later research has shown that people often switch strategies within one and the same description, usually without signalling the switch (Tversky, Lee, & Mainwaring, 1999).

The purpose of this first part of the chapter is to investigate how players and readers talk about the spatiality of the game world. The main motivation was to study the descriptive strategies of the players, and compare these with descriptive strategies found in earlier research of people learning spatial layouts in other situations. The readers serve as control group when the participatory property is left out.

6.1.1 Analysis

In analysing how players talk about space in the computer game, the procedure here follows the outline of Taylor and Tversky (1996). First, the overall *perspective* was judged for each description made by the participants (route, survey, or gaze, or a mixture of these). Then, a more detailed analysis of language use was made on three types of elements which make up the perspective: what *relational terms* were used (e.g., left, north), what *referents* were used (e.g., the addressee, landmarks), and the occurrence of *active* and *stative verbs* (e.g., *enter* and *to be*, respectively).

6.1.2 Results

Below, the results of analysis are presented for *descriptive perspectives*, *relational terms*, *referents*, and *verbs*, and under each point, for the players followed by the readers. For players, data from three participants were analysed (participants 1–3) (data from the fourth participant on an explicit instruction to describe places was missing). For the readers, data from four participants were analysed (participants 5–8). Descriptions were available for the overall layout

of the game (referred to as *City*) as well as for a smaller part of the game (referred to as *House*).

6.1.2.1 Descriptive perspectives

Following Taylor and Tversky (1996), first, each landmark description in the descriptions was coded according to perspective type (route, survey, or gaze). Landmarks were mainly locations (places possible to move between in the computer game), but sometimes what was technically a single location had multiple landmarks (e.g., the square, which was a landmark in itself, also had an obelisk in its centre—a landmark but not a location). Then, depending on the landmark coding, the entire descriptions were classified into route, survey, or gaze if at least all but two landmarks were described using that perspective. Descriptions were classified as mixed if two or more descriptions of landmarks were classified as belonging to a perspective different from the main perspective.

Players. The results (Table 6.1) show that participants use survey descriptions exclusively (i.e., an extrinsic reference system using north, south, etc.) when describing the spatial layout of the game world. All descriptions were started at the same place, *Outside the real estate office*, where the game begins.

Readers. The results show that readers mainly used survey descriptions when describing the spatial layout of the game world (Table 6.2). In some cases, the participants did not relate landmarks spatially at all. Two descriptions were started at the location where the game begins (*Outside the real estate office*), while three descriptions had other starting places (*The pub*, *The house*, and *The university*).[25]

6.1.2.2 Relational terms

Players. In the descriptions made by players, only extrinsic relational terms (e.g., north, south) were found, shown in the left part of Table 6.3.

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[25] One participant gave two separate descriptions, thus the total sum of five.

Table 6.1. Occurrence of perspective in the descriptions of the computer game for participants 1–3.

	Descriptive perspective			
Spatial area	Route	Gaze	Survey	Mixed
City	0	0	3	0
House	0	0	3	0
Total	**0**	**0**	**6**	**0**

Table 6.2. Occurrence of perspective in the descriptions of the game world for participants 5–8.

	Descriptive perspective				
Spatial area	Route	Gaze	Survey	Mixed	None
City	0	0	3	0	1
House	0	0	3	0	1
Total	0	0	6	0	2

Note: *None* means no description strategy could be determined because no spatial relations were present in the data.

Table 6.3. Frequencies of all relational terms from the participants.

Players		Readers	
Relational term	Occurrences	Relational term	Occurrences
south	14	*east*	4
north	9	*north*	1
down	8	*up*	1
up	7	*west*	1
west	6		
southwest	5		
east	4		
close to	3		
southeast	2		
northwest	1		

Note: In the data, *up* (*upp*) was found to be used similarly to *above*, and is treated as an extrinsic relational term, although it is strictly relative to, e.g., the body.

Two occurrences of *fram* (forward) were found. The first one was *komma fram till* (arrive at), which suggests an orientation towards the thing that one arrives to. However, since this was a single isolated case, it was not considered further. The other occurrence was *rakt fram var masters bedroom* (straight ahead was the master bedroom) (see the discussion section below).

Readers. In the spatial descriptions made by readers of the non-participatory version, relational terms were sparse. It was more common to name locations without giving a spatial relation than to relate locations spatially. The few relational terms that occurred were extrinsic, shown in the right part of Table 6.3.

6.1.2.3 Referents

Players. In talk about spatiality from the computer game, the occurrences of referents were about equally split between using a landmark as referent and using canonical directions (north, east, etc.). For the landmarks, a mixture of English and Swedish terms was used, even within one and the same participant and within one and the same utterance.

Readers. In the non-participatory version, landmarks were used as referents by all four participants. In the description of one participant, six occurrences of canonical directions were present.

6.1.2.4 Verbs

Players. For players, the stative verbs were about twice as numerous as the active verbs, as shown in the left part of Table 6.4. The class of active verbs, used to describe, for example, the path of a road, called *fictive motion* by Talmy (1996) had only a single occurrence in the descriptions (*gå*/go), as shown in example 6.1 (see Table 5.3 in Chapter 5 for a transcription key).

(6.1) Participant 2:
därifrån nånstans så kom man till en väg som
from somewhere around there one came to a road that
gick (.) *i nord sydlig riktning*
went (.) in a north south direction

The relational term *up* always occurred together with an active verb, the single exception being *där uppe låg huset* (up there was the house).

Readers. Stative verbs dominated the descriptions from the readers, as shown in the right part of Table 6.4.

6.1.2.5 Summary of results

A summary of the results of spatial descriptions and comparison between computer game and non-participatory version is shown in Table 6.5. In the table, *dominant* means *most frequently occurring*, which serve as the basis for classifying descriptive perspectives (Taylor & Tversky, 1996).

Table 6.4. Number of occurrences of stative and active verbs from participants' descriptions.

Players				Readers			
Stative verbs		Active verbs		Stative verbs		Active verbs	
finnas (be)	22	*gå* (go)	21	*vara* (be)	11	*gå* (go)	3
vara (be)	16	*klättra ner* (climb down)	1	*ligga* (lie)	10		
ligga (lie)	5			*leda* (lead)	1		

Note: English translation within parentheses.

Table 6.5. Summary of the results of spatial descriptions and comparison between computer game and non-participatory version.

	Source condition	
Topic of spatial description	Computer game	Non-participatory
Dominant descriptive perspective	Survey	Survey
Dominant relational terms	Extrinsic	None
Dominant referents	Landmarks, canonical directions	Landmarks
Dominant verbs	Stative	Stative

6.1.3 Discussion

6.1.3.1 Descriptive strategies, relational terms, referents, and verbs

Descriptions of the spatial layout of a work of interactive fiction were analysed with respect to reference system, referents, and verbs, in order to determine whether a gaze, route, or survey description was used. The results show that players as well as readers used a survey description throughout the descriptions: The relational terms were all extrinsic, referents were either landmarks or the canonical directions and the dominant verb class was stative verbs—all characteristics of a survey description (Taylor & Tversky, 1996). The addressee (i.e., the interviewer) was never used as a referent (i.e., no participant used the interviewer as a spatial referent by saying, e.g., 'to *your* right'). In one description, there was one possible instance of one landmark being described according to a route description, shown in example 6.2.

(6.2) Participant 3:
utan jag följde med michael upp för trappan direkt (.) *så det var*
but I followed michael up the stairs directly (.) so it was
[(.) *foajé*]
[(.) foyer]
[((both hands shape an enclosed space: iconic gesture, observer viewpoint))]
[*trappa upp*] *och*
[up a staircase] and
[((right hand moves up: iconic gesture, observer viewpoint))]
[*sen rakt fram var masters bedroom*]
[then straight ahead was the master bedroom]
[((right hand open palm fingers together back a bit then forward: iconic gesture, subjective viewpoint))]

This occurred in the description of the house. This fact could have influenced the switch to route perspective, since a small environment influences the description towards route descriptions (Taylor & Tversky, 1996). However, an alternative explanation could be that 'forward' might mean 'north', considering that north is up

(forward) on a two-dimensional map (the influence that the game is to be thought of as such a map is very strong—using the reference system of a map, and within the genre of these kinds of games it is frequent to draw these maps). In support of this idea, 'down' was sometimes used to mean 'south', such as in example 6.3 from participant 1.

(6.3) Participant 1:
uppdelad i två bitar eh jag man började i den norra bi-
divided into two parts eh I you started in the north pa-
den norra delen (.) *o:ch sen så skulle man gå ner till söder*
the north part (.) a:nd then you were supposed to go down south

The players used the canonical directions (north, south, etc.) as landmarks to a greater extent than the readers. The reason for this may be that players to a large extent used the canonical directions for movement when playing the game—this is how most of the movement in the game works. But it could also be that the players were more prone to think of spatial issues because of the navigational demand, and this made them more aware of how the game world was configured in terms of the canonical directions. As will be seen in the second part of this chapter, the players had superior knowledge of the spatial layout, compared to the readers.

Interestingly, active verbs were commonly used in the survey perspective description using an extrinsic reference system, and also more so for the players than for the readers. The use of active verbs is not common in spatial descriptions made from a survey perspective (Taylor & Tversky, 1996). The explanation for this could be that the players performed movements in the game, and this made the active verbs more salient than for the readers, who did not focus in the same way on the movements described in the text they read (the non-participatory version).

6.1.3.2 Why not a route perspective?

Why did players not adopt a route perspective when describing the environment? This would be expected given that players learned the

environment by exploration. Taylor and Tversky (1996) obtained experimental results that when learning an environment by exploration (in contrast to learning it from descriptions or from maps), people are more likely to adopt a route perspective in their descriptions of that environment. However, there are at least three factors present in the current situation against using a route description. First, the choice of perspective has been shown to be influenced by certain features of the environment described. If the environment features a single path or has landmarks of roughly the same size, it is more likely to be described using a route perspective (Taylor & Tversky, 1996). The game world, in contrast, has multiple paths and feature landmarks of various sizes (e.g., a bathroom, a deserted lane, a square). Second, the conventional use of extrinsic referential terms (north, south, etc.) within the genre of interactive fiction most likely influenced participants' choice of perspective. The fact that the game used an extrinsic reference system may have forced participants into adopting a survey perspective. Third, related to this, is the fact that in the game, 'you', the player character, cannot change orientation. 'You' move from place to place, always facing the same direction. There is no information of a particular direction in the location descriptions from the game. Even if orientation changes are sometimes implied, as when a description is given of possible paths of movement, the orientation is always returned to an unspecified state. The following example of a description of a location from the game illustrates this point:

> Outside the Real Estate Office
> A grim little cul-de-sac, tucked away in a corner of the claustrophobic tangle of narrow, twisting avenues that largely constitute the older portion of Anchorhead. Like most of the streets in this city, it is ancient, shadowy, and leads essentially nowhere. The lane ends here at the real estate agent's office, which lies to the east, and winds its way back toward the center of town to the west. A narrow, garbage-choked alley opens to the southeast.

Further, there are at least two major methodological differences between the present study and that of Taylor and Tversky (1996).

One difference concerns the task instructions. In their study, participants were told to give descriptions 'so that someone who was unfamiliar with the environment and had never seen the map could read the description and know where all the landmarks were' (Taylor & Tversky, 1996, p. 378). This may have influenced Taylor and Tversky's participants to use a route perspective more frequently in order to guide another person around the landmarks. A second difference is that the participants supplied their descriptions in *writing*, while in the present study, participants used *speech*. It is unclear how spatial descriptions are affected by this difference, but it is conceivable that it may have an effect on perspective choice, especially since this choice takes place in the later stages of language production (Levelt, 1996).

6.1.3.3 Starting points of the descriptions

Even though the players gave survey descriptions of the computer game, they all started their descriptions with the same landmark—the place where the game begins. Among the readers, it was as likely to start descriptions at the starting point of the game as at some other significant location. The reason for this difference may be that players see the starting point as more important, since they worked on the puzzle in the game of how to enter the office. Both kinds of starting points are consistent with Taylor and Tversky's (1996) observation (although they were speaking about route descriptions) that starting points typically were entrances or large landmarks ('large' is translated to 'important' in the present study).

6.1.3.4 Single perspective

Participants used a single perspective throughout their descriptions. In contrast, Taylor and Tversky (1996) found that perspective switches were frequent. Apparently, in the present study, participants felt they could adequately describe the environment with a single perspective. This suggests that the environment was perceived as homogenous by the participants or that perspective switches

would require too high cognitive effort to be worth while (Tversky, Lee, & Mainwaring, 1999).

A final question is what descriptive strategies tell us about the underlying long-term memory representation of spatiality. According to Levelt (1996), it tells us very little, since perspective is not part of the mental representation of space but is chosen at a late stage in the verbalisation process. But the study of descriptive strategy does tell us two things. First, as has been discussed, the descriptive strategy used by the participants in the present study tells us something about how the spatial descriptions are made when a spatial layout was learned in a work of interactive fiction. This case can be compared against other cases, such as learning from maps, from written instructions, from exploration, etc. So, even if descriptive strategies do not tell us directly about the memory representations, they do reflect parts of the ongoing cognitive processes at the time the description was given. Second, the fact that players—in contrast to readers—gave *elaborate* spatial descriptions suggests that they were indeed drawing their descriptions from long-term memory spatial mental representations. The following section investigates this issue in detail.

6.2 SPATIAL MENTAL REPRESENTATIONS

In this second part of the chapter, the focus is the nature of the mental representations of spatiality constructed by participants. But before proceeding, there is a need to discuss the fundamental question of whether people form spatial mental representations in long-term memory at all.

6.2.1 Do people form spatial mental representations?

Two lines of criticism of the claim that people construct spatial mental representations are that (i) spatial representations are not

truly spatial, and (ii) spatial representations are spatial, but they may not be constructed in a given situation.

The first line of criticism concerns the very nature of mental representation and questions whether spatial representations are truly spatial. Even though everyone may agree that there are mental representations of spatial facts about the world, one can disagree on the question whether the representations themselves are actually spatial. After all, even mental representations in the form of propositions can represent spatial facts about the world, without themselves being spatial in nature. The issue of mental imagery has had a long history of debate within the field of cognitive psychology. Note, however, that *image* is not synonymous with *spatial mental representation*, because the latter has non-image-like features, such as being non-metric and combining information from several sense-modalities (Tversky, 2000). For the purpose of this study, however, this fundamental question bears little relevance. The question does not address the issue of *differences* in mental representations of spatial facts about story texts and interactive fiction. If one claims that spatial mental representations cannot be spatial, then this holds irrespective of whether the mental representations are about stories in traditional media (such as novels and films) or interactive media (such as interactive fiction). If one accepts that mental representations can be spatial, then this of course is a possibility for both cases.

Turning to the second line of criticism, even agreeing that spatial mental representations are possible, there is still the question of under what circumstances people actually construct spatial mental representations. Taylor and Tversky (1992) found that when given descriptions of fictive places to read, without explicit instructions to remember the spatial layout, people did construct spatial mental representations spontaneously. However, this conclusion can be criticised on methodological grounds. It was an artificial laboratory situation, and not a real story. Even if participants were not told they were later going to draw a map, because of the situation they could have anticipated a memory test of the contents of the text. As was discussed above, it has been found that readers of normal texts

in naturalistic settings do not normally construct long-term memory representations of spatial relations. Nor do readers construct spatial mental representations when the narrative is indeterminate, poorly organised or contains overly difficult descriptions. The present study is arguably naturalistic when it comes to playing the computer game (see Chapter 5). So, do players construct spatial mental representations of the game world in normal game playing, and what evidence would let us determine this?

6.2.2 Determining spatial mental representations

Starting off with audiovisual data on players talking about the computer game after having played it, there are several types of evidence that would support the claim that participants form spatial mental representations of the game world in long-term memory:

(i) *Elaborate spatial descriptions*. The basic observation that players actually gave lengthy descriptions, spatially relating various places from the game is intriguing. This observation does not tell us whether any spatial mental representations reflect the actual spatial layout of the game, but even taken alone, it makes it probable that players drew their spatial descriptions from a spatial mental representation—truthful or not.

(ii) *Description order*. If the order in which places from the computer game are mentioned by the participants matches the order in which the places were visited, participants may simply recall places off a temporally ordered list that was memorised at the time of encoding. This would suggest that no spatial mental representation was formed. On the other hand, if participants mention places that are spatially proximate when considering the spatial layout as a graphical map—in other words, an order that is consistent with doing a sweep across a map—there is reason to believe that a spatial mental representation is the source of these descriptions.

(iii) *Completeness and accuracy*. Another piece of evidence is correspondence of the talk about spatiality to the true spatial layout

of the computer game by the description being complete and correct.

(iv) *Consistency and integration*. A fourth piece of evidence is if descriptions present a consistent and integrated picture of the spatial layout. In other words, it is suggestive of spatial mental representations if participants do not contradict themselves when giving spatial descriptions and if the descriptions present a connected whole.

(v) *Other features of spatial mental representations*. The descriptions should express properties that spatial mental representations have been shown to have in other studies, such as hierarchical organisation. The presence of systematic distortions that is common in memory for graphical maps would also be revealing.

The first point has already been discussed in the first part of this chapter. The last four points will now be investigated by analysing the verbal descriptions of spatiality made by the participants.

6.2.3 Method

6.2.3.1 Analysis of description order

For each participant, a list of places from the computer game world (henceforth called *locations*) was constructed, in the order they were mentioned in the descriptions. Synonyms and translated names of locations were considered in order to resolve referential ambiguities. References that were still uncertain were marked as such. Some place names could not be mapped directly to locations in the game. These were listed in italics by the name used by the participant in the description. For each of the players, a second list of locations was constructed. The lists were arranged in the order in which the participants visited the locations, resulting in a unique list for each player. For the readers, a single list was made from the order the

locations were mentioned in the text of the non-participatory version of the computer game.

From the same transcriptions, for each player, a graphical map was constructed by interpreting the participant's description using a set of drawing conventions, shown in Table 6.6. The graphical maps thus represent the spatial information in each player's description. The purpose of constructing the graphical maps was twofold. First, the maps were used when comparing the mentioned order of locations to see whether description order matched spatial proximity. Second, the maps were used when investigating the truthfulness of the descriptions by comparing them to actual maps from the computer game. Note that the constructed graphical maps did not represent *distance*, because this information was not available from the descriptions (variation in distance on the constructed maps was made according to drawing convenience). One possibility to reconstruct distance would have been to use participants' choice of verbs as an index of distance, for example, 'walk' would mean a short distance, and expressions such as 'is located north of' would mean a long distance. However, this procedure was abandoned, mainly for its speculative nature, but also because distance is not represented in the original map anyway (in the game, 'going west' or 'travelling west' moves the player the same distance, always one location at a time).

As a final step, the order of mentioning the locations was compared to the order in which the locations were visited as well as to spatial proximity on the constructed graphical maps.

Table 6.6. Drawing conventions used when constructing graphical maps from participants' descriptions.

Description element	Drawing convention
Relation	Arrow labelled in capital letters with relational term used
(no relation mentioned)	Locations mentioned but not related spatially by the participants were drawn in separate, spatially unconnected solid-line boxes
Hierarchical regions	Dotted-line ellipses
North	Above
East	To the right
South	Below
West	To the left
Northeast	Above to the right
Southeast	Below to the right
Southwest	Below to the left
Northwest	Above to the left
Up	Above, labelled 'UP'
Down	Below, labelled 'DOWN'
In	To the right, labelled 'IN'
Out	To the left, labelled 'OUT'

Note: Additional relations, not in the list, were labelled on the map with the term used by the participant and positioned in ways most practical to fit on the map.

6.2.3.2 Analysis of properties of spatial mental representations

In order to compare how well the given spatial description actually corresponded to the true spatial layout of the game world, four measures were employed. *Completeness* of the spatial mental representation was calculated by the number of described locations divided by the number of actually visited locations (to count, the mentioned locations had to be locations actually occurring in the game). *Accuracy* was calculated by number of correct descriptions of spatial relations between two locations divided by the total number of descriptions of spatial relations between two locations. *Consistency* is judged by the absence of contradictions. A contradiction

was said to have occurred if the participant gave incompatible spatial relations between two locations, for example, first saying the pub was north of the church, then later saying that it was south of the church. A low number of contradictions suggest a stable mental representation of the spatial layout. *Integration* concerns the question of whether the participant's description of the spatial layout forms a connected whole, or if the description consists of a number of separate, spatially unconnected regions. A region was defined as at least two locations related spatially.

Hierarchical organisation was investigated by looking for superordinate categories in a part-relationship to location categories. For instance, a forest would be a superordinate category to a clearing, and a hospital would be a superordinate category to a waiting room (subordinate categories were not considered, since locations are instances of categories, and thus already at the 'lowest' level).

The participant's descriptions were searched for errors, and these were compared to known distortions for graphical maps, such as alignment bias (Tversky, 1981).

6.2.4 Results

Here, the results are presented concerning the analysis of description order, completeness, accuracy, consistency, integration, hierarchical organisation, and systematicity of errors.

Participant 4 was not explicitly asked to describe places and their locations, as were the other participants, but nonetheless gave lengthy spontaneous descriptions when asked a different question. These data were analysed in the same way as for the three other participants, but one should keep in mind that the circumstances under which the data for Participant 4 were collected differed from the others.

6.2.4.1 Description order

Players. The order in which locations were mentioned in the descriptions made by the players sometimes, but not always, matched the order in which the locations were visited. In the same way,

mentioned order sometimes, but not always, was consistent with scanning a graphical map of the locations.

Participant 1 gave three consecutive descriptions, with each description starting over from the beginning, containing varying amount of details in each version. Participants 2 and 3 gave two separate descriptions each. It is the order within each of these descriptions that was compared to the order in which the locations were visited. There were insufficient data for participant 4 from which to construct a list. An example of a list of locations in visited order and mentioned order can be seen in Table 6.7 (for participant 2).

Figure 6.1 shows an example of a graphical map constructed from descriptions (for participant 2).

Mentioned order was compared to visited order and spatial proximity on the maps for each participant. Participant 1 made four descriptions. The first three describe the overall layout of the game, and can be considered three versions of the same description (the participant can be seen starting over from the beginning in each description). The fourth description is of the *House*. In the first short description of places, the order of mentioning is the same as the order visited. In the second, longer description, the mentioned order of descriptions partly matches the order visited. One exception is the occurrence of *University court* and *Library*, which appear much earlier in the description than in the order visited. This suggests that the description was generated by some other means than going through the locations in the same sequence they were visited while playing the game. Comparing the list of mentioned locations with the constructed map for participant 1, it was seen that the description order was consistent with doing a mental sweep on a spatial representation from east to west. The other exception is the occurrence of *The house* before the occurrence of *The sea*, with the latter being added at the end. One explanation for this could be that the participant inspected the spatial mental representation when talking about *The house*, and found that, around that area, *The sea* was located. The last exception is the mentioning of *Town square* (although this reference is uncertain; the participant uses the term 'a

square'), which is not consistent with the order visited. It may be represented close to *Twisting lane* in the participant's spatial mental representation, and in that case it is consistent with reading off a spatial representation, although it is not located in the place described by participant 1 on the objective game map.

The order of locations in the description made by participant 2 roughly followed the order the locations were visited. Two positions in the orderings are sometimes switched, sometimes three. Once exception is that *University court* is mentioned last, after *The house*. On the map, these two places are located at two separate ends. This makes it unlikely participant 2 came to focus on *University court* by reading off a spatial mental representation.

For participant 3, the order mentioned does not match the order visited for the most part.

Table 6.8 summarises the results of matching the mentioned order to visited order and spatial proximity. Players are listed in the upper half of the table. There was an artefact of the matching method: As can be seen in the table, in the cases where a description consisted of few locations (say, below 5), matches were very frequent.

Readers. The order in which readers mentioned the locations generally did not match the order in which they occurred in the text, as shown in the bottom half of Table 6.8. An exception was participant 8 who, while mentioning the highest number of locations, also did so in the order they were visited. No graphical maps were constructed for participants 5–8, since the spatial relations were either very vague or missing completely. Thus, a graphical map would in those cases be just a list of locations. Because of this, it was not possible to compare mentioned order to maps.

Table 6.7. For participant 2, the order in which the locations were mentioned (the participant gave two descriptions), and the order in which the locations were visited.

Locations		
Order mentioned		
First description	Second description	Order visited
The real estate office	Upstairs landing	Outside the real estate office
Narrow beach	Master bedroom	Alley
Local pub	Bathroom	File room
Town square	Foyer	Office
Whateley bridge	Darkness ?	Narrow beach
Asylum courtyard		Narrow street
Court house		Twisting lane
Under the bridge		Local pub
Vacant lot		Whateley bridge
Wharf		Town square
Deserted lane		Dark corner
Churchyard		Asylum courtyard
House		Riverwalk
University court		Vacant lot
		Wharf
		Under the bridge
		Chilly avenue
		Deserted lane
		Churchyard
		Behind the church
		Down the road
		Side alley
		Junction
		University court
		Library
		Scenic view
		Outside the house
		Foyer
		Upstairs landing
		Darkness 1
		Darkness 2
		Master bedroom
		Bathroom

Note: Question marks indicate unclear references. Italics mark terms used by the participant but not matching any actual game location.

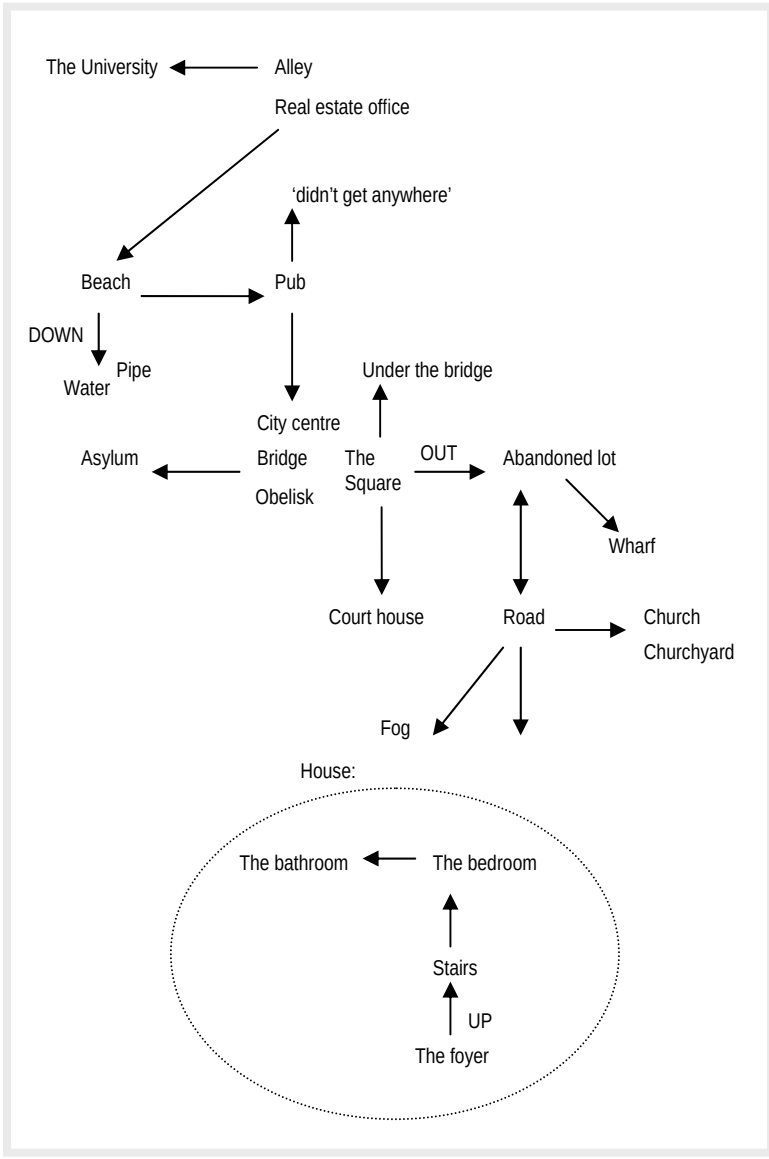

Figure 6.1. Graphical map constructed from participant 2's description. See Table 6.6 for a list of drawing conventions used.

Table 6.8. The results of matching the order in which locations were mentioned to the order in which locations were visited/read and to spatial proximity on the constructed graphical maps.

Spatial description	No. of locations	Matches	
		Visited/read order	Spatial proximity
Players:			
Participant 1: Description 1	6	yes	yes
Participant 1: Description 2	14	no	yes
Participant 1: Description 3	2	yes	yes
Participant 1: Description 4	4	yes	yes
Participant 2: Description 1	14	no	no
Participant 2: Description 2	5	no	yes
Participant 3: Description 1	13	no	no
Participant 3: Description 2	3	yes	yes
Readers:			
Participant 5: Description 1	5	no	–
Participant 5: Description 2	6	no	–
Participant 5: Description 3	5	no	–
Participant 6: Description 1	3	no	–
Participant 6: Description 2	2	no	–
Participant 7: Description 1	7	no	–
Participant 7: Description 2	2	yes	–
Participant 7: Description 3	4	no	–
Participant 8: Description 1	9	yes	–

6.2.4.2 Completeness, accuracy, consistency, integration

Players. The left part of Table 6.9 reveals that the players' descriptions of spatiality were relatively complete, to a high degree accurate, consistent and in most cases integrated. No locations that were not in the game were described (i.e., there were no occurrences of made-up or falsely remembered locations). It should be noted that the results for participant 4 differ as a result of differences in the eliciting conditions. The fact that participant 4 was not explicitly asked to describe the spatial layout probably had the effect that the description was less complete, accurate, and integrated than would have been the case if this question had been asked explicitly.

Readers. The results of the readers present a contrasting picture, as can be seen in the right part of Table 6.9. Readers gave descriptions that were mostly incomplete. Very few spatial relations were mentioned, but the ones that did occur were about 50 percent accurate. Because of the low number of spatial relations, the consistency and integration measures were not calculated for readers (see further the discussion below).

Table 6.9. Completeness, accuracy, consistency, and integration of participants' spatial mental representations of the layout of the game world.

Measure	Players					Readers				
	1	2	3	4	Mean	5	6	7	8	Mean
No. of described locations	14	21	17	21	18	10	3	10	9	8
No. of encountered locations	26	33	26	42	32	25	25	25	25	25
Completeness of locations	54%	64%	65%	50%	57%	40%	12%	40%	36%	32%
No. of accurate relations	7	13	15	16	13	1	0	3	0	1
No. of described relations	8	16	16	24	16	3	0	5	0	2
Accuracy of relations	88%	81%	94%	67%	80%	33%	–	60%	–	50%
No. of contradictions	0	0	0	0	0					
No. of regions	1	1	1	6	2.25					

Note: The overall accuracy figure is lowered by the fact that the total number of spatial relations consists of the categories *correct*, *incorrect*, and *uncertain*, the last category including, e.g., spatial relations that may be correct but where no destination location was mentioned.

6.2.4.3 Hierarchical organisation

Players. The players' descriptions expressed hierarchical organisation of elements (see Figure 6.1 for an example). Participant 1 talked about the northern and the southern parts, and places were located in each part. All players talked about the house and rooms within the house. Participant 4 talked about the upper floor of the house and what rooms it contained, expressing a two-level hierarchical organisation. Participant 1 also used a two-level hierarchy when talking about the rooms in the house, and said that the house was located in the southern part.

Readers. Descriptions by readers also showed a hierarchical organisation. Participant 5 expressed a hierarchical organisation by talking about the town and places within it. Participant 6 talked about the first floor of the house, and said that the bedroom was located there. Participant 7 also gave a similar description of the first floor, and also described the town square and the places it contained. Participant 8 mentioned that the foyer and the master bedroom were inside the house.

6.2.4.4 Distortions and errors in spatial mental representations

Players. Although the players' spatial descriptions were highly accurate, two kinds of systematic errors were found in the player's descriptions: a possible case of alignment bias and confusions of the canonical directions *east* and *west*.

The data do not permit analysis of fine-grained spatial differences between the original map (the one constructed from the participant's game session log) and the map as described (those kind of analyses require distance information in an original map and a map drawn by the person). However, the memory bias called *alignment*, which causes objects in the memory of a map to be lined up horizontally or vertically (Tversky, 1981), could explain one inaccuracy found in participant 2's spatial representation. The location *Vacant lot* was aligned with the road south which leads to *The House*. In the original map, the *Vacant lot* lay more to the east, but this location may have been seen as more important by the participant than the

Riverwalk which was actually situated in the place where *Vacant lot* was described to be.

Another type of error was to confuse certain directions more often than others. The directions east/west were mistaken more often than north/south. Participant 1 described an exit to the east when it actually was located to the west, as shown in example 6.4.

(6.4) Participant 1:
trappan ledde ju till sovrummet (.) *å från sovrummet*
the staircase led to the bedroom (.) and from the bedroom
fanns det två stycken utgångar en i söder å en (.) *i öster*
there were two exits one to the south and one (.) to the east

In example 6.5, participant 2 makes two errors. First, a beach is described as being located southwest instead of east or southeast. Second, the pub is described as being located east instead of west.

(6.5) Participant 2:
(*du*) *har ju fastighetskontoret* (.) *sen öh:* (.) *sen eh:*
(you) have the real estate office (.) then eh: (.) then eh:
sydvä:st om de så fanns de nån strand (.) *som man*
southwe:st from that there was some beach (.) that you
kunde klättra ner på (.) *där det fanns*
could climb down onto (.) where there was
[*en ett rör som stack ut*]
[a pipe that stuck out]
[((shows an extended object with thumb and index finger three times right-left-right: iconic gesture, unknown viewpoint))]
(.) °*hh* (.) *å vatten då mm* (.) *lite mer ö:sterut* (.) *så fanns det en pub*
(.)°hh (.) and water mm (.) a bit more to the ea:st (.) there was a pub

Speech repairs also suggest that east and west are confusing, as shown in example 6.6.

(6.6) Participant 2:
innan man gick ner dit så kunde man ta sig ut på en
before you went down there you could get to an
abandoned lot där det fanns en madrass och så (.)

abandoned lot where there was a mattress and (.)
kunde man gå (.) *söderut* (.) *sydväst! eller sydöst*
you could go (.) south (.) southwest! or southeast
därifrån så kom man ner till vatten också
from there and you came down to water too

Readers. The failures of the readers consisted chiefly of not mentioning spatial relations. Readers also gave fewer locations than players. No other systematic errors were found in the readers' spatial descriptions.

6.2.5 Discussion

6.2.5.1 Description order

The order in which the locations were mentioned in the descriptions by the players as well as the readers did not match the order in which they were visited for the most part. In contrast, Taylor and Tversky (1992) found that the order in which participants drew landmarks matched the order in which landmarks were presented in a text describing a spatial layout. However, the many differences between Taylor and Tversky's study and the present one make a comparison difficult. The length of the text, the number of landmarks, the time duration that the participants were allowed to study the text, the instructions given to the participants, and the fact that their participants drew a map as compared to giving description in speech are some potentially influencing factors. The order in which the participants in the present study mentioned the locations was not consistent with doing a scan over a spatial representation. Even though some descriptions matched visited/read order and spatial proximity, neither visited/read order nor spatial proximity receives support as a general explanation for why participants mentioned the locations in the order they did. This suggests that participants used some other strategy when recalling the locations than simply remember them in the order they were visited, or scan a spatial mental representation.

In the players' mentioning of the locations, there was a primacy effect. The first three locations were given by all players. An explanation for this is that an initial obstacle was presented to the players (how to get into the real estate office) and they spent time trying to solve this puzzle, thereby elaborating these places during encoding in memory.

6.2.5.2 Completeness, accuracy, consistency, integration

Completeness. Players as well as readers mentioned a fair number of the locations from the game world, but players were more complete in their descriptions.

In studies of learning from graphical maps, Taylor and Tversky (1996) found that a mean of 94.6 percent of landmarks were mentioned by participants. Of course, this depends on the number of landmarks to be learnt, but the Taylor and Tversky figure is higher than the one obtained here for players and readers. The players should have had plenty of opportunity to learn the locations. The readers, on the other hand, may have made less effort to learn the locations, so the low figure of the readers is more expected. An explanation for the low number can be the presence of a bias in the completeness measure. It describes the spontaneous completeness given by the participants, since they were not instructed to describe the places from the game exhaustively, and no follow-up questions were asked when they gave their descriptions. To some extent, there is a chance element to the completeness measure used here. Whether memory retrieval is triggered in order to further describe the spatial layout in part depends on cues that happen to be available from, for example, the interviewer's utterances or the participant's associations. Thus, it is likely that the completeness measure presents an unfairly low figure. If prompted, participants may have given more locations and the completeness figure would go up. However, there is no reason to believe that this would have affected players and readers differently.

Nevertheless, there is a difference between players and readers concerning completeness. What could be the reason for this? At least three possible explanations suggest themselves. First, players

were exposed to the locations a greater number of times than readers. This repetition effect may have increased the strength with which the locations were encoded. Another explanation could be that players were more interested and focused on the locations, since they present an important part of playing *Anchorhead*—players need to move between locations to explore and solve the game. In this way, locations may have been elaborated in memory. The readers, in contrast, may have put less effort into thinking about the locations, and the locations were thereby less elaborated. Finally, consistent with the difference in completeness, players, but not readers, may have formed a coherent spatial mental representation—as a result of the navigational demand—which would make remembering locations easier.

Accuracy of spatial relations. Players provided highly accurate descriptions of the spatial relations, while readers did so less. Both players and readers made mistakes, but players gave fewer inaccurate spatial relations.

The numbers are comparable to studies by Taylor and Tversky (1992), where map drawings were made from learnt written route descriptions. The means of four experiments showed an 82–90 percent accuracy, although the conditions were different from those in the present study.

The difference in the accuracy of spatial relations between players and readers could be explained by the processes of repetition and elaboration of single items. However, the difference between players and readers was even larger concerning spatial relations than concerning locations. This strongly suggests that the difference is due to the fact that players constructed coherent spatial mental representations.

Consistency. There were no occurrences of contradictions in spatial relations in the descriptions made by players, even though a large number of spatial relations were mentioned. Readers gave very few spatial relations, which made it unlikely that contradictions could occur (the consistency measure does not reveal much in the case of the readers).

The consistency of the players goes well with the idea that they were using a spatial mental representation as a source for their descriptions.

Integration. Players spontaneously gave descriptions that consisted of integrated wholes. Participant 4 was an exception, describing six unconnected regions, but considering the difference eliciting conditions, this is expected (he was not asked to give a description of the spatial layout, but gave spatial description when answering other questions).

Because the readers gave few or no spatial relations, their descriptions can be said to show a very low degree of integration, if the measure could be meaningfully applied at all.

Taken together, these four measures support the conclusion that players were indeed making their descriptions from spatial mental representations, and the readers were not.

6.2.5.3 Hierarchical organisation

Players as well as readers expressed in their descriptions a hierarchical spatial organisation of the game world. However, this finding does not warrant the conclusion that players and readers had hierarchical spatial mental representations in long-term memory. As Brockmole and Wang (2002) point out, when using verbal descriptions as a measure of the spatial representation, it will proceed in an ordered and hierarchical way, because of demands of the communicative situation. So, this could be attributed to the memory retrieval and language production processes and is not necessarily a property of the underlying mental representation. On the other hand, hierarchical organisation is something we would expect to find in participants' descriptions, because hierarchical organisation is a fundamental property of spatial mental representations (Tversky, 2000). If no signs of hierarchical organisation were to be found in the descriptions, we would be reluctant to conclude that the descriptions were made from spatial mental representations.

6.2.5.4 Errors

Two types of systematic errors were found in the players' spatial descriptions: a probable case of alignment bias, and confusion between the directions *east* and *west*.

As demonstrated by Tversky (1981), and many after her, it is typical of spatial mental representations to be biased in a number of ways. One type of error, alignment bias, seemed to be present in the spatial descriptions made by the players. Given that it is indeed a case of alignment bias, this suggests that the spatial description was made from a spatial mental representation.

There were other errors in the spatial descriptions which suggest a spatial mental representation. It was found that *east* and *west* were confused more often than other pairs of directions. This suggests a mapping of the terms *east* and *west* to a spatial organisation, because people tend to more often confuse symmetrical axes than asymmetrical ones in spatial arrangements (Tversky, Lee, & Mainwaring, 1999). The explanation given by Tversky, Lee, and Mainwaring is that 'north-south are absolute directions, anchored at the poles, whereas east-west are relative terms' (p. 7). They also present findings that *left* and *right* are confused more than *front/back* or *head/feet*. These findings more directly relate to an experience of symmetry and asymmetry. Then, another explanation for the confusion of *east* and *west*—not mentioned in their article—would be that they are spatially mapped onto *right* and *left* respectively. This is the standard way of reading a map and may therefore influence the spatial experience of the game world. Regardless of whether east-west are inherently confusing, or whether they are confusing because they are mapped to right–left, the errors strongly suggest an underlying spatial mental representation.

The occurrences of mistaken directions, be it confusion between east–west or other errors in directions, were associated with signs of audible hesitation. Vowels were noticeably longer in cases of mistaken spatial relations than in cases of correct spatial relations. This observation suggests that, to the extent participants were using spatial mental representations as a source for their descriptions, they were at least partly constructing the spatial mental representation at

the time they gave the description. The reason is this: If participants on the other hand did construct a spatial mental representation at the time they played the game, the incorrect directions would be part of the spatial mental representation in just the same way as the correct ones. When retrieving directions from this spatial mental representation, all directions—correct as well as incorrect ones—would be treated equally. But instead, as was seen, many of the incorrect directions were reported in a different manner than the correct ones. Thus, at least part of constructing a spatial mental representation had to be performed at the time the descriptions were made.

6.2.5.5 Why did the players construct spatial mental representations?

There are at least three possible reasons why players formed spatial mental representations. First, it could be that having spatial mental representations simply facilitates navigation in the story world. Second, closely connected to the first reason, it could be that not only navigation, but also understanding of the participatory story, and knowing which actions to perform, is facilitated by having a 'mental map' of the story world. Finally, as opposed to the other two more functionalistic explanations, the spatial mental representation may serve a purely aesthetic purpose in that participants enjoy the participatory story more when they can 'see' the participatory story world in their mind's eye. It is not possible to rule out any of these three explanations on the basis of the data in the present study. On the other hand, there is little evidence to support any other conclusion than that the spatial mental models facilitate navigation. There are no reasons to believe that actions other than navigation would be facilitated by spatial mental representations. If the spatial mental representations served a purely aesthetic purpose, readers of non-participatory stories would form them as well, but this does not seem to be the case. Thus, it seems that players form spatial mental representations because it helps them navigate in the game world.

6.3 CONCLUSION

In summary, the present study of audience spatial cognition provides evidence that there is a difference in audience cognition between participatory stories and non-participatory stories. Participants who played the computer game *Anchorhead* supplied longer, more elaborate verbal descriptions of spatiality of the game world than participants who read the non-participatory version of *Anchorhead*. Players remembered spatial facts better. This was supported by more complete descriptions of locations and more accurate descriptions of spatial relations. It is suggested that the reason for this improved memory performance is that players formed coherent spatial mental representations in long-term memory. This was supported by the findings that their verbal descriptions of spatiality were highly consistent and presented an integrated spatial whole. The forming of spatial mental representations by players was to some degree supported by confusion of the symmetrical axis east–west. Consistent with spatial mental representations, players' verbal descriptions showed spatial hierarchical organisation.

Consequently, it seems that despite the often claimed fragmentation of interactive fiction, players were able to form a coherent spatial mental representation.

It could be argued that the non-participatory version of *Anchorhead* that was constructed for this study may be an atypical text and not like an ordinary short story. It has an uncommon perspective (second-person pronouns) and may be less interesting than an authentic short story. However, although the non-participatory version acted as a point of comparison, the weight of evidence for the construction of spatial mental representations in authentic reading situations of non-participatory stories can be found in other studies, such as those by Zwaan and van Oostendorp (1993) and Hakala (1999).

Nevertheless, the results of the present study give strong support to the conclusion that players did construct spatial mental representations of the game world. The reason is probably that they did so because they needed to. There is a need to move around—a naviga-

tional demand—in *Anchorhead*, as in almost all works of interactive fiction. Thus, the hypothesis which states that players only use information locally in each situation in order to navigate can be refuted. As the navigational demand is present in most participatory stories, it is likely that the audience constructs spatial mental representations in other kinds of participatory stories as well.

CHAPTER 7

Exploring memory qualities using the reality monitoring framework

Proposing a framework called *reality monitoring* (RM), Johnson and colleagues (Johnson & Raye, 1981; Johnson et al., 1988) have shown that memories of events that actually happened differ in quality from memories of events that were merely imagined. Memories of real events generally contain more perceptual detail, contextual embedding (such as time and place), and connections to other memories before and after the event. In contrast, memories of imagined events generally contain more information about thoughts and reflections from the time of the imagining.

Can the RM framework shed light on the qualities of memories from a participatory story? Considering that the events that take place in the participatory story are fictive, but at the same time come about from actions carried out by the person experiencing the story, the following questions present themselves: Are memories of events from a participatory story qualitatively like memories of real events, or like memories of imagined events, or do they present a case in between these two positions? In other words, do they contain a high degree of perceptual details and contextual embedding (like real events), or do they rather contain information on thoughts and reflections (like imagined events), or are the kinds of information in memory in between these two? Using the RM framework, this chapter explores the elicited interview data where people talk about events from five sources (described in Chapter 5) in order to answer these questions.

7.1 REALITY MONITORING, DECEPTION DETECTION, AND RATING OF VERBAL ACCOUNTS

First in this section, the RM framework is discussed. After that, earlier studies are investigated where RM has been applied to find differences in verbal statements of actual versus imagined events in the area of deception detection—approaches which served as a model for the present study of memory qualities.

7.1.1 Reality monitoring

Reality monitoring is a framework put forward by Johnson and colleagues (Johnson & Raye, 1981; Johnson, Foley, Suengas, & Raye, 1988) that addresses the question of how a person discriminates between memories that have an external (perceived) or an internal (imagined) origin. According to the theory, the origin of a memory is not stored explicitly in memory, but is rather inferred from various sources of information, among other things, the qualities of the memory. Memories of events that have been experienced, that is, that have an external origin, contain more perceptual, spatial, temporal, emotional details. In contrast, memories of events that have been imagined, that is, that have an internal origin, contain more elements of cognitive operations such as thoughts and reasonings. When a person tries to remember whether a certain memory corresponds to an actual experience or not, both conscious as well as non-conscious processes are at work. Whether a memory is attributed to an external or internal source depends in part on the qualities contained in the memory. Although misclassifications occur, most of the time, these processes arrive at correct classifications. To measure the degrees of various qualities of memories, Johnson et al. (1988) developed a memory characteristics questionnaire (MCQ), where participants rated their own memories.

The RM framework has not previously been applied to memories from participatory stories, but has been useful in explaining findings in areas such as post-event memory suggestion (Schooler, Gerhard, & Loftus, 1986), dreams (Johnson, Kahan, & Raye, 1984), and deception detection (further discussed in detail below).

Schooler, Gerhard, and Loftus (1986) studied the qualities of memories of real versus suggested details in a scene as revealed through written descriptions by participants. The study seems to be the first to take the step from studying people's ratings of *their own* memory qualities to studying the presence of various types of information in *external*, *verbal* descriptions of memories. In the study, judges rated the written descriptions on sensory, geographic (i.e., spatial), functional, and cognitive-processing information, as well as verbal hedges (e.g., 'I think...', 'I believe...'). The real-memory descriptions had more sensory and geographic information, while the suggested-memory descriptions had more functional and cognitive processing information as well as more verbal hedges. Thus, it seems reasonable to make a connection between, on the one hand, memories of external events and non-suggested memory, and on the other hand, memories of internal events and suggested memory.

Next, one particular application of the RM framework is considered which includes external ratings of memory qualities, offering promising methods for the present study: the detection of deception.

7.1.2 Deception detection using verbal accounts

The RM framework has been applied to the problem of discriminating truth from lies by researchers working in the field of deception detection within forensic psychology. The general procedure is, first, to obtain spoken accounts from people who have witnessed actual events or have imagined events. These accounts are then transcribed and subsequently rated by judges who score the contents on a set of RM criteria. In contrast to the MCQ, where people rate their own memories, in deception detection research, judges rate *other people's* accounts. These characteristics make RM applied to deception detection suitable for the present study where data also was collected in the form of spoken accounts. A general assumption in the use of RM in deception detection is that false testimonies can be likened to memories of internal events, and that true testimonies can be likened to memories of external events.

Alonso-Quecuty (1992) was the first to test whether the RM framework could be used to distinguish between true and false testimonies, and also investigated the influencing effect of a time delay (10 min) between experience and testimony. Participants were divided into two groups. In Group 1, participants watched a videotape of a person performing a criminal act. Half of the participants were instructed first to tell what they saw on the videotape, and then give an account that made the person not guilty of having performed the criminal act. The other half gave the accounts in the reverse order. Participants in Group 2 received the same treatment as those in Group 1 with the insertion of a 10-minute delay before giving the accounts. Five measures were taken on the accounts: number of words, number of pauses, and ratings of sensorial, contextual, and subjective idiosyncratic information. In the paper, no details are given about the last measure, but presumably, it coincides with the RM property *cognitive operations*, that is, reasoning, inferring, etc. Results showed that false testimonies were longer and contained more pauses when there was a delay. The immediate true accounts had more sensorial and contextual information, while the immediate false accounts had more subjective idiosyncratic information. In the delayed condition, only the amount of idiosyncratic information differed, being higher in the false accounts. Thus, the study appears to show that the RM framework can be used for deception detection, at least when the testimonies are made without delay.

In a similar study, Hernández-Fernaud and Alonso-Quecuty (1997) found more contextual and sensorial information in true statements, but no difference concerning cognitive operations in true compared to false statements, as would be expected from the RM framework.

Vrij, Edward, Roberts, and Bull (2000) studied, among other measures, the presence of RM criteria in true and false accounts. Results concerning RM criteria showed that perceptual (vision, sound), spatial, and temporal information were present to a higher degree in true than in false accounts. Contrary to RM predictions, cognitive operations were also more present in true accounts. Vrij,

et al. (2000) explain this finding by noting that cognitive operations are one way of facilitating memory for experienced events, by using the context to reason about the likelihood of actually having experienced the event (e.g., a person may believe she has driven a car fast in Germany, because it is a likely consequence from remembering having used the motorway).

In a recent study by Vrij, Akehurst, Soukara, and Bull (2004), results were consistent with RM predictions. Visual, auditory, spatial, and temporal details were present to a higher degree in true than in false statements. Cognitive operations were present to a higher degree in false statements.

Another application of RM in deception detection was made by Sporer (1997). Sporer noted that the methods of content-based analysis of accounts in criminal contexts lacked psychological theory, and suggested that the RM framework can fill this role. In Sporer's study, participants were first instructed to tell about real and invented events (either immediately or with a short delay) while being video recorded (the terms 'lie' and 'truth' were deliberately not used in the instructions). These video recordings were transcribed and rated by judges on the degree of various kinds of information related to the RM framework. The criteria used by Sporer were a reduced version of the MCQ, where several dimensions had been collapsed into eight scales, based on factor analyses and theoretical assumptions of the RM framework. Sporer's criteria were adapted for judgement of accounts by external observers. Judges rated the criteria on a three-graded scale. The results showed a higher presence of spatial, time, and emotional information, but only when there was a short delay before giving the account. Averaged across the immediate and delay conditions, the results showed a higher presence of emotions and realism in the true accounts. The RM criteria could successfully discriminate true stories from false stories (71.3 percent correct, which is considered a high figure within the field of deception detection).

In summary, the application of the RM framework in deception detection has proven partly successful. The presence of perceptual and contextual details is most often found to a higher degree in accounts of real, experienced events. However, the evidence that cognitive operations are present to a higher degree in accounts of imagined events is mixed—most studies show more cognitive operations in false statements, but some studies show no differences, and some studies even show a higher degree of cognitive operations in true statements, contrary to predictions from the RM framework.

Because of the success of Sporer's (1997) study as well as the relatively detailed documentation of it, its method was used as a basis for the present study. In applying Sporer's method in the present study, a parallel is assumed between, on the one hand, external and factual events, and on the other hand, between internal and fictional events. The assumptions of the present study are put in relation to assumptions of deception detection in Table 7.1. However, in making the connection between fictional and imagined events, it is important to add that it is not claimed that fiction is the same as lies (see Chapter 3 for a discussion of fiction).

Table 7.1. Assumptions regarding the status of events based on the reality monitoring framework in deception detection and the present study.

Reality monitoring	Detection deception	The present study
Memories with external origin	Truth	Factual
Memories with internal origin	Lie	Fictional

7.2 REALITY MONITORING CRITERIA

The rating criteria in the present study consisted of nine elements, described below. Criteria 1–7 are those typically present to a higher degree in memories of real, external events, while criterion 8 typically is present to a higher degree in memories of imagined events. The first six criteria were taken from Sporer (1997). The criterion of *Degree of details* was added because this quality separates external and internal memories according to the RM framework (Johnson & Raye, 1981). Further, Sporer's criterion *Cognitive operations* was divided in two criteria, *Cognitive operations at the time of the event*, and *Cognitive operations at the time of retelling*. This division was made in order to sort out cognitive operations tied to the memory itself, for example, 'I thought that he was going to run after me' (which according to the RM framework are associated particularly with internal memories), in contrast to cognitive operations occurring as part of the telling, for example, 'When I think about it now, it seems that what happened was...'. Schooler, Gerhard, and Loftus (1986) use the term *verbal hedges* to refer to what is here called *Cognitive operations at the time of retelling*. Without this division, there was a risk that raters would collapse both criteria, when only criterion 8 is of interest within the RM framework. Criterion 9 is related to the conversational level of the discourse, and does not correspond to qualities of the *memories* themselves. A characteristic is that for *Cognitive operations at the time of retelling*, the verb is virtually always in the present tense, while for *Cognitive operations at the time of the event*, the verb is usually in the past tense.

The requirements for judging whether RM criteria are present are as follows:

1. *Clarity*. This refers to the clarity and vividness of the statements. This criterion is present if the report is clear, sharp, and vivid (instead of dim and vague).
2. *Perceptual information*. This criterion is present if the statement includes sensorial experiences such as sounds (e.g., 'He really shouted at me'), smells (e.g., 'It had a smell

of rotten fish'), tastes (e.g., 'The chips were very salty'), physical sensations (e.g., 'It really hurt'), and visual details (e.g., 'I saw the nurse entering the ward').

3. *Spatial information*. This criterion is present if the statement includes information about locations (e.g., 'It was in a park') or the spatial arrangement of people and/or objects (e.g., 'The man was sitting left of his wife' or 'The lamp was partially hidden behind the curtains').

4. *Temporal information*. This criterion is present if the statement includes information about when the event happened (e.g., 'It was really in the morning') or explicitly describes a sequence of events (e.g., 'When he heard all that noise, the visitor became nervous and left', 'As soon as the guy entered the pub, the girl started smiling').

5. *Affect*. This criterion is present if information is included about how the participant felt during the event (e.g., 'I was very scared').

6. *Reconstructability of the story*. This criterion is present if it is possible to reconstruct the event on the basis of the information given.

7. *Degree of details*. This criterion is present if the account has a high degree of detail (e.g., 'The door-knob was made of brass', 'He opened the envelope eagerly').

8. *Cognitive operations at the time of the event*. This criterion is present if there are descriptions of conclusions, reasoning, or thinking that took place at the time of the event or events (e.g., 'Then I decided to...', 'Her reactions gave me the impression that she was upset').

9. *Cognitive operations at the time of the telling*. This criterion is present if there are descriptions of conclusions, reasoning or thinking occurring at the time of the telling (e.g., 'I think this is what happened...', 'As I remember it...', 'It strikes me now that...').

(The description of the first six of Sporer's criteria is quoted from Vrij (2000), p. 160; some parts of another rating system are left out.)

Sporer (1997) used an additional RM criterion, *Realism*, but this was considered irrelevant in the present study and was removed. The reason was twofold: The content of the stimulus stories was often given to the participants who made the account, giving them little chance to influence it and therefore the degree of realism of their tellings. Further, the source of each account was often explicitly stated in the accounts, for example, 'I remember when *I* was ten years old...', 'The *game* started with...', and '*Sherlock Holmes* deduced that the criminal must have...'. This makes the issue of realism meaningless in the present study, since judges could easily tell from what source the account was made. In contrast, Sporer used the criterion because his judges did not know from which condition the accounts came.

7.3 HYPOTHESES

As described in Chapter 5, the participants' accounts were from five sources:

- *Game:* Events from a computer game which the participants played.
- *Story:* Events from a short story which the participants read.
- *Personal:* Events that took place earlier in the participant's life.
- *Tasks:* Events from three tasks carried out in a laboratory setting.
- *Non-participatory:* Events from a special, adapted non-participatory version of the computer game, printed on sheets of paper, which the participants read.

According to Johnson and Raye (1981), Johnson et al. (1988), and Sporer (1997), the RM criteria 1 to 7 (described above) should be present to a higher degree in external, real events. The RM criterion 8 should be present to a higher degree in internal, imagined events (as discussed, criterion 9 does not concern RM issues, and is therefore not part of the hypotheses). The hypotheses were that memories of events read about in a short story (*Story*) share qualities of imagined events, and that memories of events from a computer game (*Game*) share some of the qualities of memories of actual events as well as some qualities of imagined events. Further, it was hypothesised that memories of events from personal experience (*Personal*) share qualities with memories of events from the laboratory tasks (*Tasks*), and that memories of events read about in a short story (*Story*) share qualities of memories of events from the non-participatory version of the computer game (*Non-participatory*). Thus, the hypotheses regarding the rating scores on the RM criteria in the present study were as follows:

RM criteria 1–7 (perceptual, spatial, time, affect, etc.):

Personal = Tasks > Game > Story = Non-participatory

RM criterion 8 (cognitive operations):

Personal = Tasks < Game < Story = Non-participatory

7.4 METHOD

All material and instructions are presented here translated into English from Swedish, which was the language used for conducting the study.

7.4.1 Data processing

7.4.1.1 Accounts

From the transcriptions of the interview data from the eight participants (see Chapter 5), the accounts of events therein were extracted. Deciding what constitutes a single account or several accounts is difficult to do formally and consistently (for a discussion of this problem in relation to everyday narrative, see Labov & Waletzky, 1967). In the present study, the start of accounts was chosen according to several criteria: content, the occurrence of a long pause or an inhalation, or typical occurrences such as 'Let me tell you about when I...'. The end of accounts was chosen according to content or typical summing-up phrases. The beginning and end of accounts were also signalled by non-feedback turn-taking. All non-word elements from the account transcriptions were removed. All conversational turn-taking was removed, leaving only what appeared to be an account given in monologue. If accounts were less than 50 words and they belonged to a more general account (if the theme was similar, i.e., it was a partial account), it was merged with the account following it. Accounts longer than 500 words were cut approximately at that point (letting them end as naturally as possible). This cut off two accounts, otherwise being 2,432 and 1,002 words. The upper length of 500 words was chosen as a practical limit for the rating procedure. Any potential qualities were considered to be well present within the first 500 words. An example of an extracted account, in the format presented to the judges, is shown in Table 7.2 (here with an added English translation).

Table 7.2. Example of an extracted account used in the study.

Swedish	English translation
det visar sig att man är en kvinna som är gift med en man som heter michael och som har fått reda på att han har släktingar i nån nån liten stad där både fiskeindustrin och pappersindustrin har gått omkull då tydligen får man reda på sen eh man flyttar dit och ska hämta nycklarna på ett fastighetskontor men där är det stängt och låst å man kan ta sig in genom ett fönster på baksidan och där inser man att eh man kan lyssna på en telefonsvarare å få reda på efternamnet på familjen sen går man å letar efter familjen i file room där hittar man nycklar men man hittar också att alla papper är borta sen ska man hitta sin eh man då på universitetet eh ta mannen å gå till huset å sen ska man gå och lägga sig sen tar det slut	it turns out that you are a woman who is married to a man named michael who has learnt that he has relatives in some some small town where both the fishing industry and the paper industry have been shut down evidently you learn later eh you move there and is supposed to get the keys at a real estate office but it is closed and locked and you can get in through a window at the back and there you realise that you can listen to a telephone answering machine and learn the name of the family then you go to search for the family in the file room there you finds keys but you also find that all the papers are gone then you're supposed to find your eh husband at the university eh get the husband and then go to the house and then you're supposed to go to bed and then it ends

A total of 32 accounts were extracted. The number of accounts per source varied between 4 and 9. The accounts varied considerably in length. A one-way analysis of variance (ANOVA) showed that the mean lengths of the stories from the five sources differed, $F(4,27) = 3.365$, $p = .023$. However, given that the ratings were made globally for each account, they should not be sensitive to differences in length, even if these are systematic.

7.4.1.2 Rating questionnaire

The rating questionnaire consisted of general information about the study, descriptions of the nine RM criteria together with examples, description of the rating scale, some background questions on age, gender, and first language of the judge, followed by three practice accounts and the 32 accounts (in randomised order for each judge).

After each account, the nine criteria was listed followed by a three-graded rating scale, taken from Sporer (1997) (0 = not present, 1 = some indication present, 2 = clearly present). The three-graded rating scale was used instead of the seven-graded scale of the MCQ (Johnson et al., 1988). The rationale was that a seven-graded scale is suitable when the rater has rich information from which to rate, as is the case with the MCQ when rating one's own phenomenological qualities of memories. When rating the sparse information in brief verbal accounts, very little information is available on which to base a rating, making a two- or three-graded scale more suitable.

7.4.2 Rating procedure

Two judges, one male and one female, both with Swedish as their first language, rated each of the 32 accounts on the nine RM criteria. The judges were both students with some experience of reading transcribed speech, but unaware of the research hypotheses. Prior to rating, the judges were briefly trained in using the RM criteria. After an introduction to the meaning of each RM criterion, the first account was rated together with the experimenter and the ratings discussed. The second and third accounts were rated separately, but discussed together. After this training, the judges were considered to have reached a sufficient level of understanding of the RM criteria, and they rated the 32 accounts separately.

7.5 RESULTS

Results are here presented first for inter-rater agreement, then for the rating scores of the RM criteria.

7.5.1 Inter-rater agreement

The inter-rater agreement was calculated with percent agreement and Pearson product moment correlation, shown in Table 7.3. The percent agreement varied between 46.9 and 84.4 with a mean of 59

percent for all criteria. Inter-rater correlation was significant at the $p < .01$ level for *Clarity*, *Perceptual information*, *Spatial information*, *Time information*, and *Affect*, while *Degree of details* and *Cognitive operations at the time of the event* were significant at $p < .05$.

Table 7.3. Inter-rater agreement of the RM criteria ratings of the two judges.

RM criteria	% agreement	Pearson *r*
1. Clarity	68.75	.467**
2. Perceptual information	59.375	.564**
3. Spatial information	68.75	.714**
4. Time information	53.125	.507**
5. Affect	84.375	.702**
6. Reconstructability	53.125	.103
7. Details	46.875	.444*
8. Cognitive oper. at event	50	.441*
9. Cognitive oper. at telling	46.875	.082

*$p < .05$; **$p < .01$.

7.5.2 RM criteria

The mean of the ratings of the two judges were used in the subsequent analyses—values ranging from 0.00 to 2.00.

Descriptive analyses revealed that the fifth criterion, *Affect*, was hardly ever coded to be present in the accounts ($M = 0.11$), and was therefore excluded from further statistical analyses. There was considerable variation within the ratings of the other criteria, and thereby presumably in their discriminative value.

ANOVAs investigating effects of identity and gender of the participant who made the account on ratings showed no significant effects.

Length of accounts correlated with *Time information* (RM criterion 4), $r = .426$, $p = .015$, and with *Cognitive operations at the time of the telling* (RM criterion 9), $r = .402$, $p = .023$.

The rating means for accounts of the five sources, for each RM criterion, can be seen in Table 7.4. Table 7.5 shows the collapsed means of RM criteria 1–4 and 6–7, as well as RM criterion 8 (as discussed, criterion 5 was discarded from analyses because of a floor effect).

The hypothesis that ratings for criteria 1–7 would be highest for Personal and Tasks, with Game in between, and Story and Non-participatory lowest, was not supported by the data (one-way ANOVA with source and means of RM criteria 1–4, 6–7, $F(4,27) = 0.146$, *n.s.*) However, comparison of individual RM criteria against source revealed a significant difference for *Spatial information* (RM criterion 3) (one-way ANOVA with source and RM criterion 3, $F(4,27) = 7.264$, $p < .001$). Multiple post hoc comparisons using Tukey HSD showed that for Tasks, *Spatial information* was rated lower than for Story ($md = 0.9167$, $p = .005$), Non-participatory ($md = 1.1250$, $p = .007$), and Game ($md = -1.2500$, $p = .001$).

The hypothesis that ratings for *Cognitive operations at the time of the event* (criterion 8) would be highest for Non-participatory and Story, with Game in between, and Personal and Tasks lowest, was not supported by the data. No difference across sources was found (one-way ANOVA with source and RM criterion 8 yielded $F(4,27) = 0.658$, *n.s.*)

Table 7.4. Means of RM criteria ratings as a function of account source.

RM criteria	Personal	Tasks	Game	Story	Non-p.
1. Clarity	1.50	1.75	1.33	1.44	1.38
2. Perceptual information	0.60	1.06	0.42	0.78	0.13
3. Spatial information	0.80	0.25	1.50	1.17	1.38
4. Time information	1.00	1.13	1.25	0.83	1.38
6. Reconstructability	1.40	1.63	1.50	1.33	1.50
7. Details	0.50	0.69	0.50	0.78	0.88
8. Cognitive oper. at event	0.60	1.13	0.92	0.67	0.75
9. Cognitive oper. at telling	0.50	0.25	0.17	0.44	0.63

Scales range from 0.00 to 2.00. Criterion 5 was excluded from analyses because of a floor effect.

Table 7.5. Means of RM criteria ratings for the five sources on criteria 1–4, 6–7 and criterion 8.

Source	Criteria 1–4, 6–7*	Criterion 8
Personal	0.97	0.60
Tasks	1.08	1.13
Game	1.08	0.92
Story	1.06	0.67
Non-participatory	1.10	0.75

Note: Scales range from 0.00 to 2.00. *Criterion 5 was excluded from analyses because of a floor effect.

Correlations between RM criteria were calculated in order to see if they represented independent factors, or if some criterion was redundant with respect to others. Calculation of Pearson r, $N = 32$, two-tailed, revealed five significant correlations at the .01 level, as shown in Table 7.6. Correlation between RM criteria is further discussed below.

Table 7.6. Significant correlations among RM criteria.

RM criteria	RM criteria	r	p
1. Clarity	6. Reconstructability	.456	.009
1. Clarity	7. Details	.551	.001
1. Clarity	8. Cognitive oper. at event	.479	.006
4. Time information	6. Reconstructability	.523	.002
4. Time information	8. Cognitive oper. at event	.536	.002

Note: Correlations were calculated with Pearson r, $N = 32$, two-tailed, $p < .01$. p is the level at which the correlations are significant.

7.6 DISCUSSION

The goal of the present study was to see whether the RM framework could shed light on qualities of memories from a participatory story by applying external ratings of RM criteria to verbal accounts. The results showed no support for the hypothesis concerning the higher presence of perceptual, contextual, and emotional information (criteria 1–7) in events from personal experience and laboratory tasks (real, actual events), nor any support for the hypothesis concerning higher presence of cognitive operations (criterion 8) in events from a short story and a non-participatory printed version of interactive fiction. The only criterion that differed across sources was *Spatial information* (criterion 3), which was present to a lower degree in events from laboratory tasks than in events from interactive fiction, the short story, and the non-participatory version.

One reason for caution is the quasi-experimental nature of the study. The sample size was small (N = 32), the influence of individual variation was only partially balanced, and the content varied between the conditions (see Chapter 5 for more details about the method). However, if people discriminate memories in the way suggested by the RM framework, effects could be visible even given these methodological shortcomings.

7.6.1 Inter-rater agreement

The criteria *Reconstructability* had a low inter-rater correlation (r = .103) and a rather low inter-rater agreement (53.13 percent). However, this low value was because of the three-point scale used. If the criteria are recoded by combining ratings of 1 and 2 to a single value (thus dichotomising the scale), the inter-rater agreement rises to 93.75 percent. Based on this, it is reasonable that *Reconstructability* was part of the analysis. The criterion *Cognitive operations at the time of telling* also had a low inter-rater correlation (r = .082) and a low inter-rater agreement (46.88 percent), but as this criterion was not used in the analysis, it is of no concern in the present study.

The inter-rater agreement between 46.9 and 84.4 percent with a mean of 59 percent is comparable to that of Sporer (1997), where

the percentage inter-rater agreement of the two raters varied between 36.3 and 67.5 percent with a mean of 52.5 percent. Inter-rater correlation was significant at the $p < .01$ level for five criteria and significant at $p < .05$ for two criteria. This is also comparable to Sporer's inter-rater correlations that were significant at the $p < .01$ level for four criteria and at the $p < .05$ level for one criterion. Although the raters in the present study received only little training, their ratings agreed as much as or more than the extensively trained raters used in Sporer's study.

7.6.2 Presence of criteria 1–7 in memories of events

The hypothesis that ratings of criteria 1–7 would be highest for Personal and Tasks, with Game in between, and Story and Non-participatory lowest, was not supported by the data. Thus, it appears that in accounts, the qualities associated with external events are not present to a higher degree in interactive fiction than in a short story, or even in a manipulated non-participatory version of interactive fiction, otherwise identical. Neither is the presence of such qualities lower in interactive fiction than in accounts of personal experience or laboratory tasks, which would be expected considering the RM framework.

The only RM criterion that differed across sources was *Spatial information*. Contrary to expectation, the accounts of events from the laboratory tasks contained less spatial information than all other sources except events from personal experience. In contrast, Sporer (1997) obtained higher ratings for true accounts for *Spatial information* (when accounts were made when the speaker was given extra preparation time)—similar findings were made by Hernández-Fernaud and Alonso-Quecuty (1997), Vrij, et al. (2000), and Vrij, et al. (2004). Also, Alonso-Quecuty (1992) found more contextual information (of which spatial information was a part) in immediate true accounts. Similarly, Schooler et al. (1986) found more geographic information in non-suggested memories. The explanation for the results in the present study is probably that the events from the various sources differed in content. The laboratory tasks did not

involve much spatial aspects, at least not beyond the space around the body. Thus, there may have been little spatial information to report. In contrast, the other sources contained events of spatial movement on a larger scale.

The criterion *Perceptual information* showed no difference across the five conditions. In contrast, Alonso-Quecuty (1992) found more sensorial information in immediate true accounts, Hernández-Fernaud and Alonso-Quecuty (1997) found more sensorial information in true statements, Vrij et al. (2000) and Vrij et al. (2004) found more perceptual information (both vision and sound) in true accounts, and Schooler et al. (1986) found more sensory information in real (non-suggested) memory. This result in the present study is surprising, since the two conditions of personal experience and laboratory tasks should present typical cases of real, external events, while the short story and the non-participatory version of the computer game should present the opposite—events that did not have any external source.

In Sporer's (1997) study, there were additional differences in RM criteria between invented and true accounts. *Time information* and *Emotions* differed when the accounts were made with extra preparation time for the speaker. Vrij et al. (2000) and Vrij et al. (2004) also found more temporal information in true accounts. For the criteria *Emotions* and *Realism* (the latter was not included in the present study) Sporer (1997) obtained higher overall means for true accounts, regardless of preparation time. In the present study, *Emotions* received very few ratings and was as a result excluded from further analysis. Perhaps a reason for the difference concerning emotional content is that in Sporer's study, the participants were instructed to give accounts which included personally important events. It is conceivable that the requirement of *importance* led to accounts that were *emotional*. Although the present study contained the possibility for emotional events (participants could choose personally experienced events, and participants could relate emotionally to the laboratory tasks—e.g., by being frustrated or bored by them), there was no explicit instruction to give accounts of emotional or personally important events. Turning to the criterion

Time information, the difference found by Sporer (1997), Vrij et al. (2000), and Vrij et al. (2004) was not seen in the present study. The criterion should be able to vary freely in the accounts from the various sources in the present study, and nothing was found that could explain the difference in this criterion compared to the results the other studies mentioned.

The lack of difference between the personal experience condition and the other conditions can partly be explained by the effect of time. Johnson et al. (1988) obtained results that showed that actual and imagined events become more alike as time passes. However, the laboratory tasks condition is not influenced by time since it was performed recent to giving the accounts.

7.6.3 The presence of cognitive operations

The hypothesis that *Cognitive operations at the time of the event* (RM criterion 8) would be highest for Non-participatory and Story, with Game in between, and Personal and Tasks lowest, was not supported by the data. Cognitive operations from the time of the event are not present to a higher degree in accounts about events from interactive fiction compared to accounts about personal experience or laboratory tasks. Likewise, accounts about interactive fiction events do not appear to contain cognitive operations to higher degree than accounts about personal experience or laboratory tasks.

This finding is consistent with that of Sporer (1997), where his criteria *Cognitive operations* did not differ between invented and real accounts, but inconsistent with Alonso-Quecuty's (1992) results that idiosyncratic information is present to a higher degree in false testimonies (both immediate and delayed), and with Schooler et al.'s (1986) results that there are more cognitive operations in descriptions of suggested memories, as well as with Vrij et al. (2000), who found more cognitive operations in true than false testimonies.

The differences across various studies in results regarding the presence of cognitive operations in verbal descriptions suggest that there may be a problem of reliability concerning this criterion. Some studies show the lowest inter-rater agreement on this criterion

(Vrij et al., 2004; Strömwall, Bengtsson, Leander, & Granhag, 2004), or next-to-lowest (Vrij et al., 2000). Vrij, Evans, Akehurst, and Mann (2004) even failed to find a reliable inter-rater agreement score for cognitive operations, and discuss that it may be difficult for raters to grasp the meaning of this criterion. For many studies, the operationalisation of this criterion is not documented, making it difficult to know whether the same characteristic is being rated across studies. As done in the present study, one suggestion is to separate two kinds of cognitive operations: those tied to experiencing the event, and those tied to reporting about the event. The former is usually given with the verb in the past tense. The latter, being on the here-and-now level of the discourse, virtually always includes verbs in the present tense.

Regarding the ratings of *Cognitive operations at the time of the event* in the present study, a possible explanation of the results appears be that there may be an influencing factor other than the source from which the events were taken. Looking at Table 7.5, it appears that the ranking of low to high degree of information about cognitive operations could be explained by the amount of focus on problem-solving in each situation. A low focus on problem-solving (personal experience) would give a low rating on the presence of cognitive operations in the accounts, and a situation in which the focus is on problem-solving (laboratory tasks) would result in an account which is ridden with talk about cognitive operations. However, this explanation was not supported by the data, since there was no significant difference in ratings between the sources.

7.6.4 Correlations of RM criteria

Analysis of correlations between RM criteria showed that several criteria were correlated. One may consider that the correlations were present because they were all correlated with the length of the account. That is, longer accounts would mean more chance of *any* criterion being present. However, the only criterion correlated with length was *Time information* (criterion 4).

The correlational analysis indeed showed that some criteria appear to be redundant. While some correlations do not seem to capture any structural properties of the RM criteria (e.g., *Clarity* and *Cognitive operations at the time of the event*), the correlation of *Reconstructability* (criterion 6) with *Clarity* (criterion 1) as well as with *Time information* (criterion 4) seems to suggest that these are three aspects of the same underlying property. If an account contains time information and is clear, it is also easier to reconstruct the whole event. Thus, on the basis of these correlations, the criterion *Reconstructability* can be viewed as consisting of the more specific criteria *Clarity* and *Time information*, which would make the *Reconstructability* criterion redundant in similar future studies.

7.6.5 Validity of the method

There are several possibilities related to the method used, explaining why no support was found for the hypotheses concerning differences in qualities of memories in the present study.

First, it might be that differences in qualities are present in memories, but that they are not transferred to language. One possible influence could be the situation in which the verbal accounts were given. Participants might have adapted their accounts according to any number of expectations (whether controlled by the experimenter or not). This is not likely, because great care was taken that the situation should be as similar across sources and as natural as possible (see the extensive discussion of this point in Chapter 5). However, there may still be some general reason why thought qualities are not put into words. The original formulation of RM was arrived at by self-rating of memory qualities. In contrast, the present study uses ratings by external observers, which adds another layer on top of the memories. However, Sporer (1997), Alonso-Quecuty (1992), and Schooler et al. (1986) have demonstrated that qualities as described by the RM framework can be transferred from memories to verbal accounts. In Sporer's study, the *invented* accounts were not remembered by his participants. As a consequence of his experimental procedure, the invented accounts were rather

created in the experimental situation. However, the true accounts were made by instructing the participants to tell about events that had happened to them personally. Thus, qualities of memories of real events were present in the verbal accounts.

Second, the reason for lack of support of the hypothesis in the present study might be that the differences in qualities actually are present in the accounts, but that the rating procedure was not sensitive enough to differentiate between the sources. However, the satisfactory results of the inter-rater analysis make this explanation implausible. Also, the success of applying RM ratings on actual and invented accounts, as was done in Sporer's (1997) study, indicates that the rating procedure has something going for it.

In summary, the ratings in the present study should reflect actual qualities in memories of events, because these are transferred from memory to language and the rating procedure should be able to detect them.

What is left, then, is the explanation that there are no qualitative differences in memories of events from the five sources studied, at least not those as isolated from the RM framework by Sporer (1997).

7.6.6 Alternative interpretations

How may the result that no differences were found between the five conditions, as predicted by the RM framework, be explained?

7.6.6.1 A participatory story as similar to real personal experience

Could it be that the participatory story created as vivid and 'external-like' memories (in the RM framework) as real personal experience? This conclusion seems to be supported by the data, since there was no difference in the ratings of the RM criteria of the Game and Personal conditions. However, if this is so, then one is forced to conclude that also the short story and the non-participatory version created these kinds of vivid memories. Since this leads to a situation in which nothing is explained, the initial interpretation that the participatory story and real personal experience produce the same kind of vivid memories was rejected.

7.6.6.2 Factual versus fictional events

Is the RM framework really about how people distinguish memories of actual events from memories of events that did not happen? Or is RM about distinguishing *perceptually-based (i.e., external)* memories from *non-perceptually based (i.e., internal) memories.* In other words, can the parallel between external/real and internal/fictional be sustained? It seems that the RM framework makes the tacit assumption that real events are always external and non-real events are always internal. However, factual events can be both external (e.g., seeing someone driving a car) and internal (e.g., reading the news). Fictional events can be both external (e.g., watching a play) and internal (e.g., reading a fictional novel). Thus, it seems that the RM framework may not address the real/fictional distinction at all (see Table 7.7).

A task for future research would be to tease apart the factual/fictional status of events from the RM framework's external/internal status. An experiment could present the four conditions shown in Table 7.7 and afterwards let participants rate their memories using Johnson et al.'s (1988) MCQ. Of course, a challenge for such a study would be to control for differences in contents between the four conditions. An interesting question for future research would be to locate the position of memories of a participatory story in such a scheme.

A conclusion from the present study is that not only could an RM rating not shed light on the status of memory qualities of interactive fiction, but nor could it reveal differences between accounts of events from a short story as compared to real life personal experience. This has implications for psychological research on reading comprehension and the reading experience, particularly for the reading of fiction. Using the RM framework, or at least Sporer's (1997) reduced set of criteria and ratings by external judges, in research on experiential qualities of reading would not be a promising approach. The same may also hold for studies of film comprehension.

Table 7.7. Factual, fictional, external, and internal events

Fictional status of event in memory	Origin of memory	
	External	Internal
Factual	Addressed by the RM framework	Not addressed by the RM framework
Fictional	Not addressed by the RM framework	Addressed by the RM framework

7.7 CONCLUSION

Taken together, the results of this study suggest that qualities of memories of events from sources such as a short story, a computer game, and personal experience, do not differ along the RM dimensions. This goes counter to predictions from the RM framework, under the assumption that memories of internal events are like memories of fiction (e.g., things read in a short story) and memories of external events are like memories of personal experience. If the results are not influenced by methodological limitations, then the explanation may be that the RM framework is simply not a suitable candidate for an explanation of the difference between memories of events with varying degree of fictionality. Teasing apart the external/internal distinction from the factual/fictional distinction is then a task for future research. What the results imply for cognition and the concept of participatory stories is discussed in Chapter 9.

CHAPTER 8

Perspective on actions and events

THE QUESTION of concern in this chapter is: What *perspective* do people adopt on actions and events from participatory stories? The term *perspective* has a variety of meanings, but is here constrained to mean how a speaker mentally positions herself, both spatially and regarding psychological distance, in relation to some remembered event or action. Thus, perspective is here defined as a cognitive construct.

As discussed in Chapter 4, at the heart of participatory stories is the concept of *agency*. The audience *carries out actions* when interacting with a participatory story. How is experiencing a story different when you carry out actions in it compared to when you do not (as is the case in non-participatory stories)? And how is it different to carry out actions in a participatory story compared to carrying out actions in the real world? How does the audience view agency in participatory stories? *Who* is carrying out actions in a participatory story? Is it the *audience* or the *character/agent* in the story? These questions connect to the general question of differences in audience cognition when comparing participatory stories and non-participatory stories. More specifically, the questions concern what, if anything, is different about how events are cognitively processed between participatory stories and non-participatory stories. Thus, *perspective* may be one such difference. When remembering events from one's own personal experience, the perspective on the memory is that one participated in the event. When talking about agency in such situations, one would use the pronoun *I*. In contrast, remembering events from a fictional text, such as a novel,

would lead to a different perspective—that of an observer, looking at the event from the outside. Here, when talking about agency, one would use pronouns such as *he* or *she*, or nouns such as *woman*. Considering that participatory stories contain the elements of fiction as well as action, the question becomes what perspective people adopt on actions and events from participatory stories.

In her studies of Swedish children's discourse during computer game playing, Johansson (2000) noticed that the pronoun *jag* ('I') can switch between two different meanings; either it refers to the character that is controlled in the computer game, or it refers to the player as an individual. Linderoth (2004) also studied the discourse of Swedish children while playing computer games. He based his analysis on Goffman's idea that activity always takes place in a *frame*, a certain context which, among other things, gives the utterances a particular meaning. Linderoth identified three meanings of *jag* ('I'), depending on which frame it occurs in. First, the pronoun could refer to the speaker as a person—in the same way as noted by Johansson (2000). Linderoth's second meaning of *jag* ('I') is similar to Johansson's second meaning: it may refer to the character in the game as a game unit. Third, Linderoth found an additional meaning, which is that *jag* ('I') may refer to the character as a role. The distinction between the second and third meanings can be seen with the following examples: If a person playing the board game Monopoly says *I ended up on Park place* she is not pretending to be either a dog, a shoe, or any of the other tokens in Monopoly (Linderoth, 2004). But if a person playing a computer game says *oh, someone is shooting at me* in a squeaky voice, that person may be acting as if she was in fact the character in the game.

While Johansson (2000) seems to view the multiple meanings of *jag* ('I') as tied exclusively to the activity of playing computer games, Linderoth (2004) acknowledges that the multiple meanings extend to other games in addition to computer games. Indeed, the phenomenon does not have anything to do with computers *per se*. For instance, consider the following example from a report of a golf tournament on television (heard by the author): *Woods hamnade i vattnet* ('Woods ended up in the water'). Of course, we do not

wonder whether Tiger Woods became wet, but understand that it was *his golf ball* that ended up in the water. In this case, it would be perfectly reasonable to hear Woods say *I ended up in the water*. Here, *I* does not refer to himself as an individual, but to an object under his control.

Neither Johansson (2000) nor Linderoth (2004) gives an explanation *why* it is that *jag* ('I') can have multiple meanings. Such an explanation is given by Wilhelmsson (2001) in his conceptual framework for cognitive aspects of computer game activity, where he uses the work of Lakoff on the conceptual structure of the self. According to Lakoff (1996), the self is conceptualised as consisting of two parts: the Self, which is the part carrying out actions and associated with social roles and past actions, and the Subject, who is the locus of subjective experience, reasoning, and feeling. Wilhelmsson characterises the *Game Ego* as a Self that extends into the computer game: 'The Game Ego is the agency that exerts force upon the game environment and that the game environment exerts its force upon' (Wilhelmsson, 2001, p. 150). However, Wilhelmsson supplies no empirical evidence of the existence or structure of the Game Ego. Evidence of this kind can be provided by the present study of perspective. Wilhelmsson emphasises the role of motor activity in establishing a Game Ego: 'If the game player is given motor control of a character's or an object's motion, he or she is more likely to identify with that character or object' (Wilhelmsson, 2001, p. 155) and 'Controllability is . . . essential to the theory proposed. . . . Motor activity and cognition add up to a Point of Being—a way of perceiving oneself as Being within the game environment' (Wilhelmsson, 2001, p. 160). In the present study, a computer game involving little or no motor activity, *Anchorhead*, was used and the resulting perspectives of the participants were studied, thus providing a test of Wilhelmsson's claimed importance of motor activity. Wilhelmsson also discusses computer games without direct control, like the one used in the present study: 'This type of interface delays the action and generates a weak motor link between the player and the Game Ego' (Wilhelmsson, 2001, p. 162). By hypothesis, this would then result in a weak Point of Being, that is, not experiencing oneself as

'in the game'. Whether indirect control results in a weak feeling of being 'in the game' is also answered within the present study of perspective.

Wilhelmsson (2001) also makes another reflection concerning perspective in textual interactive fiction:

> [The computer game] Zork [similar to *Anchorhead*] is sometimes referred to as a Second person game. This is so because of the use of 'you'. . . . It is not a 'you' that performs the action. . . . When you think about the game and the game environment you will refer it to your Self and you[sic] Subject (Wilhelmsson, 2001, p. 173)

This conclusion is not based on systematic empirical studies, but rather on intuition. Does it hold up to empirical testing?

A method to reveal perspective is to study language when people talk about events. Both the verbal and the non-verbal parts of language can give clues to which perspective is adopted by a person speaking about an event. As mentioned, verbal clues are, for example, choice of referent terms. Non-verbal clues can be found in gesture, particularly the viewpoint expressed in iconic gestures (McNeill, 1992). For example, showing gesturally an action as if you are performing it yourself, compared to gesturally illustrating the action seen from an observer viewpoint.

When studying what perspective is used by people when talking about events in participatory stories, the interviews (described in Chapter 5) were used as data. In the data, there are four additional conditions for comparison where people talk about events from other sources: personal experience, laboratory tasks, a short story, and a special non-participatory version of the participatory story. The last condition provides a case for direct comparison against the participatory story, since the events are the same, and described in the same way, but without the element of participation.

The former research question can then be rephrased in terms of language: What perspective is used when speaking about events from participatory stories, and how does this differ when talking about events from other sources, such as non-participatory stories

and real-life events? This question separates in two main parts, a non-verbal (gesture) part and a verbal part. Two individual studies will now be presented which study these approaches to perspective, starting with how perspective is manifested in gesture.

8.1 PERSPECTIVE AS MANIFESTED IN GESTURE

When people retell events, gestural activity with the hands and arms often spontaneously accompanies their speech. Several gesture classifications systems have been developed, for instance, by Ekman and Friesen (1969) and McNeill (1992). McNeill has carried out extensive studies of retelling of narrative and shown that gesture can give important information about what speakers are thinking, especially if this information is only supplied through gesture and not in speech. The gesture categories of McNeill's classification are *metaphorics*, *deictics*, *beats*, *emblems*, and *iconics*. *Metaphoric gestures* give something non-physical a physical shape. For instance, *time* is shown as a physically extended object with points located to the left (before) and right (after) of a centre (now). *Deictic gestures* are pointing gestures. They could point out a direction or a real or imaginary object or person. *Beat gestures* are short, marking movements where the hands quickly return to the rest position. Beats can be overlaid onto iconics and metaphorics. Beats are motorically simple, but cognitively complex. Occurrence of a beat sends the listeners in search of another context. They function to introduce new characters and mark functions or attributes of an object talked about. *Emblems* are conventionalised gestures, such as making a V sign for victory or giving 'thumbs up' to signal that something is good. Emblems are usually made with conscious effort and are different from the other gestures in being more verbal, sometimes replacing words or phrases. Thus, they do not, in the same manner as the other gestures, provide a window to the ongoing cognitive processes. Finally, *iconic gestures* show a similarity to the things they depict, or they show the manner in which something is performed.

Part of McNeill's gesture theory concerns *perspective*. For McNeill, the *perspective* taken on a described event means the *distance* with which the speaker positions herself in relation to the event. Gesturally, perspective is manifested in iconic gestures. McNeill identifies two possible perspectives in iconic gestures: *character viewpoint* and *observer viewpoint*, and in support he mentions confirming studies of retelling of narrative carried out by Stephens and Tuite. *Character viewpoint* shows closeness to the events described:

> Consider the event in the cartoon where Sylvester climbs up the pipe. This could be conveyed gesturally in either of two ways. One would be to move one's arms up and down, as if climbing a ladder. Here, the viewpoint would be the character's: we imagine ourselves playing the part of Sylvester—the pipe is in front of us and we move our hands up and down as if clambering. . . . With this viewpoint we feel that the narrator is inside the story. (McNeill, 1992, pp. 118–119)

In contrast, *observer viewpoint* expresses a distance to the event described:

> A different gesture for the same event would be to make the hand into Sylvester as a whole and cause it to rise upward. We see Sylvester before us, rising, upward, but we are not part of the scene. . . . With this viewpoint, the narrator keeps some distance from the story. (McNeill, 1992, p. 119)

In the present study, the term 'character viewpoint' was replaced with 'subjective viewpoint'. The reason is that the data from the present study contain people speaking about events that are sometimes fictional and sometimes real. McNeill's term 'character' is suitable for his studies of retelling of cartoon narratives, which are fictional. But when people are talking of what they themselves did at an earlier time, 'character' is not an appropriate term. Instead, the general term 'subjective' was chosen, which reflects the fact that the viewpoint is neutral with respect to fictional status. The speaker could either be herself or himself, or could pretend to be someone

else acting out from that character's perspective. This discussion is omitted entirely by McNeill (1992). However, this is mostly a change in terminology, since the categories character viewpoint and subjective viewpoint in practice appear to cover the same gesture occurrences.

8.1.1 Research question

If the audience in participatory stories 'identifies' with the agent in the participatory story—if the player character is a 'Game Ego' by means of a 'projected Self', in Wilhelmsson's (2001) words (see Chapter 4)—the audience would then experience, encode, and remember events from a first-person perspective. Thus, the prediction was that gesture would show a higher proportion of subjective rather than observer viewpoint in retellings of events from participatory stories, compared to the short story and the non-participatory version of the participatory story.

8.1.2 Method

8.1.2.1 Data

Gestural perspective on actions and events was investigated by using the transcriptions of the interviews with the eight participants as data. For description of participants, material, procedure, transcription, and coding, see Chapter 5. The interviews concerned talk about events from five source conditions:

- *Game*: Events from the computer game *Anchorhead* which the participants played.
- *Story*: Events from a short story which the participants read.
- *Personal*: Events that took place earlier in the participant's life.
- *Tasks*: Events from three practical tasks carried out in a laboratory setting.

- *Non-participatory*: Events from a special, adapted non-participatory version of the computer game, printed on sheets of paper, which the participants read.

8.1.2.2 Transcription

The participants' gestures were transcribed using a system based on McNeill (1992). McNeill's system suits the present study particularly well for two reasons: It was developed within the context of narrative discourse, and it is part of a theory of the connection between cognition and gesture. Transcription proceeded as follows. First, the arm and hand movement was classified as gesture or non-gesture. A non-gesture would be, for example, scratching one's chin. If it was indeed a gesture, the following features were transcribed:

- left or right hand
- fingers: extended, fist, pointing
- palm up or down
- movement of arm and hand: start and end, trajectory

The detailed temporal unfolding of single gestures was not transcribed. McNeill (1992) identifies preparation, stroke, and retraction phases of the gesture. This was considered too high a level of detail with regard to the research questions asked in the present study. In the transcriptions, it is mainly what corresponds to McNeill's stroke that is marked. For the transcription, it was not considered important exactly where gestures start and end in relation to speech. The timing of the gesture was marked in accordance with the Conversation Analysis standard, that is, placing it within double parentheses and aligning it with the speech that is concurrent with it. These modifications follow the recommendations made by McNeill (1992) regarding a simplified transcription, adapted to the purposes of the present study.

The interviewer was not filmed, and consequently no gesture transcription was made for the interviewer.

8.1.2.3 Coding

The gesture system of McNeill (1992) was used to classify the gestures in the data into the categories iconics, metaphorics, deictics, beats, and emblems. The viewpoints of iconic gestures were classified as *observer* or *subjective* (or N/A if a viewpoint was missing or could not be decided). Table 8.1 gives an overview of the coding scheme for gestures. Figure 8.1 shows an example from the data of a subjective viewpoint in an iconic gesture. An example of an observer viewpoint from the data can be seen in Figure 8.2.

An important clarification is made by McNeill (1992) concerning the gesture coding system he proposes when he states that gesture categories are not mutually exclusive. A gesture can belong to more than one category. An iconic gesture showing how something moves can also be deictic, showing the direction of movement. Beats are often superimposed on other gestures. However, in the present study, effort was made to find the *most likely* category to which each gesture to be coded belonged. Every gesture was coded with only one category.

Lastly, it should be noted that gesture coding (similar to much other coding work) has a large arbitrary element. Coding demands much experience, and even then, coding can differ substantially between coders (McNeill, 1992). In order to test coding reliability, two transcriptions of the interviews with the eight participants were randomly selected; one from participants 1–4 and one from participants 5–8. The transcriptions were used in full—and not partially—in order to test coding for all the five conditions. The transcriptions were additionally coded by a gesture researcher, unaware of the present research questions. As measures of inter-rater reliability, percent agreement and Cohen's kappa were calculated for both gesture categories and iconic gesture viewpoints.

sen [*så klängde* (*jag*) *mot* (.) *mot eh mot väggen*]
then [(I) clung onto (.) onto eh onto the wall]
[((arms extended forward up fingers spread slightly bent palms forward))]

Figure 8.1. Example of subjective viewpoint in an iconic gesture. See Chapter 5 for transcription key for speech.

å [från innergården tog jag mig uppåt]
and [from the backyard I went up]
[((right index finger in trajectory from right to left, then upwards))]

Figure 8.2. Example of observer viewpoint in an iconic gesture.

Table 8.1. Coding scheme for gesture.

Gesture type	Description	Example
Iconic: Observer	The gesture depicts how something appears or in what manner an action is performed. The gesture expresses an outside, observer perspective—a narrator who 'looks down' on the events and describes from the outside.	'I walked up the mountain' while the person's finger traces a twisting line in the air.
Iconic: Subjective	The gesture depicts how something appears or in what manner an action is performed. The gesture expresses an inside perspective. The person gesturing is taking the perspective of an agent who performs the action.	'I walked up the mountain' while the person moves the arms as if walking.
Iconic: N/A	The gesture depicts how something appears or in what manner an action is performed. No viewpoint was present, or no viewpoint could be determined.	
Deictic	The gesture points to a direction or a real or imaginary object or person.	The index finger points left while the person says 'over there'
Metaphoric	Something non-physical is given physical shape, e.g., length, front/back, up/down.	'Forward in time' is shown by pointing to a position to the left and 'backward in time' is shown by pointing to a position to the right.
Beat	Short, marking movement, where the hand(s) quickly resume to the resting position. Sometimes occurs several in sequence. Can be layered on top of iconics and metaphorics—then the hand(s) return to the local resting position (which then is the position of the gesture on which the beat is layered).	'It didn't [matter]' The hands move briefly up, then are dropped back into the lap.
Emblem	A conventionalised gesture.	Makes a V sign for victory.

Note: Adapted from McNeill (1992).

8.1.2.4 Analyses

For analysis of gesture, only cases of reference to past events were included. In other words, the analysis was made exclusively on 'the level of narrated events' (McNeill, 1992). This included references to the game world (for the participatory story condition and the non-participatory version condition), the story world (for the short story condition), and the situation of the original event (for the personal experience condition and the laboratory tasks condition). Among the other levels present in the data, was, for instance, the conversational level, which had utterances such as 'I remember now that...'. On the conversational level, the speaker uses *I* to refer to herself and the verb is in the present tense. Since the conversational level was present for all conditions, it does not reveal how the perspective on actions and events in the conditions may be different. Talk on the conversational level together with talk about other things besides events from the five sources was disregarded in the analyses.

During coding of gesture, it became evident that also gestures other than iconic gestures seemed to express a viewpoint. This led to an alternative gesture viewpoint coding, where *all gestures* were coded according to the scheme above. Coding viewpoint in gestures other than iconic gesture is not taken up by McNeill (1992) in his gesture theory, and it therefore has less theoretical underpinning. However, there are at least two arguments in support of carrying out this alternative analysis in the present study. First, excluding these other gestures from the analysis of viewpoint would not reveal the complete picture of what viewpoints were being communicated through gesture. Second, gesture coding proves to be quite arbitrary. An iconic gesture could just as easily be coded as a deictic or metaphoric gesture, thereby excluding it from further analysis of perspective. By coding viewpoint for all gestures, the chances are higher to capture any viewpoints that were expressed gesturally.

For each participant, the total length for each of the five conditions was calculated by summing up that condition's segments (see Table 5.7). The gesture occurrences were divided by the total length to give occurrences per minute. Finally, to reduce error variance in

the analysis, for each participant, a ratio of subjective and observer viewpoint was used instead of the actual frequencies. The average of all participants was used in the analyses.

8.1.3 Results

Results are presented first for the general occurrences of gesture, showing all types, then for the iconic gesture viewpoints.

8.1.3.1 General occurrences of gesture

The results of analysis of inter-rater reliability for the gesture coding showed that percent agreement was 56.1 percent and Cohen's kappa was .318.

The occurrences per minute of gesture types (average for all participants) for the five conditions are shown in Table 8.2. There, it can be seen that iconic gestures constitute between 24.6 and 47.0 percent of the total gestures, depending on condition (40 percent averaged across all conditions).

Table 8.2. Occurrences of gesture types per minute in the five source conditions, for narrative level.

	Source condition				
Gesture type	Game	Story	Personal	Tasks	Non-partic.
Deictics	1.05	0.23	0.45	0.55	0.74
Iconics: subjective	0.93	0.47	0.58	5.70	0.47
Iconics: observer	1.45	0.73	1.59	0.20	1.37
Iconics: N/A	0.17	0.13	0.06	0.00	0.10
Metaphorics	1.02	0.81	0.48	2.84	2.13
Beats	1.36	0.43	1.99	3.34	2.71
Emblems	0.03	0.03	0.24	0.68	0.38
Total gesture freq.	6.01	2.83	5.39	13.31	7.9
Percent iconics	42.4%	47.0%	41.4%	44.3%	24.6%

8.1.3.2 Gesture viewpoints

The test of inter-rater reliability for the coding of viewpoints showed that percent agreement was 78.3 percent and Cohen's kappa was .566.

The analysis of viewpoint in iconic gesture and the alternative coding procedure (where viewpoint was coded for all gestures) yielded similar results. The proportions of observer and subjective viewpoints of *iconic gestures* can be seen in Figure 8.3. An analysis of variance of the viewpoint proportions across the five conditions showed that there was a difference in means, $F(4,15) = 8.416$, $p < .002$. Bonferroni post hoc test with the alpha level at .05 showed that the Tasks condition had a higher proportion of subjective viewpoints than the other four conditions. The proportions of observer and subjective viewpoints did not differ in any of the other four conditions. The increase in subjective viewpoint for the Task condition was dramatic, lowering the proportion of observer viewpoint to a few percent. The alternative viewpoint coding, in which viewpoint was coded for *all gestures* (not just iconics) gave similar results, so these data are not presented here. The gestures that were judged to express viewpoint were, in addition to iconics, metaphorics, deictics, and emblems. Here too, as in the analysis of iconic gesture only, an analysis of variance showed a difference in means of viewpoint proportions across the five conditions, $F(4,15) = 6.151$, $p < .01$, and Bonferroni post hoc tests with alpha level at .05 revealed that the Tasks condition had a higher proportion of subjective/observer viewpoints (no other differences in means)—the same dramatic high proportion of subjective viewpoints as yielded by the analysis of only iconic gestures.

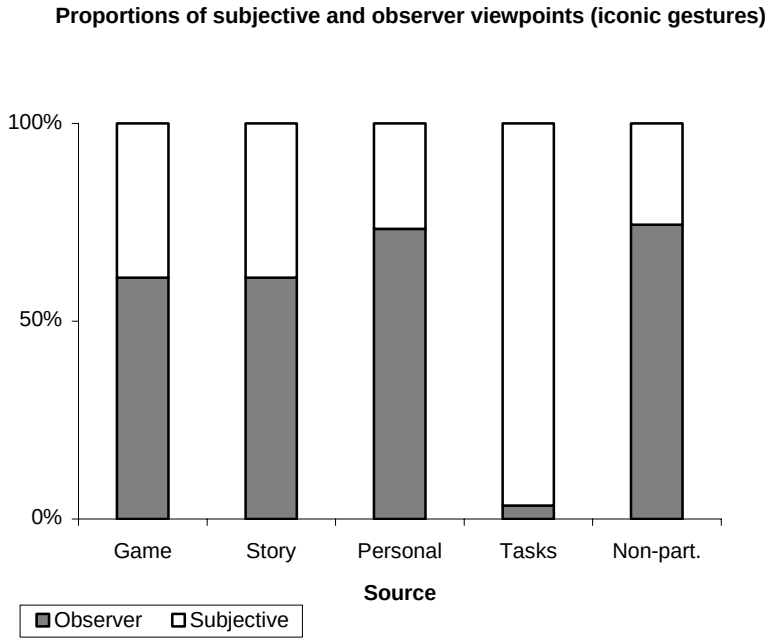

Figure 8.3. Proportions of subjective and observer viewpoints in iconic gestures on the level of narrated events. (Non-existent viewpoints or cases where viewpoint could not be decided are not shown.)

8.1.4 Discussion

The analysis of perspective as manifested in gesture in terms of proportion of subjective and observer viewpoints showed no differences between the Game, Story, Personal, and Non-participatory conditions, but in contrast to these four conditions, the Tasks condition had a higher proportion of subjective viewpoints. For the four conditions Game, Story, Personal, and Non-participatory, observer and subjective viewpoints occur about equally often. This suggests that the events are thought of both from the 'outside' and from the 'inside', that is, the participant sometimes conceptualised

as being outside the event, and sometimes as taking part inside the event.

8.1.4.1 Inter-rater reliability

The coding of gesture turned out to be somewhat unreliable—which is also an experience that has been reported from earlier studies (McNeill, 1992). It is difficult to operationalise the gesture categories and variation in experience with gesture coding can result in variable coding among researchers. However, most importantly, the coding was satisfactory for viewpoints in iconic gesture—and these data were the basis for analysis of gesture perspective.

8.1.4.2 Comparison with earlier research

Comparing the *proportions of gesture types* when describing events on the narrative level (Table 8.2) with figures presented in McNeill (1992) shows that the proportions are roughly similar. McNeill reports 57 percent iconics, 34 percent beats, 6 percent deictics, and 3 percent metaphorics. A few differences from the present study are noteworthy. First, the present study obtained a higher number of metaphoric gestures throughout the five conditions. Second, the Game condition yielded twice as many deictic gestures as any of the other conditions. This may be an indication of the spatial nature of the computer game. However, it should be noted that the conditions differ between the present study and McNeill's study. Also, slight differences in coding between the present study and McNeill's study may influence the proportions.

Turning next to the viewpoints, McNeill (1992) reports from studies by Church and colleagues on retelling of cartoon narratives, where the iconic gestures in 40 percent of the cases express an observer viewpoint and 60 percent of the cases express a character viewpoint (translated to subjective viewpoint in the present study). This relates perhaps most closely to the Story and Non-participatory conditions in the present study. Even though the two viewpoints occur equally often in these two conditions in the pre-

sent study, the figures are close to those obtained by Church and colleagues.

8.1.4.3 Why not more subjective viewpoints in personal experience?

The equal proportions of viewpoint is perhaps most surprising in the case of personal experience, since one would expect that events which actually involved the participants would be viewed to a higher degree from the 'inside'—expressed using subjective viewpoints (McNeill, 1992).

A factor that may explain why there was a difference between the Personal and Tasks conditions—two conditions which would be expected to show similar results because both are personally experienced, real events—is that different amounts of time passed since the events took place. In research on visual perspective in episodic memory, it has been found that recent events tend to be remembered using a *field* perspective (as if seeing out of one's own eyes) while distant events tend to be remembered using an *observer* perspective (Nigro & Neisser, 1983; Robinson & Swanson, 1993; McIsaac & Eich, 2002). If remembered perspective is assumed to be manifested also in gesture, the amount of time passed could be part of the explanation, but it does not seem to fully account for the results. The large difference found in the present study—subjective viewpoint outnumbering observer viewpoint by a factor of 30—has not been found in studies of remembered perspective (Nigro & Neisser, 1983; Robinson & Swanson, 1993; McIsaac & Eich, 2002).

8.1.4.4 Game versus Non-participatory

Also when comparing the Game condition with the Non-participatory condition, the results are surprising. Since the Non-participatory condition to a lesser extent involves participation, it would be expected that the events in retelling show fewer occurrences of subjective viewpoints, but this was not what was found. Let us consider some alternative explanations of the results.

8.1.4.5 Alternative explanations

A possible explanation of the results would be that subjective viewpoint is correlated with *feeling of involvement*, and not with whether the person *actually* participated or not, in the events talked about. This would explain the results for the Game condition, which one is somewhat involved in. One is less involved in the short story, and even less involved in the non-participatory version of the computer game (this is consistent with reports from participants during the interview that they thought the non-participatory story was a bit odd). The laboratory tasks would be highly involving, since they are carried out 'directly' in the 'real world' by the participants. However, the Personal condition seems to present an anomaly under this explanation, which would be expected to have a relatively higher degree of subjective viewpoint gestures, but the results show none of this. Are not people involved in things that happened to them personally some time ago? Again, the finding concerning memory age from research on phenomenal perspective in remembered events may help explain this. As the events become more distant in time, the portion of observer perspective increases (Nigro & Neisser, 1983; Robinson & Swanson, 1993; McIsaac & Eich, 2002).

A related possible explanation is that use of subjective viewpoint is correlated with degree of problem-solving carried out by the participant. The short story, the non-interactive version of the computer game, and personal experience involves a relatively low degree of problem-solving activity. The situation with the laboratory tasks was framed in a problem-solving context and the high degree of subjective viewpoint gestures mirrors this. If this explanation is accepted, one is forced to view playing the computer game as low in problem-solving activity.

The extreme result concerning the Tasks condition shows that the events talked about from the laboratory tasks are viewed almost exclusively from a subjective viewpoint. How can this result be explained? A difference in viewpoint because of varying communicative demands in the five conditions can be ruled out—the situation was virtually identical for all conditions (see Chapter 5). Another

explanation of the observed frequencies of observer and subjective viewpoints is that they are correlated neither with participation nor with involvement, but result from the nature of what needs to be communicated. The description of certain actions may demand an observer viewpoint while other actions may demand a subjective viewpoint. This may have nothing to do with who carried out the action: the participant or someone else. Particularly, taking an observer viewpoint may be necessary in order to gesturally show actions which involve space that lies beyond the reach of the speaker's arms. That way, a real space is compressed into a smaller space, which serves as a model to illustrate the actions which took place. This leads the speaker to adopt an observer viewpoint. Actions may be described using subjective viewpoint gestures as far as possible, and only if events involve space larger than that around the body, gestures with observer viewpoint are used. Reviewing the results from the five conditions shows that they are consistent with this explanation. The laboratory task condition encompassed events which could be well described gesturally using a subjective viewpoint, since they involved only a limited space around the body. The short story, the non-participatory version of the computer game, and personal experience all in addition involved events that took place in a larger space, which forced the participants to use an observer viewpoint as well. This explanation requires us to see the computer game events not as something occurring in front of a computer on a desk, but as events in the game world.

The original hypothesis that events that one participated in lead to a higher degree of subjective viewpoint can be grouped together with the hypotheses that feeling of involvement or problem-solving activity increases subjective viewpoint. This group of explanations could be labelled the 'participation' explanation. The other explanation, that certain actions—because of their spatial properties—require observer viewpoint whereas other actions require subjective viewpoint, regardless of participation, can be called the 'nature of actions' explanation. There seems to be no way of teasing apart the participation and the nature of actions explanations in the present

study. Both have to be considered possible explanations of the results.

Next, an analysis of perspective as manifested in speech is presented which clarifies the picture of the perspective that participants adopt when talking about actions and events from the participatory story.

8.2 PERSPECTIVE AS MANIFESTED IN SPEECH

When talking about a past event, a speaker has a lexical choice of how to refer to the animate agents involved in the event. For example, 'I came', 'he came', and 'one came' may describe the same event. This choice of terms for the referents is one type of choice of perspective, and will here be called *agent perspective*. Agent perspective reveals the speaker's view of the events and gives clues to ongoing cognitive activity. Let us exemplify this by looking at the agent perspectives possible in Swedish when one is talking about past events.[26] The first-person singular pronoun *jag* ('I') may be used, for instance *jag tog en promenad i morse* ('I went for a walk this morning'). This choice of pronoun indicates a closeness to and signals participation in the event talked about on the part of the speaker.

The second-person singular pronoun *du* ('you') signals lack of participation and distance on the part of the speaker, as in *du tog en promenad i morse* ('you went for a walk this morning'). (It is possible that the speaker also took part in this event, but it is not signalled by the choice of pronoun.) The pronoun *du* may also be used (loosely) to refer to the speaker, as in *det var så mörkt att du inte kunde se handen framför dig* ('it was so dark you couldn't see your hand in front of you'). In this case, the speaker uses the second-person singular to refer to an unspecified person being in the same situation as the speaker was. In this usage, *du* means almost the same

[26] Since the data in the present study consist of people talking about past events, the discussion in this chapter is delimited to ways of referencing agents of past events.

thing as *jag*, but it still signals distance and one cannot infer that the speaker participated in the event.

The use of a third-person singular pronoun signals distance of the speaker from the event and does not show that the speaker participated in the event—for example, *han tog en promenad i morse* ('he went for a walk this morning'). The same distant perspective is expressed by using nouns, such as *mannen* ('the man') or *Michael*.

Another way of referring to the agent of some event is by using the indefinite pronoun *man*, as in *man kunde inte tro sina ögon* ('one couldn't believe one's eyes'). There is no single English equivalent to this Swedish pronoun (Andersson, 1972; Norell, 1995)—*man* can be translated into 'one', 'you', or 'they', or expressed using other constructions such as passive, depending on the meaning. Andersson (1972) claims that *man* has two usages in Swedish: one general use, where reference is to the domain of all people, and one anaphoric use, where the reference is to a subset of the domain of all people. Andersson gives as an example of the first case *man skall inte tro allt som sägs på TV* ('one/you should not believe everything that is said on TV'). Here, the speaker is included in the domain of people referred to. Andersson's example of the second case is *på TV har man fått en ny chef* ('on TV they have got a new boss'). Here, the speaker is not included in the domain of persons referred to. Regardless of usage, *man* can be said to distance the speaker from what is being said.

Describing an event using the pronoun *vi* ('we')—which can be viewed as the plural version of *jag* ('I')—signals closeness to the events. It does however express a somewhat weaker participation in the events on the part of the speaker compared to *jag*. Sometimes *vi* is used as in *vi vann världscupen* ('we won the World Cup'), if *vi* refers to the nation to which the speaker belongs or to the group of people with the same nationality as the speaker, but the speaker needs not be part of the group that is referenced in a literal interpretation.

The pronoun *dom* ('they') (including the forms *de* and *dem*) is the plural form to refer to the third person. It signals neither closeness to nor participation in the events talked about.

Table 8.3 summarises the agent perspectives possible in Swedish when talking about past events, and what they signal in terms of proximity to and participation in the events.

Table 8.3. Possible agent perspective when talking about past events, and what they signal in terms of proximity and participation.

Grammatical categories	Term for referent, Swedish	Term for referent, English	Proximity of speaker to events	Signals speaker participation
First-person singular pronoun	*jag*	*I*	closeness	yes
Second-person singular pronoun	*du*	*you*	distance	no
Third-person singular pronouns and nouns	*han*, *hon* ...	*he*, *she*, nouns	distance	no
First-person plural	*vi*	*we*	closeness	mostly
Third-person plural	*de/dom*	*they*	distance	no
Indefinite pronoun	*man*	*one/you/ they/...*	distance	sometimes

8.2.1 Research questions

Which agent perspectives occur when participants talk about events from the five conditions? More specifically, how do people refer to the player character in the computer game—as 'I' or 'she' or in some other way? Based on Wilhelmsson's (2001) analysis of Game Ego, it was predicted that the participants referred to the player character in a way similar to personal experience, that is, using the pronoun *jag* ('I').

8.2.2 Method

A qualitative analysis was carried out of which agent perspectives, out of the possible ones discussed above, occur when people talk

about events from the five sources in the study, followed by a quantitative analysis of agent perspective frequencies. This lets us see how people talk about what happens in the participatory story, and how people referred to the agent (player character) in the participatory story.

Parts of the method were similar to the method used to analyse gesture and a presentation can be found in that section above.

In analysing perspective as expressed in speech, data from the interviewer as well as uncertain speech (transcribed within parentheses) were disregarded.

8.2.2.1 Coding of agent perspective

The participants' utterances were searched for terms fulfilling three criteria; the term should

- refer to an animate agent (the speaker, a character in a story or a game, etc.)
- refer to someone who performs an action
- occur on the level of narrated events (in the case of the computer game: references to the game world and its objects, etc., in the case of the short story: references to the story world, and so on).

In the group of third-person singular pronouns and nouns, pronouns such as *ingen* ('nobody') and others which expressed a common perspective with that class were included. The pronoun *du* ('you') and the construction *duet* ('the you') had only a single occurrence each in the data and were therefore discarded from further analysis. When instances of repeated occurrences of perspective expressions were found in the data (such as stuttering-like parts of utterances), only one of the occurrences was counted. Instances of agent perspectives that occurred in interrupted speech, where it could not be decided what the participant intended to say, were disregarded.

8.2.2.2 Pronoun switches

As it was noted that participants sometimes switched between *jag* ('I') and *man* ('one'/'you') in talk about the computer game, these switches were tracked. A *switch* was defined as having taken place when there was reference to the speaker (in the playing situation) or to the player character with *jag* in one section of the discourse, and then in another section of connected discourse, shift to the use of *man* (or vice versa), where connected discourse is discourse with a unified theme, not interrupted by the interlocutor except for feedback utterances or signals. Switches were counted and the (probable) reason for the switch was noted, as determined from the surrounding discourse.

8.2.3 Results

Results for occurrences and proportions of agent perspective are presented first, followed by statistical comparisons among proportions. Then, a presentation follows of how the agent perspectives were used when talking about events from the five sources. Finally, results of analyses of switches between the first-person pronoun *jag* ('I') and *man* ('one'/'you') are presented.

8.2.3.1 Occurrences and proportions of agent perspective

The occurrences and percentages of agent perspectives (occurring on the level of narrated events) expressed by the participants can be found in Table 8.4 (percentages add up to one hundred for each condition). The proportions are presented graphically in Figure 8.4.

From Table 8.4, it can be seen that talk about events from the participatory story, the short story, and personal experience contained all agent perspectives presented in the table. Talk about the non-participatory version included all agent perspectives except first-person plural (*vi*/'we'). Talk about events from the laboratory tasks contained only the agent perspectives first-person singular (*jag*/'I') and the indefinite pronoun *man* ('one'/'you').

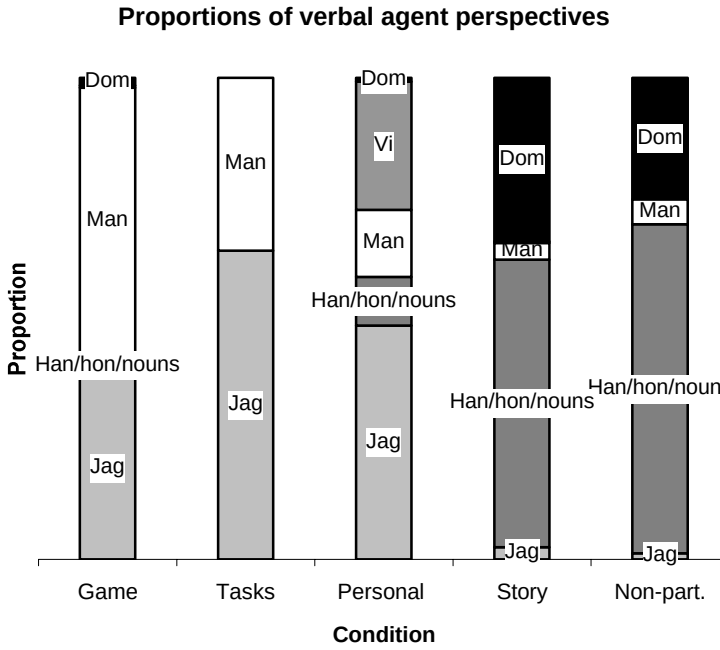

Figure 8.4. Proportions of agent perspective in talk about events from the five sources (average for all participants).

Table 8.4. Agent perspective in talk about events from the five sources (average for all participants): number of occurrences and percentages.

	Agent perspective									
	1st p. pron. *jag*		3rd p. sing. e.g., *hon*		Indef. pron. *man*		1st p. pl. *vi*		3rd p. pl. *dom*	
Source	#	%	#	%	#	%	#	%	#	%
Game	192	37.9	17	4.7	149	55.4	1	0.4	8	1.6
Tasks	60	64.1	0	0	29	35.9	0	0	0	0
Personal	76	48.5	9	10.1	31	13.9	17	26.6	3	0.8
Story	6	2.6	126	59.7	7	3.5	1	0.3	71	33.9
Non-part.	2	1.3	91	68.3	6	5.2	0	0	33	25.2

Comparing overall patterns of agent perspective, it can be seen from Figure 8.4 that the results form two main groups. The Game condition is most similar to the Personal and Tasks conditions. The second group is constituted by the Story and Non-participatory conditions, which show similar patterns of agent perspective. Interestingly, talk about events from the participatory story and the non-participatory version of the same (these two had identical textual descriptions) showed completely different patterns of agent perspective, the former dominated by *jag* ('I') and *man* ('one'/'you'), while the latter dominated by the agent perspective group consisting of singular and plural third-person pronouns, and nouns.

8.2.3.2 Comparing proportions of agent perspectives

Game condition. Within the Game condition, there was a difference in means of proportions of the five agent perspectives, $F(4,15) = 6.024$, $p = .004$, and Bonferroni post-hoc tests with alpha = .05 showed that the mean for the indefinite pronoun *man* ('one'/'you') was higher than the third-person singular group ($p = .032$), *vi* ('we') ($p = .018$), and *dom* ('they') ($p = .021$). No difference was found between the proportions of *man* and *jag* ('I').

Tasks condition. Two agent perspectives were present in the Tasks condition: first-person singular *jag* ('I') and the indefinite pronoun *man* ('one'/'you'), and there was no difference between these proportions (Bonferroni post-hoc tests, alpha = .05).

First-person singular. Comparing the proportion of the first-person singular perspective (*jag*/'I') across the five source conditions revealed a difference in means, $F(4,15) = 5.395$, $p = .007$. Talk about events from the laboratory tasks contained a higher proportion of first-person singular agent perspective than talk of events from the short story as well as from the non-participatory version (Bonferroni post-hoc tests, alpha = .05). Although means of the Game and Personal conditions appear much higher than the Story and Tasks conditions, Bonferroni post-hoc tests revealed no difference (probably because of large variation between participants).

Third-person singular. The agent perspective that included third-person singular pronouns, and nouns, differed across source condi-

tions, $F(4,15) = 64.817$, $p < .001$. Talk about events from the short story and the non-participatory version had a higher proportion of this perspective than did the other three source conditions (Bonferroni post-hoc tests, alpha = .05).

First-person plural. There was a difference among mean proportions of the first-person plural agent perspective (*vi*/'we'), $F(4,15) = 5.778$, $p = .005$. Talk about events from personal experience contained a higher proportion of this perspective than either of the other four source conditions (Bonferroni post-hoc tests, alpha = .05).

Third-person plural. The proportion of third-person plural agent perspective (*dom*/'they') differed across conditions, $F(4,15) = 22.543$, $p < .001$. Talk about events from the short story as well as from the non-participatory version contained a higher proportion of this perspective than the other three source conditions (Bonferroni post-hoc tests, alpha = .05).

Indefinite pronoun man *('one'/'you').* There was a difference in mean proportions of the indefinite pronoun *man* ('one'/'you') agent perspective across conditions, $F(4,15) = 3.430$, $p = .035$, but Bonferroni post-hoc tests (alpha = .05) did not successfully identify the conditions in which these differences occurred. A visual inspection of the data makes it likely that the difference consisted of the Game condition having a higher proportion of this perspective than the Story and the Non-participatory conditions.

In summary, the comparisons of proportions across sources of perspective as expressed in speech revealed two groups of patterns, consisting of, on the one hand, the Game, Personal, and Tasks conditions, and on the other hand, the Story and Non-participatory conditions. (The exception was that the proportion of the first-person pronoun *jag* ('I') did not differ in the Game and Personal, as compared to the Story and Non-participatory conditions.)

8.2.3.3 How was the agent perspectives used by the participants?

Let us now turn to how the agent perspectives were used by the participants to talk about events from the five sources. Some occurrences of agent perspective concern the 'main agent' in the event

(such as the player character in the computer game, or the participants themselves in personal experience). However, there are also other agents in the events described by the participants. For example, talk about personally experienced events involved other people who also did things in the events, beside the participant. These other instances also contribute to the total sum of occurrences of agent perspective. Finding the referent of a verbal expression is an act of interpretation. Background knowledge of the computer game and the short story, as well as the interview as a whole, was used in this process.

Since the agent perspective expressed by the indefinite pronoun *man* ('one'/'you') had an unexpectedly high occurrence in the Game condition, examples of this agent perspective from the data of the other conditions are presented for comparison throughout the presentation of the use of agent perspective.

Computer game. In the Game condition, the third-person group (*han* 'he', *hon* 'she', and nouns) and *dom* ('they') were used by one participant to describe the background to the participatory story (but was not used in talk about the actual events that took place). The pronoun *dom* was also used to describe a group of non-player characters in the game. The pronoun *vi* ('we') was used once to refer to the player character and her husband Michael. The latter was also referred to by the pronoun *han* ('he'). The pronouns *jag* ('I') and *man* ('one'/'you') were used to refer both to the player character and the participant herself/himself, although it was often difficult to establish a unique referent. In Example 8.1, *man* seems to refer to the player character, while it seems to refer to the participant himself in Example 8.2 (see Chapter 5 for a transcription key).

(8.1) Using *man* to refer to the player character (participant 1):
där man ställde en soptunna öppnade fönstret och kröp
where you put a trash can opened the window and crawled
in genom fönstret
in through the window

(8.2) Using *man* to refer to the participant (participant 1):
det var bara det att man tog tid på sig å sen så kollade man
you just had to take your time and then you checked things
upp och grejade å så
out and did things

Short story. In the Story condition, the third-person group (*han* 'he', *hon* 'she', and nouns) and *dom* ('they') were used to refer to characters in the story. The indefinite pronoun *man* ('one'/'you') was used by two participants to describe how to carry out a signalling procedure, which occurred in the short story, and by one participant to account for a general requirement holding in a situation in the short story. These three occurrences did not have completely unambiguous referents, but it was clear that they referred to the group of characters in the short story.

Personal experience. In the Personal condition, *jag* ('I'), *vi* ('we'), *hon* ('she') and nouns, and *dom* ('they') referred to the participant and people around her or him. The indefinite pronoun *man* ('one'/'you') was used by one participant to add psychological distance, shown in example 8.3.

(8.3) Use of *man* to add psychological distance (participant 3 and Pierre, the interviewer):
Paul: *att spionera* [*på*] *folk*
spying [on] people
Pierre: [*a*] *har du kan du berätta om nånting*
[a] have you can you tell about something like
sånt (.) *har du gjort nåt liknande eller har du*
that (.) have you done anything like that or have you
vart med om
experienced
Paul: *har jag säkert gjort när jag var liten å så där*
I have surely when I was little
Pierre: *mm*
Paul: *då smög man ju omkring och tjuvkika å så där på konstiga*
then we did sneak around and peeked and stuff at the odd
gubben på gatan å sådär gick man å tjuvkika på
man on the street and stuff we went to peek at

The indefinite pronoun *man* was also used to be general (examples 8.4 and 8.5), to describe a procedure (example 8.6), to refer to an indefinite group of people (example 8.7), and to communicate what would be experienced by anyone in the situation described (example 8.8). Thus, use of *man* was not ambiguous.

(8.4) Use of *man* to be general (participant 3):
jag var fascinerad av det som liten var jag att man
I was fascinated by that when I was little I was that you
kunde signalera morse (.) *med en ficklampa till exempel*
could signal in morse code (.) with a flashlight for example
då kunde man tala med en ficklampa
then you could speak with a flashlight

(8.5) Use of *man* to be general (participant 4):
när man tappar om man tappar nyckeln eller man till
when you lose if you lose the key or when you for
exempel bara glömt nyckeln eller så
example just forgot the key

(8.6) Use of *man* when describing a procedure (participant 4):
så här (.) *att man har haft ett eh system där man haft en en*
like this (.) that there was a system where there was a a
lapp som man drar med en tråd
note that you pull with a string

(8.7) Use of *man* when referring to an indefinite group of runners (participant 4):
där man hade sprungit över som hade blivit helt
where they had been running which had been
söndertrampat så det var alldeles dyigt
tramped down so it was all muddy

(8.8) Use of *man* when referring to anyone who would be in a situation (participant 4):
försvann skon rätt i så man såg ett tomt hål mitt i dyn
the shoe disappeared so you saw an empty hole in the mud

Laboratory tasks. In the Task condition, *jag* ('I') was used to refer to the participant when describing what she or he did. The indefinite pronoun *man* ('one'/'you') was used to refer to what anyone in that task situation would experience (example 8.9) or what one was supposed to do in the tasks (example 8.10). Also, there was one possible use of *man* to add distance (example 8.11). As can be seen from the examples, the reference of *man* was relatively clear.

(8.9) Use of *man* to describe what anyone in the situation would experience (participant 6):
först så fick man (.) *ett papper där man fick välja vilken typ*
first you got (.) a paper where you could choose what type
av uppgift man ville göra om man ville göra (.) *gissa eller*
of task you wanted to do if you wanted to do (.) guess or
jämfö:ra eller mä:ta
compa:re or mea:sure

(8.10) Use of *man* to describe what one was supposed to do in the tasks (participant 7):
första uppgiften var att man skulle (.) *beräkna* (.) ((*smack*))
the first task was to (.) calculate (.) ((smack))
öh arean eller a i rummet man satt i
eh the area or eh of the room you were sitting in

(8.11) Use of *man* to add distance (participant 7):
dom flesta hade man ju en klar bild av vad det var
for most of them you had a clear picture what they
i men det kan ju vara fel
contained but that could be wrong

Non-participatory version. In the Non-participatory condition *hon* ('she'), *han* ('he'), *alla* ('everyone'), *ingen* ('no one'), and nouns, and *dom* ('they') were used to refer to the woman and other characters in the story. The indefinite pronoun *man* ('one'/'you') was used to refer to anyone who might be in a certain situation (examples 8.12 and 8.13).

(8.12) Use of *man* to describe what anyone in that situation would see (participant 6):
det första man öh ser var att det var en sto:r eh svart dörr
the first thing you eh see was that it was a bi:g eh black door

(8.13) Use of *man* to describe what anyone in that situation would see (participant 8):
det såg stort ut utifrån men gav ett öh ett öh det gav ett
it looked big from the outside but have a eh a eh it gave an
tryckande intryck när man kom in att man kände sig eh (.)
oppressive impression once you came in that you felt eh (.)
nedtryckt
oppressed

And as also occurred in the Game condition, *man* ('one'/'you') was used to refer to anyone playing a game (example 8.14).

(8.14) Use of *man* to refer to anyone playing a game (participant 7, and Pierre, the interviewer):
Marie: *den var skriven ganska roligt för att det jag tänkte*
it was written quite amusingly because what I thought
på en gång på (.) *dataspel såna här*
about right away was (.) computer games these
äventyrsspel
adventure games
Pierre: *mm*
Marie: *å det var väldigt upplagt så att man skulle gå till nord*
and it was very arranged so that one should go to north
nordväst å hon skulle gå till nordväst å så skulle hon så
northwest and she was going to the northwest and then
såg hon miljön å allting som var
she was then she saw the surroundings and everything
där då som man kunde använda sig av eller ta upp
there then that could be used or picked up

8.2.3.4 Switches between jag and man in the Game condition

A total of 46 switches between the first-person pronoun *jag* ('I') and the indefinite pronoun *man* ('one'/'you') were found in talk about

events from the computer game: 22 shifts from *jag* to *man* and 24 shifts from *man* to *jag*. Example 8.15 shows a part of the interview where there is a switch from *man* to *jag*.

(8.15) Use of *man* to refer to anyone playing a game (participant 7):
man får klättra in genom fönstret (.) *sen får man*
you have to climb in through the window (.) then you get
nycklarna där och sen så går man till (.) *sen gick jag till*
the keys there and then you go to (.) then I went to
puben (.) *och där så hittade jag* (*en*) *flaska jag tog och*
the pub (.) and there I found (a) bottle that I took and then
sen så gick jag till universitetet (.) *och träffade min man*
I went to the university (.) and met my husband michael
michael (.) *och sen gick vi till huset* (.)*och gick och la oss*
(.) and then we went to the house (.) and went to bed

Table 8.5 shows the reasons for the switch as determined by looking at the functions of the pronoun immediately after the switch. The total occurrences of *jag* and *man* were 341, which, given the 46 switches, makes on average a switch around every 7 occurrences of these two pronouns.

Table 8.5. Switches between *jag* and *man* in the Game condition.

Switch	#	Function
jag → *man*	16	what would happen to any player
jag → *man*	3	what one was supposed to do
jag → *man*	1	thinking about a future possibility in the playing situation
jag → *man*	1	general reference to someone using a technique
jag → *man*	1	constraints of the game, holding for any player
man → *jag*	16	specifics of what was done in the game, or could be done
man → *jag*	4	thoughts about how to proceed in the playing situation
man → *jag*	3	mental state in the playing situation
man → *jag*	1	what happened in the playing situation, game as abstract object

8.2.4 Discussion

When analysing how perspective on actions and events from the five sources was expressed in speech, the results revealed two main groups. The first group of perspective use consisted of the Game, Personal, and Tasks conditions. This group was characterised by the use of *jag* ('I'), *vi* ('we'), and *man* ('one'/'you'). The other group consisted of the Story and Non-participatory conditions. Here, the use of perspective was characterised by the third-person groups of singular (*han* 'he', *hon* 'she', and nouns) and plural (*dom* 'they'). The interpretation of these results is that participants mainly took an outside perspective when talking about the events from the short story and the non-participatory version. In the other three conditions, the perspective was mainly an inside perspective, but the common use of the indefinite pronoun *man* ('one'/'you'), especially in the Game condition, added distance to the perspective.

8.2.4.1 Agent perspective in the Game condition

The case of most theoretical concern in the results is when participants talk about events from the computer game. In contrast to the other conditions, where the perspective is more or less given, the events from the computer game present an intriguing case for studying how actions and events in the computer game are thought about by the participants.

The indefinite pronoun man *('one'/'you').* Perhaps the most unexpected result concerning the use of perspective in the Game condition is the frequent occurrence of the indefinite pronoun *man* ('one'/'you') (55.4 percent, compared to 5.2 percent in the Non-participatory condition). What does *man* mean? In one sense, the meaning of *man* seems to be rather close to *jag* ('I') in that these two terms can sometimes be exchanged without changing much of the meaning (se examples 8.1 and 8.2). Sometimes *man* was used in order to express something one should do, considering the intention of the designer of the computer game. However, the event described need not have occurred. Thus, using *man* was a way of referring to actions which should be performed, even if they were not actually

performed by the participant when playing the game. Used in this way, *man* refers to a group of people of which the speaker is not a part (cf. Andersson, 1972).

The high frequency of the indefinite pronoun *man* may be due to the fact that Swedish was the language used to describe events from the computer game. Perhaps other languages that do not have a direct corresponding indefinite pronoun (such as English) would have led to a lower frequency of this agent perspective. This is a question for future research.

There is sometimes referential ambiguity in the use of *man*, as in example 8.16. Is 'found' something happening to the person or the game character? This ambiguity is also present in the use of the first-person singular pronoun, which will be discussed next.

(8.16) Referential ambiguity in the use of *man* (participant 1):
det enda man hittade överhuvudtaget var en: (.) *et- en spade*
the only thing you found at all was a: (.) a shovel

The first-person singular pronoun jag *('I').* The first-person pronoun *jag* ('I')—like the indefinite pronoun *man* ('one'/'you')—was ambiguous and referred sometimes to the participant as an individual and sometimes to the player character. It was not always possible to decide to whom a particular instance of *jag* ('I') referred.

The two senses of *jag* ('I') noted by Johansson (2000)—the *participant* and the *player character*—were found also in the present study. There are at least three differences between Johansson's study and the present study, however, namely, that Johansson studied *children*, that her discourse was recorded *while persons were playing computer games*, and that the computer games she used were *graphical and with more direct motor-visual control* of the player character. Since results similar to those of Johansson were obtained in the present study, Johansson's results seem to generalise beyond all of the three conditions mentioned.

The third meaning of *jag* ('I') found by Linderoth (2004)—that of referring to oneself when playing the role of the game character—was not found in the present study. The reason may be that the pre-

sent study investigated talk about events from the computer game in a later situation, while Linderoth recorded talk during the computer game playing. It may also be that Linderoth's third meaning of *jag* is particular to children.

The referential ambiguity of first-person pronouns leads to methodological difficulties. There is a problem as regards what should count as an event that took place *in the game world*, compared to *in the game playing situation.* The use of *jag* ('I') cannot unproblematically be taken as a reference to the individual in the game playing situation. Consider example 8.17. Here, the participant refers to a door in the game world, but the problem was something that belonged to the playing situation. (The methodological solution, though not optimal, was to include these unclear cases in the total count together with cases on the narrative level.)

(8.17) Referential ambiguity in the use of *jag* (participant 1):
när man väl kom till huset så va det bara liksom egentligen
once you got to the house it was basically a matter of
å (.) *lägga sig försöka lägga sig å stänga dörren som jag hade*
(.) going to bed try to go to bed and close the door that I
problem med å så
had trouble with

There seem, however, to be ways of separating the two meanings of *jag*. In the use of *jag* ('I') to mean the individual, references are to (i) mental states such as thoughts, (ii) the physical surrounding in the playing situation, and (iii) managing and progressing in the game as an abstract object. In the use of the other meaning of *jag*, the player character, there are references to the game world and its objects, places, and characters. These characteristics can work as guidelines, but they do not completely eliminate the referential ambiguity of *jag*.

No participant referred to the player character with the third-person pronoun, e.g., *hon* ('she') or a noun, such as 'the woman'. The use of a first-person pronoun does not seem to depend on whether the player character is described in the game as a person the player is supposed to be 'playing', in contrast to indicating that

the player is 'playing herself'. Even in this case, where the player character was clearly described as a woman, all participants (including the male participants) referred to the player character with *jag* rather than with a third-person pronoun or noun. The possibility can be ruled out that the participants were not aware that the player character was a woman, for instance, because of inattention to this information as it was presented, because all participants included this fact in their talk about the computer game.

Game Ego. The lack of motor activity for direct control does not seem to have lessened the tendency of the participants to view themselves as being 'in the game'. Wilhelmsson's (2001) Point of Being seems to have been established, because participants used 'I' when talking about what happened in the computer game, and never adopted a second- or third-person perspective. Thus, the results do not support Wilhelmsson's idea of a need for a strong tactile motor/kinesthetic link in order for a Point of Being to arise. The results support Wilhelmsson's application of Lakoff's Self and Subject. Participants talked as if they were themselves present in the game world. Thus, participants' Subjects seem to have been projected into the player character's Self.

Agent perspective switches between jag *and* man. A surprising result was the frequent perspective switches between *jag* and *man* when participants talked about events from the computer game (on average a switch around every 7 occurrences of *jag* or *man*). The most frequent reason for switching from *jag* to *man* was to talk about events in the game that would happen to any player. In this way, the switch allowed the participants to be more general. The most common reason for switching in the other direction, from *man* to *jag*, was to tell about specifics of what the participant did in the computer game. The use of *jag* does not entail that what is described would happen to any player playing the game, or that it is something that the designer of the game had in mind as something a player *should* do in order to succeed in the game. In this way, the use of *jag* expresses that what is being described from the game is something occurring because of an *action*—a conscious decision—on the part of the player.

The shifts did not appear to be signalled in any way other than lexical choice. They were not associated with any non-verbal features, such as pauses, prosody, or gesture.

That perspective switches occurred is however perhaps not surprising considering other research that has found that perspective switching in describing spatial scenes is frequent and sometimes can be more effective than maintaining a consistent one, even considering the cognitive cost for the interlocutors (Tversky, Lee, & Mainwaring, 1999).

8.3 COMPARING THE TWO STUDIES OF PERSPECTIVE EXPRESSIONS

Do the results of the two studies of expressed perspective provide a unified picture? In comparing the match between how perspective was expressed in gesture and speech, the following assumptions were made, based on McNeill's (1992) theory of perspective: Iconic gesture observer perspective is associated with third-person singular and plural pronouns, and nouns, as well as with the indefinite pronoun *man* ('one'/'you') (since it expresses distance). This perspective is here called *distant*. Iconic gesture subjective perspective is associated with first-person singular and first-person plural pronouns, because they signal closeness. This perspective is here called *close*. Table 8.9 shows the dominant perspectives for each of the five conditions.

It is only for expression of perspective on actions and events from the computer game that gesture and speech reveal the same picture. In the Game condition, both subjective/close and observer/distant perspectives were adopted, and these occurred in similar proportions for both gesture and speech. For all the other four conditions, there were discrepancies in that a difference was found between subjective and observer perspectives for gesture, but no difference for perspective expressed in speech, or vice versa. In all these cases, it is possible that a match between gesture and speech could have been obtained, had the number of participants been greater.

Table 8.9. Summary of dominant perspectives found in gesture and verbal expressions.

	Expression of perspective	
Source	Gesture (observer/subjective)	Speech (distant/close)
Game	–	–
Story	–	distant
Personal	–	close
Tasks	subjective	–
Non-participatory	–	distant

Note: A dash means that no perspective dominated the other, i.e., both occur in about equal proportions.

8.4 CONCLUSION

The results of two analyses regarding which perspectives were adopted by participants on past actions and events revealed differences between the five conditions: a computer game, a special non-participatory version of the computer game, a short story, personal experience, and practical laboratory tasks.

Considering first the analysis of perspective as expressed in gesture, the results revealed that in talking about the practical laboratory tasks, participants adopted mainly a close, inside perspective (an iconic gesture subjective viewpoint). In the other four conditions, both 'outside' and 'inside' perspectives were present (proportions of subjective viewpoint and observer viewpoint were about equal).

The analysis of how perspective was revealed in speech resulted in two groups. Talk about the computer game, personal experience, and practical laboratory tasks featured mostly a close perspective, while talk about the short story and the non-participatory version of the computer game featured mostly a distant perspective. The analysis of perspective as manifested in speech give the most detailed results. These results show that the participatory story and its non-participatory version elicited different perspectives. Participants

adopted a perspective on events and actions from a participatory story similar to events and actions from personal experience. Thus, it seems that participation is the reason for adopting a personal perspective in the participatory story.

The implications of the results of the perspective study on cognition and the concept of participatory stories are discussed in Chapter 9.

CHAPTER 9

Conclusions and future research

In this closing chapter, first, the theoretical framework and the empirical findings will be summarised. Then, the consequences of the empirical results will be considered for cognition and for the central concept in this book: participatory stories.

9.1 SUMMARY

9.1.1 Summary of the theoretical framework

Part I, the theoretical framework, aimed at answering the question: *What are participatory stories?* In order to arrive at an answer to this question, the concepts of *story* and *fiction* were discussed and defined in cognitive terms. A story was defined as *a mental representation of at least two chronologically related events, including an actual or intended state change by an agent*. The content of a mental representation R is fiction to a cognitive system C *if and only if C believes that R should not be evaluated in relation to the real world*. This laid the foundation for a definition of *story participation* and *participatory stories*, thus providing a viable classification and characteristic of participatory stories in terms of cognition. The importance of a cognitive perspective was framed in a *weak* and a *strong* version, where according to the *strong cognitive thesis* it is *necessary* to include cognitive aspects in order to show what differentiates participatory stories from non-participatory stories, and the *weak cognitive thesis*, stating that it is *fruitful and enlightening* to account

for cognition when characterising participatory stories. It was argued that the only plausible solution is to adopt the strong version of the cognitive thesis. A definition of story participation was proposed as *perceiving at least two different potential event sequences of a story, and causing one of them to occur by controlling the actions of an agent in the story*. A participatory story was defined as *a physical system separate from the audience allowing participation in a fictive story*. In contrast to the foci of earlier research, participatory stories were defined without reference to the sense modalities or the type of actions that are involved when experiencing them.

9.1.2 Summary of empirical results

In the second part of the book, the line of reasoning from Part I was followed, resulting in a series of empirical studies of cognition of participatory stories. An explorative method of obtaining data about cognition was developed in order to study differences between participatory stories and non-participatory stories. Participants were exposed to events from five sources with varying degrees of participation, fictionality, and authenticity:[27] an interactive fiction computer game, a short story, personally experienced events, practical laboratory tasks, and a special non-participatory version of the computer game. Afterwards, participants were interviewed about the events. Language data were analysed from three main viewpoints: spatial cognition, memory qualities, and perspective on memories of events and actions. The results of the analyses are given here and they are further related to cognition in Section 9.2 below.

When analysing participants' verbal descriptions of spatiality from the participatory story, it was found that participants exclusively used a survey descriptive strategy (i.e., giving a description from the above) using an extrinsic frame of reference (e.g., *north*, *south*). This was true for both the computer game and the non-participatory version. A marked difference was found regarding how complete, accurate, consistent, and integrated these spatial de-

[27] *Authenticity* here means how true the material and situations in the study were to naturally occurring non-study settings, i.e., ecological validity.

scriptions were. Participants who played the computer game revealed elaborate, relatively complete, accurate, and integrated descriptions of spatiality. In contrast, participants who read the non-participatory version of the computer game provided sparse and incomplete spatial descriptions of the game world.

Exploring differences between memories of events from the five sources regarding memory qualities, results showed that verbal transcripts of event descriptions from the five sources were rated roughly equally by external judges. This prompted the conclusion that the reality monitoring framework is suited to explain differences between memories of events with external and internal origin, but not suited to explain differences between memories with varying degree of fictionality, as studied in this book.

The analysis of how perspective on actions and events was revealed through *gesture* showed that participants used roughly equal proportions of subjective (close) and observer (distant) viewpoints (except when talking about the practical laboratory tasks, where primarily a subjective viewpoint was used). This suggests that participants sometimes viewed themselves as being outside the event, and sometimes as taking part inside the event.

Results from analysis of how perspective was expressed in *speech* revealed two main groups. In the computer game, personal experience, and laboratory tasks, participants used mainly an inside perspective using the first-person pronoun *jag* ('I'), but the common use of the indefinite pronoun *man* ('one'/'you'), especially when talking events and actions from the computer game, added distance to the perspective. In the other two conditions, participants mainly adopted an outside perspective by using third-person pronouns and nouns. There was a frequent perspective switching between *jag* ('I') and *man* ('one'/'you') when participants talked about events from the computer game. The most frequent reason for switching from *jag* to *man* was to talk about events in the game that would happen to any player. In this way, the switch allowed the participants to be more general. The most common reason for switching in the other direction, from *man* to *jag*, was to tell about specifics of what the participant did in the computer game. In this way, the use of *jag*

expresses that what is being described from the game is something occurring because of an *action*—a conscious decision—on the part of the player.

9.2 THE IMPLICATION OF THE RESULTS FOR COGNITION

The results of the empirical studies in this book have implications for both the cognitive processes directly studied here (spatial cognition, memory qualities, and perspective), but also by raising questions about cognition in general and suggesting future research.

9.2.1 Spatial cognition

The analysis of the players' spatial descriptions showed that players of interactive fiction (in contrast to readers of fiction) spontaneously created spatial mental representations of the participatory story world. This conclusion was reached because of the completeness, accuracy, consistency, and integration revealed through the player's spatial descriptions. The reason for forming spatial mental representations is probably that they help navigation. People did not rely only on information available in the immediate situation in order to navigate, as would be expected from a view of cognition as basically situated, but instead internalised a great portion of the spatial world they experienced in the computer game.

Because spatial cognition was studied through language in this book, only a coarse-grained analysis was possible. In a future study, one could study, for instance, distortions in a better way using finer-grained data, by having participants draw (or build by computer) maps. This could be compared to known distortions of spatial cognition in real environments explored by navigation.

Another question concerns *when* spatial mental representations are constructed. Are they formed directly at encoding or as a consequence of rehearsal (because they are accessed and used)? This could be tested by interrupting participants at various points while they

are using a participatory story and studying their mental representations.

In order to see whether spatial cognition depends on the presentation of space or whether the results from the present study are general, one could carry out studies of spatial descriptions and spatial mental representations when the participatory story presents the story world in another way, such as in a graphical three-dimensional first-person view.

9.2.2 Memory qualities

Memories of events from a participatory story (textual interactive fiction) did not differ in characteristics typical of memories of external events (such as perceptual and contextual details), compared to memories of personally experienced, real events, along the dimensions of the reality monitoring framework. This lack of difference can mean at least two things regarding cognition; that memories from participatory stories are vivid and life-like as memories of real events, or that the personally experienced events in the study did not have the qualities typically associated with memories of external events. But regardless of interpretation, these two types of memories seem to be similar in terms of their characteristic qualities. In that respect, the two types of memories would work in cognitively similar ways. However, since the participants had no trouble separating memories of fictional events from memories of real events, there must be other cognitive processes at work—besides those proposed in the reality monitoring framework—that enable this separation.

In the reality monitoring framework, actual events are linked to external events while imagined events are linked to internal events. This may seem like a straightforward distinction. But what kind of events are events from a participatory story? What does 'actual' and 'imagined' mean? There is a need to tease apart the external/internal dimension from the fictional/factual dimension.

Related to the issue of memory qualities are *field* and *observer* modes of remembering (Nigro & Neisser, 1983; Robinson & Swan-

son, 1993; McIsaac & Eich, 2002). The results of analysis of the participant's spatial descriptions—survey descriptions using an extrinsic frame of reference—suggest that people may more often use an observer perspective when remembering events from a participatory story (at least from a work of interactive fiction such as *Anchorhead*). Systematicity of modes of remembering of events from participatory stories could be studied by explicitly asking participants (as in the studies of, e.g., McIsaac & Eich, 2002).

9.2.3 Gesture and cognition

According to McNeill (1992), the viewpoint expressed in iconic gesture when describing an event is a manifestation of the speaker's perspective (in cognition) on that event. Character viewpoint (called *subjective viewpoint* in this book) indicates a psychological closeness to the event while an observer viewpoint indicates a psychological distance to the event. In contrast, the analysis of perspective as manifested in gesture in the present book casts doubt on this view because the analysis of perspective as manifested in gesture did not correspond to gesture as manifested in speech. Perhaps the gesture viewpoint is not a function of how close or distant the speaker is in relation to the event, but it depends on the spatial configuration of the event. When describing some events, it may suffice to use the space immediately around the body in a one-to-one scale, which would lead to a character viewpoint. Other events may require a larger space; it is then compressed, resulting in an observer viewpoint. By manipulating the type of event, one could experimentally study the effect on gesture in order to answer this question.

9.2.4 Self

It is perhaps the manifestation of perspective in speech (rather than gesture) that gives the clearest picture of how participants seem to think about the events and actions from the five sources. The feature of participation seems to shape thinking about events and actions from a participatory story into a form which is similar to thinking about events from past personal experience and tasks per-

formed in a laboratory. This conclusion is particularly persuasive when contrasting the perspectives used about the participatory story and the non-participatory version where the textual expressions of events in the sources are identical. Participants used the pronoun *jag* ('I') when referring to the actions and events in the participatory story (even though a reasonable choice of pronoun would have been *hon* ('she'), since the participants knew that the participatory story was about a woman). Thus, the participants viewed the actions and events as happening to *the self* rather than to a character. What consequences may this have for cognition?

There might be differences concerning encoding of events that involve the participant compared to more unconnected events that happen in the story but are not brought about by the participant. Actions that are enacted compared to read or watched have been found to lead to better recall (Nilsson, 2000). One would expect to find differences found in other research fields between actions that are self-performed and actions that are not self-performed. For example, according to the self-generation effect (Symons & Johnson, 1997), memory performance should be superior for actions in a participatory story compared to a non-participatory story. This question would be of special interest when considering educational uses of participatory stories.

A related but distinct question is whether more intense immersion leads to a better recall of the narrative (although there is little to suggest that participatory stories generally have more intense immersion than non-participatory stories—see Chapter 4).

Finally, the thinking about actions and events in a participatory story may have consequences for research on autobiographical memory, as studied within cognitive psychology. Autobiographical memory is said to be unique because it is closely associated with a sense of *self*:

> In our approach this memory awareness or feeling state (the sense of *self* [italics added] in the past) signals to a rememberer that the mental representation it is associated with is in fact a memory of an experi-

> ence that actually occurred and is not a fantasy, dream, plan or some other (experience-distant) mental construction. (Conway, 2002, p. 54)

What does 'autobiographical' in autobiographical memory mean? Is it memory about episodes involving the individual herself, or also episodes involving a participatory story agent? Simply put: Are memories of events from participatory stories autobiographical? As with the reality monitoring framework discussed above, research on autobiographical memory does not seem to acknowledge the fictional status of events. Following the quotation above, we would erroneously conclude that the audience (which relate to memories using the self as shown in the perspective study), when remembering an event from a participatory story assumes that this memory is of an event that actually occurred in real life and not only in an imaginary story world. Earlier research has shown that autobiographical events differ neurologically from other kinds of events ('public events' and other knowledge), as studied by brain imaging techniques (Maguire, 2002). Research may answer the question of whether events from participatory stories are autobiographical by comparing neural activation of memories of participatory story events compared to real world personal experience, 'public events', and other knowledge.

9.2.5 Other cognitive aspects to be explored

In the present work, *off-line* cognition has been studied, that is, cognition taking place *after* people have experienced a participatory story. A theme not explored in the present book is *on-line cognition*, that is, what is going on cognitively *while* experiencing a participatory story. Here, a number of questions present themselves. Is a different amount of *attention* required in comprehension? There might be higher cognitive loads on the comprehender's limited attentional capacity since her role is not confined to interpretation only, but also to participation. Other differences may concern *inferences* found in comprehension of traditional narrative, for instance, predictive inferences, on-line versus off-line inferences, and the time

duration inferences are active (e.g., Trabasso & Suh, 1993). When people comprehend traditional narratives, to some extent they generate predictive inferences about what is to happen next. Now, since the user intervenes in what happens next in participatory stories, predictive inferences may be affected. There could be more predictive inferences, they could be active for a longer time, or they could be of a different kind. Another difference may concern *monitoring*, how comprehenders keep track of the narrative characters' knowledge and point of view, for instance, 'who said what' and 'who knows what' in the story (see Graesser, Bowers, Olde, White, & Person, 1999), since the player is controlling one of the characters. Finally, how is the *feeling of presence*, or *immersion*, affected by being able to intervene in the narrative? The received view appears to be that intervening leads to greater immersion, so that participatory stories are more immersive than non-participatory stories (e.g., a simulated three-dimensional world compared with a traditional book). Such conclusions have only been supported by intuition. It might just as well be the other way around; that a greater amount of user intervention disturbs the feeling of immersion. Actually, some studies suggest that in real classroom learning situations with multimedia stories, interaction hinders immersion (Plowman, 1998). Empirical studies are needed in this area.

9.3 WHAT ARE PARTICIPATORY STORIES?

The implications of the empirical studies in Part II of this book for the concept of participatory stories as put forward in Part I will now be discussed. Generally, the results of the empirical studies of the book show that participatory stories (such as a work of interactive fiction) are things very different from non-participatory stories (such as a short story). Let us look more closely at the concept of participatory stories concerning three issues: spatiality, actions and event sequences, and the modality-independence assumption. The discussion ends with a consideration of the possibility of generalisa-

tion from the specific empirical studies to participatory stories in general.

9.3.1 Spatiality

The finding that players of interactive fiction created spatial mental representations is not reflected in the definition of participatory stories. However, as the definition gives only minimal requirements of a participatory story, there is no demand that a participatory story involves a spatial world at all. Nonetheless, the spatial mental representations can be said to act as support for the decision part (causing one event sequence to occur rather than another), involved in all participatory stories, according to the proposed definition. If decisions involve spatial movement of the agent in the story, spatial mental representations give the basis for such decisions. It seems that it is the element of participation that causes spatial mental representations to form, since readers of non-participatory stories did not form these (see also Zwaan & van Oostendorp, 1993; Hakala, 1999). The likely reason for forming spatial mental representations is to facilitate navigation. However, it cannot be ruled out that they serve other purposes, such as general understanding of the participatory story, or that they have a purely aesthetic function.

Another point shown by the analysis of spatial cognition is that even though a participatory story may seem fragmented at a glance, it can induce a coherent spatial mental representation in the audience.

9.3.2 Actions and event sequences

What can the results of the empirical studies tell us about the part of participatory stories which deals with causing events sequences to occur, that is, *action*? From the accounts of events from the participatory story given by participants, it is not directly apparent that a choice between event sequences had been performed while they were involved in the participatory story. However, when participants talked about what happened and what was performed, it was implied that out of the possible actions that could be taken, one was

chosen. This could particularly be tied to the switch to and use of the agent perspective *jag* ('I') (as opposed to *man*, 'one'/'you').

The results from the study of perspective as expressed in speech show a striking case of treating the story agent as an extension of oneself. In all of the data where participants were talking about actions from the computer game, not a single reference was made to the agent *as agent* (for instance, using third-person pronouns or nouns). Participants talked about actions in the story world as if they were carried out by themselves (or used an indefinite pronoun to refer to players in general). This finding may even warrant a revision of the original definition of participatory stories, introducing the notion that actions should be performed *as if they were performed by oneself*, and not via a story agent. However, this may prove overly restrictive, since it after all does not seem to be a *necessary* feature of story participation.

The results from the reality monitoring memory quality analysis are consistent with the view that participants related personally to the actions in the participatory story. The memory qualities did not differ between talk about events and actions from a participatory story and real personal experience.

9.3.3 Modality-independence

In Chapter 4, it was argued that participatory stories should be defined without reference to the sense modalities or specific actions involved when experiencing them (called the *modality-independence assumption*). In contrast, Aarseth (1997) and Wilhelmsson (2001), emphasise the importance of physical, motor actions when describing the essence of participatory stories. Wilhelmsson also expresses the view that the visual modality (and to some extent also the auditive modality) is especially tied to participatory stories. What do the results of the empirical studies tell us about this independence assumption?

From the results of the studies of spatiality, it can be seen that elaborate spatial mental representations can be formed with no visual perceptual input other than text.

Regarding memory qualities, the results show that it does not matter whether the source is purely textual or rich in sensory modality, when it comes to perceptual details of memories.

Results from the study of perspective in speech show two things concerning modality independence. First, similar perspectives were adopted when talking about the computer game, the laboratory tasks, and real personal experience. This happened even though the computer game was purely textual while the laboratory tasks and prior personal events were experienced with multiple sense modalities. Second, neither a graphical, visual representation (other than text) nor a direct motor-kinesthetic link is necessary in order to think of oneself as 'being in the game'—in Wilhelmsson's (2001) words *establishing a Point of Being*.

9.3.4 Generalisations

Since a participatory story of a certain kind was used in the empirical studies in this book (*Anchorhead*, which is an instance of interactive fiction), the question is to what extent the results can be generalised to other kinds of participatory stories. The possibilities for generalisation may seem hopelessly remote, and all that one can say anything about is the specific instance used in the study, and not the general category. However, let us remember that this is nothing unique to the studies of the present book. In any empirical study, such as experimental studies, one uses a particular instance of something as stimuli but still generalises beyond those particular stimuli. Thus, the issues become a matter of arguing for prototypicality of the selected instance. In the present book, attempts were made to see to that the chosen participatory story was a prototypical instance of participatory stories (according to the definition proposed in Chapter 4).

Consequently, the findings of this book would be possible to generalise concerning memory qualities and the perspective that people adopt on events and actions. There may be some differences concerning spatiality. Strategies for describing spatiality may differ because of varying ways of presenting the spatiality of the participa-

tory story world (e.g., a first-person viewpoint three-dimensional presentation of some graphical participatory stories compared to the textual presentation of *Anchorhead*). The use of the perspective expressed by the Swedish indefinite pronoun *man* ('one'/'you') may not generalise to participatory stories other than those framed in a game context (such as live role-playing and children's pretence), since this perspective was mainly used to talk about what one *should do* in the game. Other than for these aspects, it is predicted that the results of the studies in this book will generalise to participatory stories in general.

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APPENDIX

Excerpt from log file transcript generated while using the participatory story *Anchorhead* (participant 4)

ANCHORHEAD

[Press 'R' to restore; any other key to begin]

November, 1997.

You take a deep breath of salty air as the first raindrops begin to spatter the pavement, and the swollen, slate-colored clouds that blanket the sky mutter ominous portents amongst themselves over the little coastal town of Anchorhead.

Squinting up into the glowering storm, you wonder how everything managed to happen so fast. The strange phone call over a month ago, from a lawyer claiming to represent the estate of some distant branch of Michael's family, was bewildering enough in itself... but then the sudden whirlwind of planning and decisions, legal details and travel arrangements, the packing up and shipping away of your entire home, your entire life...

Now suddenly here you are, after driving for the past two days straight, over a thousand miles away from the familiar warmth of Texas, getting ready to move into

the ancestral mansion of a clan of relatives so far removed that not even Michael has ever heard of them. And you've only been married since June and none of this was any of your idea in the first place, and already it's starting to rain.
These days, you often find yourself feeling confused and uprooted.

You shake yourself and force the melancholy thoughts from your head, trying to focus on the errand at hand. You're to meet with the real estate agent and pick up the keys to your new house while Michael runs across town to take care of some paperwork at the university. He'll be back to pick you up in a few minutes, and then the two of you can begin the long, precarious process of settling in.

A sullen belch emanates from the clouds, and the rain starts coming down harder -- fat, cold drops smacking loudly against the cobblestones. Shouldn't it be snowing in New England at this time of year? With a sigh, you open your umbrella.

Welcome to Anchorhead...

ANCHORHEAD
An interactive gothic by Michael S. Gentry

(Type HELP or ABOUT for some useful information.)

Release 5 / Serial number 990206 / Inform v6.15 Library 6/7

Outside the Real Estate Office
A grim little cul-de-sac, tucked away in a corner of the claustrophobic tangle of narrow, twisting avenues that largely constitute the older portion of Anchorhead. Like most of the streets in this city, it is ancient, shadowy, and leads essentially nowhere. The lane ends here at the real estate agent's office, which lies to the east, and winds its way back toward the center of town to the west. A narrow, garbage-choked alley opens to the southeast.

>enter office
(opening the real estate office door first)
It seems to be locked.

>examine door

The door has a glass front with the name of the real estate company -- Benson & Brackhurst -- stenciled across it. The blinds are drawn, the lights are off inside, and no one appears to be home. Odd, since the agent knew you were coming today.

>exa window
That's not a verb I recognise.

>examine window
You can't see any such thing.

>l

Outside the Real Estate Office
A grim little cul-de-sac, tucked away in a corner of the claustrophobic tangle of narrow, twisting avenues that largely constitute the older portion of Anchorhead. Like most of the streets in this city, it is ancient, shadowy, and leads essentially nowhere. The lane ends here at the real estate agent's office, which lies to the east, and winds its way back toward the center of town to the west. A narrow, garbage-choked alley opens to the southeast.

In the distance, you can hear the lonesome keening of a train whistle drifting on the wind.

>enter alley

Alley
This narrow aperture between two buildings is nearly blocked with piles of rotting cardboard boxes and overstuffed garbage cans. Ugly, half-crumbling brick walls to either side totter oppressively over you. The alley ends here at a tall, wooden fence.

High up on the wall of the northern building there is a narrow, transom-style window.

>examine boxes
The boxes are filthy, slimy and soaked with rain.

>open boxes
Open or closed, there's very little difference; it's all one soggy mass of rotted cardboard.

>search boxes
The piles of cardboard boxes are empty.

>examine cans
The metal garbage cans are stuffed to overflowing with slowly decomposing refuse.

>examine refuse
The metal garbage cans are stuffed to overflowing with slowly decomposing refuse.

>search refuse
You are not about to go digging through garbage.

>dig garbage
Digging would achieve nothing here.

>l

Alley
This narrow aperture between two buildings is nearly blocked with piles of rotting cardboard boxes and overstuffed garbage cans. Ugly, half-crumbling brick walls to either side totter oppressively over you. The alley ends here at a tall, wooden fence.

High up on the wall of the northern building there is a narrow, transom-style window.

>exa walls
That's not a verb I recognise.

>examine walls
It's just an ordinary-looking wall.

>search wall
You find nothing of interest.

>examine fence
One of the boards seems to be loose down at the bottom; you could probably just squeeze through.

>squeeze through fence
(closing the umbrella first)
Dropping to your hands and knees, you wriggle underneath the loose board and scramble down a muddy slope.

Narrow Beach
This narrow strip of beach is tucked away between two outcroppings in the predominantly rocky shoreline, accessible only from a steep, muddy slope to the west. The sand is filthy and strewn with rocks, seaweed, litter and other bits of storm-tossed detritus.

Near the bottom of the slope, a sewage outflow pipe juts out over the beach, about three feet above the ground. A thin stream of acrid-smelling sewer water trickles out over the lip of the pipe, forming a puddle in the sand.

You are getting wet.

>i
You are wearing your wedding ring, your trenchcoat and your clothes; in addition, you have in your hand your umbrella.

The pockets of your trenchcoat are empty.

You are getting wet.

>exa ring
That's not a verb I recognise.

>look ring
You can't see any such thing.

>look at ring
Staring at your wedding ring like that tends to make you sentimental.

A sudden gust of wind blows a cold spray of rain into your face.

You are getting wet.

>examine ring
Staring at your wedding ring like that tends to make you sentimental.

Another wave crashes against the rocks, sending a cloud of spray into the air.

You are getting wet.

>open umbrella
You open the umbrella.

>l

Narrow Beach
This narrow strip of beach is tucked away between two outcroppings in the predominantly rocky shoreline, accessible only from a steep, muddy slope to the west. The sand is filthy and strewn with rocks, seaweed, litter and other bits of storm-tossed detritus.

Near the bottom of the slope, a sewage outflow pipe juts out over the beach, about three feet above the ground. A thin stream of acrid-smelling sewer water trickles out over the lip of the pipe, forming a puddle in the sand.

>look pipe
You can't see any such thing.

>look at pipe
The concrete pipe is about a foot and a half in diameter. Looking in, you can only see about three feet before the inner walls of the pipe disappear into blackness.

>enter pipe
You don't really feel like crawling head first into a smelly, filthy, pitch black sewer pipe.

>close umbrella
You close the umbrella.

You are getting wet.

>enter pipe
You don't really feel like crawling head first into a smelly, filthy, pitch black sewer pipe.

The clouds overhead mutter restlessly to themselves.

You are now, sadly, entirely soaked.

>laugh
That's not a verb I recognise.

>enter pipe
You don't really feel like crawling head first into a smelly, filthy, pitch black sewer pipe.

>search pipe
You can only see a few feet into the pipe before the interior is lost in darkness.

>i
You are wearing your wedding ring, your trenchcoat and your clothes; in addition, you have in your hand your umbrella.

The pockets of your trenchcoat are empty.

>l

Narrow Beach
This narrow strip of beach is tucked away between two outcroppings in the predominantly rocky shoreline, accessible only from a steep, muddy slope to the west. The sand is filthy and strewn with rocks, seaweed, litter and other bits of storm-tossed detritus.

Near the bottom of the slope, a sewage outflow pipe juts out over the beach, about three feet above the ground. A thin stream of acrid-smelling sewer water trickles out over the lip of the pipe, forming a puddle in the sand.

Another wave crashes against the rocks, sending a cloud of spray into the air.

>look at water
Which do you mean, the sea, the rain or the sewer water?

>look at sewer water
The water coming from the pipe is foul-smelling and brown.

>taste sewer water
You must be joking.

>yep
That's not a verb I recognise.

>taste sea water
You've no wish to drink from these dismal waters.

>l

Narrow Beach
This narrow strip of beach is tucked away between two outcroppings in the predominantly rocky shoreline, accessible only from a steep, muddy slope to the west. The sand is filthy and strewn with rocks, seaweed, litter and other bits of storm-tossed detritus.

Near the bottom of the slope, a sewage outflow pipe juts out over the beach, about three feet above the ground. A thin stream of acrid-smelling sewer water trickles out over the lip of the pipe, forming a puddle in the sand.

>look at sea
The sea is the color of old pewter, surging and chopping restlessly beneath the clouds.

>enter sea

The water doesn't look inviting.

>look at rain
It's coming down in uneven spatters, broken by intermittent gusts. Most of the time you enjoy such weather, but this has to be the most thoroughly depressing rain you've ever experienced in your life.

>l

Narrow Beach
This narrow strip of beach is tucked away between two outcroppings in the predominantly rocky shoreline, accessible only from a steep, muddy slope to the west. The sand is filthy and strewn with rocks, seaweed, litter and other bits of storm-tossed detritus.

Near the bottom of the slope, a sewage outflow pipe juts out over the beach, about three feet above the ground. A thin stream of acrid-smelling sewer water trickles out over the lip of the pipe, forming a puddle in the sand.

>look at puddle
The water coming from the pipe is foul-smelling and brown.

>search puddle
You find nothing of interest.

Another wave crashes against the rocks, sending a cloud of spray into the air.

The rain slackens off momentarily to a weak drizzle, then returns afresh in a brief, freezing downpour.

>open umbrella
You open the umbrella.

>l

Narrow Beach
This narrow strip of beach is tucked away between two outcroppings in the predominantly rocky shoreline, accessible only from a steep, muddy slope to the west. The sand is filthy and strewn with rocks, seaweed, litter and other bits of storm-tossed detritus.

Near the bottom of the slope, a sewage outflow pipe juts out over the beach, about three feet above the ground. A thin stream of acrid-smelling sewer water trickles out over the lip of the pipe, forming a puddle in the sand.

>look at sand
There is nothing of any worth or interest here, just drifts of trash.

>put arm in pipe
You can't see any such thing.

>i
You are wearing your wedding ring, your trenchcoat and your clothes; in addition, you have in your hand your umbrella.

The pockets of your trenchcoat are empty.

>put ring in puddle
(first taking it off)

You slip the plain gold band from your finger. Usually you feel almost naked without your ring on, although sometimes you do find yourself taking it off briefly, just to read the inscription along the inside.
That can't contain things.

>read inscription
Engraved along the inside are Michael's and your initials, along with your wedding date -- June 28th.