UNIVERSITY OF SOUTHAMPTON

FACULTY OF PHYSICAL AND APPLIED SCIENCES

Electronics and Computer Science

Multiplayer Interactive Narrative Experiences: Understanding Player Interaction in Authored Non-Linear Narratives

by

Callum Spawforth

ORCID ID 0000-0002-1751-4820

Thesis for the degree of Doctor of Philosophy

February 2022

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

FACULTY OF PHYSICAL AND APPLIED SCIENCES
Electronics and Computer Science

Doctor of Philosophy

MULTIPLAYER INTERACTIVE NARRATIVE EXPERIENCES: UNDERSTANDING PLAYER INTERACTION IN AUTHORED NON-LINEAR NARRATIVES

by Callum Spawforth

Interactive Narrative (IN) is a type of storytelling in which the dramatic storyline is created and influenced through the players' actions, within a system defined by a set of rules. Examples of this range from gamebooks to hypertext to modern narrative games. However, research has predominantly focused on the singleplayer narrative experience. Limited research exists that explores multiplayer interactive narratives, and many of its interesting properties are overlooked. These include multiplayer differentiability (where each player as a distinct narrative experience to the others) and inter-player interaction, and the role it plays it shaping the multiplayer experience. This thesis explores the concept of multiplayer narrative experiences (MINEs), which are INs that feature inter-player agency and distinct narratives for each player. It begins to answer questions like: How can we create MINEs? What types of interaction can exist within multiplayer narrative? How do those interactions affect the multiplayer experience? To begin answering these questions, a classification of interactions in multiplayer video games was performed, resulting in a framework consisting of 9 characteristics that distinguish between different interactions in a medium-agnostic way. Following this, a model was designed based on sculptural hypertext that supports each of these these types of interaction. This model was then implemented by extending an existing system for storytelling using sculptural hypertext, StoryPlaces, to create StoryMINE. An experimental narrative as co-authored with two creative writers. Written for StoryMINE, it allows a player to experience a range of interaction types in a controlled manner. This narrative was then experienced by 22 participants split into 11 pairs, who were then interviewed about their experience. Inductive coding and thematic analysis of the interviews reveal 5 themes and 4 supporting factors, along with other ways in which the multiplayer element modified the experience. These results show that MINEs offer an experience distinct from that of singleplayer IN and multiplayer games, and that MINEs possess several interesting attributes that deserve further study.

Contents

List of Figures

List of Tables

Declaration of Authorship

I, Callum Spawforth , declare that the thesis entitled *Multiplayer Interactive Narrative Experiences: Understanding Player Interaction in Authored Non-Linear Narratives* and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- where I have consulted the published work of others, this is always clearly attributed;
- where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;

- parts of this work have been published as:
  Callum Spawforth, Nicholas Gibbins, and David Millard. "StoryMINE: A System for Multiplayer Interactive Narrative Experiences". en. In: Dec. 2018. URL: https://eprints.soton.ac.uk/424131/ (visited on 10/15/2018)

  Callum Spawforth and David E Millard. "A framework for multi-participant narratives based on multiplayer game interactions". In: *Interactive Storytelling: 10th International Conference, ICIDS 2017, Madeira, Portugal, November 14-17, 2017. Proceedings*. Sept. 2017

  Callum Spawforth and David E. Millard. "Multiplayer Games as a Template for Multiplayer Narratives: A Case Study with Dark Souls". In: *Proceedings of the 27th ACM Conference on Hypertext and Social Media*. 2017

  Callum Spawforth, Nicholas Gibbins, and David Millard. *Uncommon patterns - Authoring with story specific structures*. Dublin, Ireland, 2018

Signed:.....

Date:.....

Acknowledgements

I would like to give thanks and acknowledge the following people:

My supervisors, Dr. David Millard and Dr. Nicholas Gibbins. Without their tireless support, patience and guidance, I surely wouldn't have made it this far.

My internal examiners, Dr. Mark Weal and Dr. Gary Wills, for their detailed assessment of my work in its early phases.

Dr. Tom Blount, for his advice and reassurance from start to finish.

Brian de Lint and Amanda Moss, for their invaluable help in creating an engaging and enjoyable multiplayer interactive narrative.

The participants of my studies, without whom none of this research would have been achievable.

All my family and friends who have offered their support and tolerated my endless ramblings throughout.

My partner, Rai, for pushing me and keeping me going right up until the finish line.

Chapter 1

Introduction

Interactive narrative (IN) is a term far less known than the technologies it describes. Even with people that know the term, the meaning varies due to the wide variety of storytelling types in modern digital media. It can be broadly defined as a type of digital experience where a dramatic storyline is created or influenced through the players' [1] actions, within a system defined by a set of rules. This encompasses the many forms in which people might encounter interactive narrative: hypertext fiction, interactive fiction (e.g adventure games), multi user dungeons and modern games, such as Telltale's *The Walking Dead*.

This definition is a combination of the works of Murray [62] and Riedl and Bulitko [73], and it outlines two key aspects of interactive narrative. The first is that in interactive narrative, the input of the player is as important to the creation of the final story as that of the author. While this is arguably true of all written literature, as the reader constructs the details of the narrative in their mind, in interactive narrative it refers to a sense of agency. Agency is "the satisfying power to take meaningful action and see the results of our decisions and choices" [62].

The second aspect is the need for rules and constraints on the player. The rules of the system are one of the key things that differentiate the player from the author. When a player is navigating the links of a hypertext, or acting in a virtual world, they are behaving according to a set of rules that define what actions are valid. In contrast, it is the responsibility of the author to create both the constraints and content; Murray [62] describes this as procedural authorship.

One of the most interesting examples of interactive narrative comes in the non-digital form of tabletop role-playing games, such as "Dungeons and Dragons"" (D&D). In the game 'Dungeons and Dragons', one player takes on the mantle of the 'Dungeon Master', responsible for creating the world and responding to the actions of the players. Typically,

[1] The terms 'reader' and 'player' are frequently used synonymously within IN. Here, the term 'player' is used due to it not implying a textual medium.

they also outline a plot that the players may or may not follow. The game's rulebook outlines outlines many of the actions available to the players, as well as ways to resolve their outcome. The key difference between games such as D&D and digital interactive narrative is the author's active involvement; in D&D, the author narrates and adapts the narrative as the game is played, possibly bending or breaking the rules, in order to achieve a more satisfying experience. In digital interactive narrative, this real-time adaptation and narration is performed by the computer.

More pertinent to this work, D&D is a multiplayer storytelling experience. Multiple players act together, within a set of rules, to forge a narrative. This idea of multiplayer interactive narratives has frequently been neglected within research, despite the popularity of multiplayer experiences in other similar mediums, such as video games. The multiplayer-only game Overwatch[2] alone claimed over 25 million players[3] in 2017.

This work focuses on the notion of multiplayer interactive narrative experiences (MINEs). This is distinct from collaborative authoring, where multiple authors collaborate on a single text or interactive narrative. MINEs are interactive narratives in which multiple players influence the dramatic storylines of themselves *and others* through their actions. In other words, they have agency over the narratives of others. This inter-player agency is coupled to the idea of *multiplayer differentiability*, where players may have potentially distinct narrative experiences within the same interactive narrative [75].

Little literature exists that considers multiplayer interactive narrative experiences with *multiplayer differentiability* and *inter-player agency*. A few narrative models exist, none of which meaningfully consider the idea of inter-player agency. The models described by Fairclough and Cunningham [23] and Riedl et al. [75] have inter-player agency as an emergent property, or mention it only in passing. A mechanism for inter-player agency is briefly speculated on by Bernstein [7], but is gamified and tightly coupled to the system. Group-based approaches exist [34], but treat the group as a single entity, lacking meaningful *multiplayer differentiability*.

In fact, there's little research that considers one of the fundamental questions underlying MINEs: are they a distinct form of experience, that's different to other, related experiences, such as multiplayer games or singleplayer interactive narrative. This is the key question that this thesis addresses: how do multiplayer interactive narrative experiences differ from traditional interactive narrative, as a result of inter-player interaction?

[2] https://playoverwatch.com/en-us/

[3] http://www.polygon.com/2017/1/27/14417214/how-many-people-play-overwatch-25-million - Accessed 2018/05/15

1.1 Research Questions

This work explores the idea of multiplayer interactive narrative experiences (MINEs), which are defined as interactive narratives that feature multiplayer differentiability and inter-player agency. The main research question addressed by this thesis is:

1. In what ways do different inter-player interactions affect a player's experience of interactive narrative?

However, in order to begin answering this question, three other questions first need answering:

1. What distinguishes different types of player interaction in multiplayer interactive narrative?
2. To what extent could existing narrative systems model MINEs?
3. How can existing narratives systems be extended to support MINEs which feature the previously identified characteristics of interaction?

1.2 Research Framework

The main research question posed by this thesis is: "In what ways do different inter-player interactions affect a player's experience of interactive narrative?". However, this pre-supposes an understanding of the the different interactions that may exist within the domain of multiplayer interactive narrative.

In order to gain insight into the types of inter-player narrative interaction that may exist, I conducted an analysis of interactions in video games, with the goal of identifying a generalised set of characteristics that could help distinguish between different types of interaction in interactive narrative.

This analysis is described in detail in Chapter 3, but summarised in brief here. It consisted of an iterative coding of inter-player interactions (n=56) drawn from top-rated multiplayer video games[4] (n=17) across a range of genres. The reason for this approach and selection of genres is outlined in Section 3.1.

A framework was derived from this analysis consisting of 9 characteristics which distinguish between different inter-player interactions (Section 3.2). An initial exploration of the expressive power of this framework was then conducted by applying it to three

[4]Ratings provided by MetaCritic - https://www.metacritic.com/

multiplayer games known to have novel elements. This process found that while the framework was capable of categorising the interactions perceived as novel, some of the elements that made those interactions interesting within their games were missed, suggesting the framework's ability to identify and express novel interactions is limited.

In order to explore the framework's applicability to interactions in MINEs, Section 3.4 describes three narrative premises were created based on different combinations of characteristics. These premises adopt radically different narrative structures, which demonstrates that these characteristics can be used to create interactive narratives with distinct types of interaction.

The next step towards being able to see how these interaction types impact the player experience, was to find a way to embed inter-player interactions within an interactive narrative model. This was needed, as few existing models could support MINEs, and those that could lacked both the ability to tightly control the player interactions and usable implementations that could be used to conduct a study.

To rectify this situation, a model for MINEs extending sculptural hypertext [7, 58] was designed and then implemented using the StoryPlaces [40] platform (as described in Chapter 4). This model supports interactions utilising the full spectrum of characteristics identified, in turn demonstrating that systems supporting MINEs are entirely feasible.

With this in place, the last step to being able to explore the player experience was to produce a MINE to conduct a study on. An experimental MINE was produced by myself in collaboration with two creative writers. This MINE was designed using the interaction framework to both demonstrate a variety of interaction types and place players in situations that would emphasise the multiplayer interaction in unusual ways. The creation of this MINE validates the ability of the extended sculptural model to enable the creation of multiplayer interactive narrative experiences.

Finally, with everything in place, it was possible to investigate the affects of inter-player interactions on the player experience. Chapter 6 presents a qualitative study, which saw pairs of players (n=11) experience the experimental MINE and engage in an interview, where they discuss their shared experience. These interviews were then transcribed, inductively coded and grouped into themes, with the aim of beginning to identify and understand any changes to the experience brought about by the presence of the other player.

1.3 Contributions

This thesis presents the following contributions:

1. A set of characteristics that distinguish between different types of multiplayer interaction within an interactive narrative.

2. A demonstration that these characteristics can act as a lens through which to design interactions with distinct structures in multiplayer interactive narrative.

3. A model for multiplayer narrative based on sculptural hypertext that allows for the design of multiplayer interactive narratives with inter-player agency, multiplayer differentiability and the ability to be carefully controlled by the author (MINEs).

4. Proof by example that a multiplayer model based on sculptural hypertext can support all of the characteristics of multiplayer interaction identified in this thesis.

5. A web-based platform implementing the previously mentioned model enabling the construction and experiencing of MINEs.

6. A two-player MINE that demonstrates the different characteristics of multiplayer interactions in narrative.

7. A set of design considerations and challenges for authors to consider, specific to multiplayer interactive narrative.

8. An exploration and analysis of how the addition of inter-player interaction to interactive narrative affects the players' experience.

1.3.1 Publications

A number of the contributions in this thesis have already been published.

Multiplayer games as a template for multiplayer narratives: a case study with dark souls[89] was an initial investigation of whether games could be used to inspire multiplayer interactive narratives, serving as a proof of concept for Chapter 3. In it, we explore the mechanical interactions present between players in the game world, and re-imagine them as narrative in the form of sculptural hypertext, demonstrating that interactions in games and be drawn on to inspire interactions in narrative.

The interaction framework produced by analysing multiplayer games, and the narrative snippets inspired by that framework presented in Chapter 3, were published in *A framework for multi-participant narratives based on multiplayer game interactions*[88].

The extended sculptural hypertext model and accompanying StoryMINE system presented in Chapter 4 were published in *StoryMINE: a system for multiplayer interactive narrative experiences*[85].

Finally, *Uncommon Patterns - Authoring with story specific structures* was drawn from my experience authoring the experimental MINE presented in Chapter 5, and proposed

that stories may contain repeated structural patterns that are unique to that story, but common within it. This would then have implications for the design of authoring tools and their support for novel experiences.

1.4 Structure of this thesis

This document is structured as follows:

Chapter 1 introduces the context and motivation behind this thesis. It poses four research questions which are investigated over the course of the thesis, and describes the contributions present.

Chapter 2 provides background on relevant to multiplayer interactive narrative experiences, including different forms of interactive narrative, agency and related work into multiplayer interactive narratives. It further considers the ways in which video games may be used to inform our understanding of MINEs.

Based on this, Chapter 3 describes a framework for categorising interactions in multiplayer video games through an analysis of games systematically sourced from Metacritic (n=17). It then describes a validation of this framework by applying to interactions sourced from volunteers, that fit a defined interaction model. Finally, it considers how the framework can be used to inform designs of MINEs.

Chapter 4 outlines a model for MINEs based on sculptural hypertext and details its implementation using the StoryPlaces open-source tool. It then verifies that this model can support all of the characteristics identified in the interaction framework by example, presenting a set of short narrative extracts that use the model to exhibit interactions with specific characteristics.

Chapter 5 describes the design of a co-authored multiplayer interactive narrative experience, and how the framework characteristics identified in Chapter 3 are exhibited and explored. Subsequently, it describes a number of key design considerations and challenges that occurred during the authoring process.

Chapter 6 presents an exploratory, qualitative study into the experiential changes brought about by inter-player agency and the presence of other players. The study saw participants (n=22) play in pairs the MINE produced in Chapter 5, and take part in a group interview. This interview was then transcribed (Appendix D) and analysed by inductive coding. The chapter presents the methodology and results of this analysis.

Chapter 7 concludes this thesis, summarising the work presented within before exploring how this work answers the research questions posed in Chapter 1. It then briefly outlines possibilities for future work, and finishes with closing thoughts on the contributions of this thesis.

Chapter 2

Background Research

Before addressing the existing literature relating to multiplayer interactive narratives, it's important to clear up an issue of terminology. Within the interactive narrative community, there's little consensus on a word for the user of an interactive narrative system. They might be a reader, a player, a user. In this thesis, I choose to predominantly use the word 'player'. While reader is perhaps more common, 'reader' as a term implies a textual medium, such as a book. However, the research within this thesis is applicable to mediums that employ a variety of multimedia. 'User' doesn't seem contextually correct either - a person uses a narrative system, but a narrative itself isn't 'usable'. While 'player' carries with it the connotation of games, of the three common terms outlined here, it seems the most suitable. It captures the notion of interactivity, which is critical to interactive narrative, and isn't inherently tied to a particular media. While it's undoubtedly not a perfect term, due to the implication of games, I believe it to be the best option in common use.

2.1 Interactive Narrative

Interactive narrative is a form of digital interactive experience in which players create or influence a dramatic storyline through their actions [73]. While the concept of interactive storytelling has many examples in non-digital media throughout time, digital interactive narrative began to be explored in the 1970's, with Meehan's creation of TALE-SPIN [56]. TALE-SPIN sought to create stories through the simulation of goal-driven characters, requiring the player to define the initial setting and themes of the story. While not the first system to computationally address narrative, being preceded by Grimes' Fairy Tales (as reported by Ryan [78]) and Klein's novel generator [49], TALE-SPIN was the first to allow the player (as opposed to the author or programmer) to influence the narrative.

Since TALE-SPIN, many types of interactive narrative have been created. Riedl and Bulitko [73] broadly categorise them along three axes: authorial intent, virtual character

autonomy and player modelling. Authorial intent addresses the extent to which the narrative is constrained by the author. At one extreme, there are highly authored narratives in which every possible change is specified by the author; the classic example being Choose-Your-Own-Adventure books. Contrasting this is the generative approach, where the narrative is algorithmically created, typically from a set of low-level narrative components, as demonstrated by Cavazza, Charles, and Mead [11] or Ciarlini et al. [13].

The second axis is virtual character autonomy, defined by Riedl and Bulitko [73] in terms of an *experience manager*. An experience manager is a generalization of a drama manager [4], an agent responsible for driving the narrative forward while maintaining the quality of the player's experience [73]. This may take the form of guiding the player along an authored plot, or simply ensuring characters take actions that are sufficiently dramatic, while ensuring narratological principles such as coherence are maintained [74]. Riedl and Bulitko [73] define virtual character autonomy as the degree to which computer-controlled entities can act independently of the experience manager. In the aforementioned Choose-Your-Own-Adventures, the actions that characters can take within the narrative are entirely predefined by author as part of their design - the actions of the character are entirely predetermined, and thus they no ability to autonomously act within the story. In contrast, emergent narrative is formed primarily through interactions between independent characters.

The last of Riedl and Bulitko's axes is player modelling. This is the extent to which the experience manager takes into account the player's preferences. These preferences may be used by the experience manager for a variety of purposes, such as further improving the perceived quality of the narrative [80] or reducing the computational load [25].

Each type of system has strengths and weaknesses, particularly along the authored-generative axis. Highly authored narratives provide a well-formed experience to the player; the author's fine-grained control allows them to maintain a strong sense of narrative coherence and dramatic pacing [55]. However, player agency inherently requires more content to be added to the narrative, resulting in a more limited amount of agency or a combinatorial increase in the amount of content required from the author [10, 90].

In contrast, generative systems typically allow for more significant agency, due to their ability to create content based the player's actions. In turn, this results in a wider range of stories that can be told from the same source material, or "protostory", which is "a prototype, or a procedural blueprint, that describes the space of potential narrative experiences contained in one IDN system" [50]. However, this frequently comes at the cost of coherence and pacing [55, 71]. Typically, such systems also require a knowledge base of narrative components that can be assembled, which may be of a substantial size.

2.1.1 Hypertext and Interactive Fiction

Hypertext fiction is a type of highly authored narrative that features no character autonomy nor player modelling. It consists of a series of content fragments (sometimes known as pages, or nodes) with connections between them that can be traversed to explore a narrative [1]. Narrative agency is exhibited as a choice between links, which corresponds to a choice within the narrative. The upshot of this is that the more agency within the hypertext, the more content an author needs to produce [90]. When choices impact the entire subsequent hypertext, requiring two distinct branches to be formed, complexity can be exponential [10]. However, a number of common patterns for hypertext exist that reduce complexity while providing a structural toolbox for authors [8].

One of the earliest forms of hypertext is calligraphic hypertext. A term coined by Bernstein [7], calligraphic hypertext is a hypertext in which the links between narrative fragments have been explicitly added by the author. Bernstein's usage of the term calligraphic refers to the way in which the structure of the hypertext is built by successively adding lines, i.e links between nodes. Many systems exist that use this approach, such as StorySpaces [48, 9], StoryExplorer[1], Inklewriter[2] and Twine[3]. StorySpaces, Twine and Inklewriter expand on calligraphic hypertext by associating a state with the player and adding guard fields (preconditions) that prevent access to nodes unless satisfied by that state. By enabling dynamic links whose behaviour changes in the course of reading [9], decisions early in the narrative can affect events later in the narrative, without excessive branching.

Sculptural hypertext [7] takes guard fields a step further, adopting the opposite approach to calligraphic hypertext. In sculptural hypertext, each fragment is implicitly connected to all others in a dense tangle. These connections are then removed based on where the guard fields of each fragment are satisfied, leaving only a subset available. When a fragment is visited, the player's state is modified according to a set of actions, potentially changing the fragments available. This guard-driven approach lends itself to situations where the availability of links is dependent on external data, such as with locative narrative [58]. Similar to calligraphic hypertext, several design patterns are known to be applicable to sculptural hypertext [39].

Hypertext was chosen as one particular area of interactive narrative to focus on, as it goes a long way to meeting the goal of having *authorability* within the resulting interactive narrative, and is well knowing within the interactive narrative space. It has a rich history, and both calligraphic and sculptural hypertext are actively used within current tools such as Twine[4], a currently popular platform for authors to create interactive narratives.

[1] https://www.robsprojects.co.uk/apps/storyexplorer - Accessed 2018/10/05
[2] https://www.inklestudios.com/inklewriter - Accessed 2018/10/05 - Shutting down 2018
[3] http://twinery.org/ - Accessed 2018/10/05
[4] https://twinery.org/ - Accessed 2021/08/12

2.2 Agency

Agency is a concept that varies from discipline to discipline, though it each discipline it broadly relates to an entity's ability to act. In philosophy, agency considers the capacity of an entity to act on other entities, and bring about changes in its environment. Discussion frequently has centred around how agency relates to desire, motivation and intention [2, 17, 35, 57].

In a related manner, psychology regards agency as intentional actions taken to fulfill an agent's goals [51, 19], and considers how humans attribute this goal-directed agency to entities [32, 16]. Psychology also addresses the idea of a *sense of agency* [28], where a person perceives themselves to the cause or generator of an action.

Sociology meanwhile considers the relationship between agency and structure. It explores the relationship between an individual's freedom to act independently and social structures (such as relationship and institutions), and how the two mutually affect and transform each other [42, 22].

In interactive narrative, agency acts a central concept, exploring the player's ability to act in relationship to the constraints imposed by the narrative system. In this sense, it's inherently tied to the interactivity of the narrative. However, much as in the other disciplines, there is no consensus on a precise definition.

One of the oldest and most known definitions is that of Murray, who defines it as "the satisfying power to take meaningful action and see the results of our decisions and choices"[62]. She argues its importance to interactive narrative, stating "Dramatic agency should be the goal of design for interactive narrative in any form"[63].

Harrell and Zhu [41] argue that the resulting understanding of agency is overly simplified, becoming synonymous with the free will of the players. They argue that this has given rise to the idea that "the more agency, the better", which overlooks the importance of meaningful constraints in the context of the story. They propose a second type of agency that accompanies user agency termed *system agency*. This *system agency* refers to the "capacity of the computational system to modify the story world and provide affordances for users' actions" and only exists in conjunction with human actors. It's the result of human interpretation of the behaviour of the system and its responses to user actions.

Both types of agency can be considered as acting on the fabula or the syuzhet [54]. The fabula of a story consists of all the events that occur during the story, ordered chronologically. In contrast the syuzhet is the manner in which a selection of events from the fabula are presented [3]. In this way, the fabula captures the content of the story, while syuzhet captures the way in which the story is told [72]. Chatman [12] defines a similar concept consisting of *story* and *discourse*. Much like *fabula*, *story*

consists of the events in chronological order, while *discourse* is the order in which they are retold.

Based on this two-part model of narrative, [54] classes agency as either diegetic and extra-diegetic. Diegetic agency consists of the choices made as a character or presence in a story world that affect the *story* (or *fabula*). Counter to this is extra-diegetic agency, which consists of choices that a player makes as a removed observer that affect *discourse* (or *syuzhet*).

At a broader level, Wood [98] proposes a classification for the *fabula* and *syuzhet* based on the types of agency available to the player. A story where the *fabula* is provided entirely by the author is considered to have an *authored fabula* and a story where the *fabula* is created through the players' behaviour is considered to have an *improvised fabula*. The *syuzhet* of a story is *dynamic* when the player is given different ways of experiencing the *fabula*, but *fixed syuzhet* when a player has no control over how the *fabula* is presented. *Fixed syuzhet* can be considered the absence of extra-diegetic agency, while an *authored fabula* can be the considered the absence of diegetic agency.

2.3 Multiplayer Interactive Narrative

Although there is little research on multiplayer interactive narrative compared to its singleplayer sibling, a handful of approaches do exist. An early example, Social Shark [7] was a proposed extension to Card Shark, an IN tool based on sculptural hypertext. In Card Shark, sculptural hypertext fragments are abstracted as a deck of cards. These cards are shuffled, and several dealt to the player. Cards whose preconditions are not met are disabled. The player selects a card to visit, whose full text is then displayed and the state modified. Finally, a new card is drawn to replace it. Social Shark extends this idea by considering two players, each of which gets dealt a hand of cards. Each card is given a points value that differs for each player. The players then take it in turns to play cards, and play continues until neither player can continue. The winner is the player with the most points. Social Shark is an early, authored, hypothetical approach to MINEs and suffers from issues with liveness and consistency: both are dependent on the order on which cards are drawn from the deck. The shared use of that single deck also heavily restricts the types of story that can be told.

Fairclough and Cunningham [23] proposed a generative system for MINEs using a story director (a form of *experience manager*) and Propp's Morphology of the Folktale [68]. Propp's Morphology decomposes folktales into a set of narrative components that can be recombined to construct new stories with a consistent theme. Character functions are one of these components, and represent the contribution of individual characters to the overall narrative. These functions can be combined into moves, which represent individual narrative threads that may be combined to weave more complex narratives [33]. The

system proposed by Fairclough and Cunningham encodes 44 of Propp's multi-move story scripts as cases in a case base, where each case consists of a series of instructions that are derived from the move's functions and a set of requirements for each instruction. The director uses case based reasoning to select the case that is closest to the current state of the story, and assigns the instructions to characters to fulfill. Multiplayer storytelling is attempted by creating multiple story directors that construct independent stories using intersecting sets of requirements or insert the players into different roles in the same story. Unfortunately, the multiplayer aspects of the system were never evaluated, so it is unknown how it performed. Additionally, issues may exist with coherence and character believability (as explained by Riedl and Stern [74]), due to players violating the requirements of the role they are placed in. It's also unknown the extent to which meaningful inter-player agency exists, though this may be an emergent property of the system.

Closest to the work presented in this thesis is the work of Riedl et al. [75], who initial proposed the idea of *multiplayer differentiability* and an accompanying system theoretically capable of supporting MINEs. Riedl et al. explore MINEs more thoroughly than Fairclough, Cunningham and Bernstein, beginning by using multiplayer alternate reality games (ARGs) to explore the problem of multiplayer interactive narrative. They recruited a director/screenwriter experienced in crafting multiplayer ARGs to construct a multiplayer experience to engage 6 people for several hours. They ran the game five times, with actors assuming the roles of NPCs and the human director orchestrating the experience and made three observations. Firstly, that despite the efforts of the director to predict the way scenes would unfold, exceptions happened. Secondly, the director created new scenes in response to these exceptions to return players to the pre-authored scenes. Finally, where returning the player to the pre-authored scenes was too difficult, new scenes were added to skip the pre-authored scenes. From this work, they derived three properties: *multiplayer differentiability*, *authorability* and *robustness*.

Multiplayer differentiability is the concept that multiple players can participate in the same game and have potentially distinct narrative experiences. *Authorability* is the ability of the human author to easily articulate how different players' experiences should unfold. *Robustness* is the system's capability to handle unanticipated player behaviours that exceed the bounds of the authored content.

Based on these properties, Riedl at al. propose the Multiplayer Storytelling Engine (MUSE). This model employs a variation of Coloured Petri Nets [47] in which places are scenes, tokens are players and a predefined set of transitions encode the intended progression of individual players through scenes (producing a graph). Modelling players as tokens captures the ability for players to be engaged in different scenes simultaneously. For a scene to execute, it a minimum number of tokens are required, and a set of precondition predicates must be satisfied by the current world state. When a scene is done

executing, a set of predicates becomes true. Transitions are also equipped with predicates, determining if they're available. This combination of fixed transitions restricted by predicates is similar to how calligraphic hypertext uses guard fields to restrict access to nodes.

When a scene has sufficient players, a partial-order planner is invoked to ensure the scene can execute. If it can't, the planner introduces new scenes until the plan is sound and complete. In theory, this mitigates the narrative paradox by allowing players high-levels of agency within scenes, then forcing the story back to the authored plan. This is similar to the split/join pattern identified by [8] for hypertextual narratives.

MUSE, created in 2011, it represents the most actionable MINE system to-date: in theory capable of telling a variety of multiplayer narratives. Crucially, it captures the concept of *multiplayer differentiability*, something lacking from the widely adopted group-based approaches, which treat all of the players as a single decision-making entity with the narrative. However, it doesn't explicitly cover the problem of *inter-player agency* and player interaction, instead supposing a virtual environment capable of determining the contents of each scene, as well as how players may modify the world state; there's no guarantee this is the case. The repair algorithm assumes the ability to generate a coherent scene to insert, the feasibility of which depending on the complexity of the story. Most importantly, the system is itself a theoretical model, which has not been evaluated and lacks sufficient detail to be implemented in a usable system.

One notable omission from this investigation of literature around multiplayer interactive narrative games, is that of Tabletop Roleplaying Games (TRPGs) such as Dungeons & Dragons. This is done deliberately, as TRPGs are typically orchestrated by a human game master in real-time. This runs contrary to authorability, as the game master can generate content in real-time. Furthermore, the game master and players are free to bend, break and create new rules at will and interact in any way they see fit, limiting the usefulness of studying them in order to understand how to model interactions.

2.4 Interactions in Multiplayer Interactive Narratives

The lack of existing literature on MINEs leaves open the question of how they might support interactions between players.

Much as Riedl et al. [75] examined the properties of ARGs to understand MINEs, interactions in multiplayer games provide one possible starting point for understanding how player interaction can be supported in MINEs. Multiplayer games present a useful resource, as they possess a variety of mechanics: "the particular components of the game, at the level of data representation and algorithms"[45]. By looking at multiplayer games

as a medium, and how their mechanics enable interactions, it may give insight into how to enable interactions in multiplayer interactive narrative experiences.

The seminal work of Zagal, Nussbaum, and Rosas [99] considers the multiplayer experience as a whole within games. Zagal et al. outline a simple model of multiplayer games consisting of rules and goals, props and tools and players. Rules regulate the development of the game and determine the interactions within it, while goals are the objectives of the players. Props and tools are elements that enable the game to be played, where props are decorative items and tools offer functionality to the players. Six characteristics inherent to multiplayer games are detailed, of which the most relevant are *social interaction*, *competition and cooperation* and *synchronicity*.

Social interaction is the purposeful and bilateral communication between players which may be either stimulated or natural. Stimulated interaction occurs when the rules encourage players to interact, while natural interaction is when players spontaneously decide to interact. If social interaction is a desired feature of the game, it's suggested that the extent to which rules, props and tools impact social interaction is an important consideration. *Competition and cooperation* refers to the extent to which the game encourages competition and cooperation between players through rules and goals. Finally, *synchronicity* considers whether all players need to participate at the same time, which is the case in *synchronous* games. In *asynchronous* games, the entrances and exits of the players are independent. While this model and these characteristics provide a design overview of multiplayer in games that may be applicable to MINEs, they lack the fidelity to describe the fundamental mechanics that could support interaction in MINEs.

Rocha, Mascarenhas, and Prada [76] used a higher-fidelity approach, identifying a number of design patterns for cooperative mechanics. For example, the pattern "Complementarity", in which the abilities of players complement each other. Seif El-Nasr et al. [79] extended this with further patterns, such as "Shared puzzles", where both players encountered a shared challenge or obstacle. While these patterns may be useful to an author, they're built on the base concepts of games, such as character abilities and manipulatable objects. These base concepts are interactions in their own right, and don't necessarily exist in a narrative system. It's the narrative equivalent of these base concepts that needs to be explored.

Reuter et al. [69] developed a more abstract set of design patterns based on interactions in cooperative multiplayer games. To them, *"every action inside a game can be viewed as player interactions as long as it is visible to others."*, based on an earlier definition by Manninen [53]. Manninen defines them as *"...perceivable actions that act as manifestations of the user-user and user-environment interactions. They enable awareness of actions by offering mutually perceivable visualizations"*.

Reuter et al. classify game interactions along four dimensions: *spatial*, *temporal*, *player* and *functional*. *Spatial* considers whether interactions happen at a fixed location within

the game world, and the required proximity of players. *Temporal* defines the duration of the interactions, and possibly their synchronicity. *Player* considers whether the actions are voluntary and obligatory for each player, as well as the experience conveyed to the player. *Functional* addresses any further constraints required for the interaction to occur, such as the number of players and any role requirements.

Based on these dimensions, Reuter et al. went on to identify interactions in several well-received games. They then combined similar interactions into more general design patterns. For example, "Concurrency" is operating one or more objects simultaneously that could not be operated by a single player alone. They then considered the impact these patterns may have on the player experience, such as collecting them all in one place, in the case of "Concurrency". While it's easier to see how these patterns would be helpful to an author, and may form narrative patterns similar to [8], their abstract nature still leaves the challenge of implementation. Especially when these patterns still rely on game concepts, such as "interact with the object in the location".

Manninen [53] analyses interactions in more specific manner, producing a taxonomy of the different types of interaction found within 3D multiplayer games, called the Rich Interaction Framework. This framework includes elements such as avatar appearance, environmental details and language based communication, though this is non-exhaustive. While this taxonomy provides a useful spectrum of tangible actions and considers their purpose within some games, it fails to consider how those actions fundamentally differ or the ways in which those actions result in interactions. It therefore isn't easily adaptable to narrative.

The common theme within existing games interaction research is the assumption of a simulated virtual environment (sometimes known as a world) in which to act. Typically, this is accompanied by the assumption of a player 'avatar', which has the ability to move around and interact with that virtual environment. As a result, much of the literature focuses on players ability to interact using this virtual environment as a medium, such as by opening a door for another player. However, within narrative this assumption can't be made. Hypertext is one possible example of this, being an interactive narrative model that manipulates the story without any virtual environment. This severely limits the extent to which much of the existing research in this area can be used to design and understand interactions in MINEs.

2.5 Awareness Tools

While much of the study of interactions in multiplayer games holds limited use for narrative, one particular view of interactions sometimes used within game research may prove useful. 'Awareness', defined as "the knowledge of the presence of other people,

including their interactions and other activities" [20], has its origins in the study of groupware and collaborative working.

Gutwin and Greenberg describe awareness as being "knowledge about the state of an environment bounded in time and space", and suggests that because environments change over time, this knowledge must be maintained through people interacting with the environment - in their case, a shared workspace with manipulable artifacts [38]. They break down the components of awareness into two sets of elements, those addressing the present and those addressing the future. While some of these components are clearly not applicable at a purely narrative level, such as where another player is looking or their current location, others do. 'Presence' considers whether anyone is currently working in the workspace. 'Identity' considers who is participating in the workspace. 'Authorship' considers who is doing something. 'Action' consider what someone is doing, and 'Intention' asks what goal that action is contributing towards. These components are not medium specific, focusing on "awareness of people and how they interact with the workspace, rather than awareness of the workspace itself", and also capture non-verbal interactions, making them a potentially useful tool in the quest for enabling narrative interactions.

The notion of awareness has since been used to analyse multiplayer games [92, 21, 65]. It has the often applied notion of awareness 'tools', which are the mechanisms by which awareness is achieved, and these have been looked at in a number of games. In particular, Nova adapts this research to study awareness in first-person-shooter games [65]. Much like the other research in games, the awareness tools they identify are inherently tied to the medium of games, identifying elements such as "Avatar's skin", or "Weapon sound", However, they use a set of criteria to distinguish between these tools, which act far more generically. These criteria are:

- *Content* - the information which is displayed (presence, location, intention, etc).
- *Time Span* - consisting of either synchronous awareness, which is obtaining information about the present, or asynchronous awareness, which is obtaining a "historical perspective of the information".
- *Mode* - the way in which the information is acquired. Either "passive" where the information is permanently displayed, "active" where player A must activate the tool to acquire information on player B or "reactive", where player A's actions provide information to player B.
- *Perceptual output* - how the information is presented, such as a visual or audible change.
- *Recipient* - who receives the information.

These criteria are, in many ways, also medium agnostic, not addressing the specifics of games, but could be applied to awareness tools that might be found in MINEs. However, while awareness tools clearly play an important role in interactions and the social experience of gaming, the extent to which they may be used to distinguish between two interactions when taken as a whole is unclear, particularly in a narrative context.

2.6 Social Presence

Related to the idea of awareness is that of social presence. While awareness might be considered the level of information a player has about who else their playing with, social presence theory more broadly considers the sense and experience of being with another person, although definitions vary. The theory was originally developed by Short, Williams, and Christie [82], who described social presence as the degree of salience between two people using a communications medium [52]. However, there is not a widely agreed upon definition of social presence, and researchers frequently use the term to refer to a variety of highly related by subtly distinct concepts. Garrison, Anderson, and Archer define social presence as "the ability of participants in a community of inquiry to project themselves socially and emotionally, as 'real' people ... through the medium of communication being used" [29]. Gunawardena and Zittle emphasies this 'reality' of the person, defining it as the "degree to which a person is perceived as a 'real person' in mediated communication". This sense of "realness" seems to commonly underpin definitions, while the language around that concept seems to shift.

Early research (late 1980s and early 1990s) into social presence in computer-mediated communication came the conclusion that that CMC was antisocial and impersonal because of the removal of social context cues, such as physical gestures [52]. However, this was refuted in the mid 1990s, where research showed that CMC can be a very social and personal experience [36, 37, 97].

Walther further defined the notion of "hyperpersonal" communication, where CMC has surpassed the level of affection and emotion of face-to-face interaction. He proposed that in an environment where few social cues exist, the few and subtle cues that do exist take on a much larger value than they otherwise would in a face-to-face situation. He also emphasises the role of feedback between sender and receiver, and the reciprocal process of behaviour confirmation. This is where the behaviour of one person affects the behaviour of the other. When the other reciprocates, it creates an "intensification loop" that can result in a hyperpersonal experience [97].

Social presence has been shown to have a relationship to student satisfaction in online learning environments [37, 77], and Tu proposes it's required to enhance and foster online social interaction [95].

The majority of social presence literature seems to deal with educational contexts and free-form communication, such as text and video; while relevant to online interaction and offering an useful context for this work, it's difficult to bridge the gap between social presence in online education contexts and the potential for social presence in MINEs.

However, a limited amount of literature exists on how multiplayer games can enable a sense of social presence, although it's suggested social presence is an often neglected area of games research [18]. However, some attempts to study it have been made.

The "Social Presence in Gaming Questionnaire (SPGQ)" is a self-report measure that was developed to understanding the social richness present in multiplayer games, which identified three factors of social presence in games: empathy, negative feelings and behavioural engagement. Empathy relates to how people considered the feelings of others and negative feelings addresses feelings such as envy towards other players. Behavioural engagement is the extent to which players felt their actions and intentions were interrelated with those of other players. For example, questions in this category considered how a players actions depended on the actions of others, or how clear other players intentions are to the player.

Hudson and Cairns constructed a separate questionnaire designed to measure social presence in online games, and then used statistical techniques to identify the most significant areas of the questionnaire. Some of the questions identified related to the interrelationship between player actions and observed intention within multiplayer games.

Social presence is potentially an important component of player experience in multiplayer games [26, 27] and other collaborative virtual environments, suggesting it may be a substantial component of MINEs. The questionnaires described in this section provide both a potential avenue to measure social presence, but also suggest which elements of the experience are significant contributors. These significant elements may be important design considerations for MINEs.

2.7 Conclusions

This chapter has provided an overview of existing literature relating to the space of multiplayer interactive narrative experiences.

It has briefly described interactive narrative as a whole, and considered the concept of agency and how it pertains to interactive narrative.

It considered existing research systems and systems in the area of multiplayer interactive narrative. It was discovered that little literature could be found, and where systems already existed for exploring multiplayer interactive narrative, few could support the three fundamental properties of MINEs: *multiplayer differentiability*, *authorability* and

inter-player agency. Where there were systems that supported these properties, such as MUSE by Riedl et al. [75], the research did not investigate in any depth the opportunities or experience of *inter-player agency* within those systems. Similarly, these existing systems lacked sufficient information or elements of their design to be implemented and used as a base for further exploration.

Continuing along this thread of interaction, multiplayer games were looked at as a possible source of research and inspiration in how to understand interactions in MINEs. A number of taxonomies and analyses exist exploring these interactions, however in almost every case they were tightly connected to games: often presupposing the availability of a virtual world, and mechanisms for the player to navigate and interact with that world.

However, two areas of interaction seemed to be relevant to narrative as well as games: awareness tools and social presence. These aspects of interaction offer some insight into possible areas to investigate within the the realm of multiplayer interactive narrative.

In summary, there seems to be little understanding of how multiple players within an interactive narrative affects the experience or nature of the narrative. This is particularly true when focusing on interaction and inter-player agency, with no existing research on the impact player interaction has on that experience.

Further compounding the problem presented by this research gap, is that few systems exist within the literature capable of supporting MINEs. The systems that can support MINEs are lacking working implementations or sufficient detail to implemented, in addition to pre-supposing an environment such as a virtual world.

This suggests there is both the need for exploratory research, with the aim of gaining initial insight into MINEs and their inter-player interactions, as well as a means of creating and playing through a MINE.

Chapter 3

Characterising Interactions Using Multiplayer Video Games

Little literature exists that looks at creating or understanding interactions in multiplayer interactive narratives. The lack of a conceptual model or framework for inter-player interactions within a narrative structure presents an obstacle to creating these narratives, as any attempt to create such a narrative would be building interactions naively. This approach presents a significant risk of missing interesting or substantial experiential changes that result from unexplored types of interaction.

However, the lack of available MINEs for study makes creating such a model or framework a challenge due to having few data sources to draw from. As an alternative, data on interactions in multiplayer games is widely available due to their prevalence, and potentially offer a wide variety of interaction types due to their varying mechanics.

While there's existing literature around multiplayer game interactions, it adopts a game design perspective, using concepts that are not necessarily applicable to narrative. Commonly, there is the assumption of a *virtual environment* in which a player is free to act through an avatar, or a rich set of available mechanics [76, 69, 14]. This is not always true in interactive narrative, for example hypertext narrative, which uses only connected blocks of prose.

With the aim of better understanding this distinction between player interactions in games and in narrative, contrast the decisions a player may make in a game and the decisions they may make in a narrative. In games, a player may decide to fire their gun in a shooter, swap two gems in a puzzle game, move units in a strategy or accelerate in a racer. These decisions act at the level of the game's mechanics, altering a simulation with well-defined rules, with a view to affecting the future in a specific way.

Decisions in narrative have the potential to act at a different conceptual level entirely. Consider a player's decision to save a companion, to betray a friend or to set out on a

quest to save the world. These decisions can exist in any interactive medium: games, books, hypertexts, interactive fiction, tabletop role-playing games or interactive film. With this in mind, it becomes clearer why existing analyses of player interaction in multiplayer games are insufficient to describe narrative interactions: they address the simulation, rather than the story.

Despite this, games remain a useful medium for study. They possess a well-defined set of non-verbal mechanisms for inter-player interaction, explicitly designed and added by the developer. In effect defining a set of actions that, when taken, have the potential to alter the other players' experiences.

This chapter presents an alternative categorisation framework for inter-player interactions in multiplayer games. This framework aims at provide a lens through which to design and understand mechanisms for player interaction in a manner applicable to interactive narratives, regardless of the medium those narratives are created in.

The definition of interaction used in this framework is grounded in the works of Reuter [69] and Manninen [53], which state that interactions are "perceivable actions" with "perceivable visualisations".

This definition was transformed into a tighter definition that could be used to clearly identify an interaction in a game. In this new definition, an interaction consists of two players: an initiator and a recipient, and two parts: an action and an effect. An action is the command the initiator gives the system, such as "fire a bullet in this direction". The effect is the impact that action has on the game state, such as "injure this person and make a noise". The effect must be perceived by another player, in order for this to be an interaction [69].

Using this definition, a framework was developed through a systematic analysis of a sample of top-rated multiplayer games (n=17) across a variety of genres. This framework is evaluated by applying it to three video games that were perceived by myself as having novel types of multiplayer experience and were not in the original sample. Its relevance to narrative is demonstrated by creating three story premises, collectively showing that by varying these characteristics, fundamentally different multiplayer narratives can be inspired. Finally, the framework was validated by having interactions in the games independently identified by participants with experience in multiplayer gaming, then re-coded, preventing any selection bias that may have been present in the original interaction set.

To my knowledge this work is the first attempt to explore the range of interaction types that may exist within multiplayer narratives. This chapter is structured as follows: Section 3.1 outlines our methodology for creating and validating the framework. Section 3.2 presents a description of the framework and provides an example of classifying the

interactions from one of the sample games. Section 3.3 then presents the results of validating the framework against three games with novel approaches to multiplayer. Finally, in Section 3.4 we present three story premises inspired by the different characteristics within the framework, before concluding the chapter in Section 3.6.

3.1 Methodology

The framework was built through an iterative coding of unique interactions identified in a systematically sourced series of multiplayer games.

The first step of the analysis was to identify a set of games to analyse. These games had to be systematically chosen from an independent source, in order to avoid introducing bias into the game selections. Furthermore, it was preferred that the games would exhibit a range of different interactions to create a framework capable of describing a wide variety of interaction types and avoid being overly specific.

This was achieved by selecting games from a wide selection of genres. Metacritic[1] was used as a source for the list of games, due to it having a large game selection and the games pre-sorted into 18 different genres: action, adventure, fighting, first-person, flight, party, platformer, puzzle, racing, real-time strategy, role-playing, simulation, sports, strategy, third-person, turn-based, wargame and wrestling. Of these genres, 'party' was omitted due to the quantity of games consisting of combinations of smaller mini-games. Including party games would have significantly increased the complexity and decreased the clarity of the analysis.

In each genre, the top 150 games ranked by user-rating were selected to form an initial sample. User-rating was chosen as it provided a systematic way of selecting the games without introducing personal bias. Non-multiplayer games were then removed, as were games with fewer ratings than the median of 39. This was done due to remove obscure games with extremely small review quantities which were prevalent in the samples.

From these valid games, the top game (sorted by user rating) from each genre was then selected to be analysed. Initially, a saturation sampling approach was planned, which would analyse games in each genre breadth-first until no new codes were produced. However, this approach ultimately proved time-prohibitive, resulting in a single game of each genre being used. This resulted in a sample set of 17 games, spread across 17 different genres with publication dates ranging from 1998 to 2013.

For each selected game, a single gamemode was chosen for analysis. This decision was based on the mode with the most information available (a particular problem with older games), typically the main or default gamemode.

[1] metacritic.com

Once the list of games had been creating, iterative coding was used to begin classifying their interactions. This initially began at the game level, with the goal of looking at how interactions differed when aggregated per-game. An initial set of categories was chosen based on a discussion with my supervisor and the works of Zagal, Nussbaum, and Rosas, who identified the key areas of "goals" and "props and tools" [99].

For each game, information was primarily sourced from video sharing platforms that featured play of the game, augmented by wikis and reviews where the exact mechanics were unclear from footage. The amount of information consumed per-game varied, as games were studied until no new interactions were identified. In some cases, games simply did not have enough information to be understood, and were replaced by the next game on the sample list. These exclusions are described in appendix C.

The iterative coding saw each game analysed using the existing set of codes, until an interaction was found that couldn't be adequately described within the existing framework. At this point, the codes in the framework would be created, modified or removed, using the problematic interaction and hypothetical edge cases as a guide. After the framework was refined, all analysed games would be re-coded using the changed codes.

However, as the framework was refined, multiple interactions with markedly different characteristics could occur in the same game, resulting in the per-game aggregate of these characteristics losing specificity; each game would have most codes marked.

As a result of this, the approach shifted to focus on coding individual interaction mechanics within the games, and coding was re-started using the categories that had previously been identified at the game level as the initial codes for individual interactions. This process was continued until every identified interaction could be described by the characteristics of the refined framework. The identification of new interactions then resumed. The framework was completed when all interactions in all 17 of the games could be adequately described by the framework.

The framework was evaluated by applying it against games that were not in the sample set, and which were perceived by myself and Dr. Millard as having unusual multiplayer mechanics or a novel multiplayer experience. The aim of this was to discover whether the framework adequately described the novel elements. The three games selected were *Dark Souls*, *Journey* and *Dead by Daylight*.

Following this, the framework was further validated by having a set of participants re-identify interactions in the same set of games using the interaction model previously defined in this chapter. The methodology for this is further discussed in section 3.5.

This methodology is not intended to give an overall picture of interactions in multiplayer games. Although the sample is varied, the claim is not made that it is representative. Rather, the game selection criteria are used to ensure that the framework is based on the

Name	Short Code	Date	Gamemode	Num. Found Interactions
Ratchet & Clank: Up Your Arsenal	RC	2004	Siege	4
Dragon Ball Z: Budokai Tenkaichi 3	DBZ	2005	Versus	2
The Last of Us	LU	2013	Survivors	9
Counter-Strike	CS	2000	Bomb-defusal	7
IL2-Sturmovik	IL2	2001	Team-deathmatch	3
Super Mario Advance 4	IL2	2003	Cooperative	1
World of Goo	WG	2008	Cooperative	4
Midnight Club 3: DUB Edition	MC3	2005	Capture the Flag	3
Starcraft	SC	1998	2v2 Siege	4
Mario and Luigi: Superstar Saga	ML	2003	Main Game	1
Race 07: Official WTCC Game	R07	2007	Race	2
Greg Hasting's Tournament Paintball	GHTP	2005	Elimination	2
Advance Wars 2: Black Hole Rising	AW2	2003	FFA Skirmish	2
James Bond 007: Everything or Nothing	JB	2003	Cooperative	3
Fire Emblem	FE	2003	Versus	2
Toy Soldiers	TS	2010	Versus	5
WWE Day of Reckoning	WWE	2004	Exhibition	2

Table 3.1: Games classified during Framework Construction

interactions of popular and well-known games, with the contribution as the framework itself, rather than the classification.

3.2 Framework of Distinguishing Characteristics

The games analysed are shown in Table 3.1. In total 56 interaction types were identified from 17 games using iterative coding. An initial set of codes were defined based on observations from the first game, which subsequently went through 8 major revisions; each major revision typically representing a fundamental shift in the way interactions were perceived or understood. Within each major revision, individual codes were further refined, added and removed based on each interaction identified and categorised.

The end result was 9 codes that clearly describe differences between interactions in a way that is not specific to multiplayer games. These codes are shown as a summary in Table 3.2 alongside examples from the sample set. Three codes address the interaction as a whole, while three focus on the initiator and another three on the recipient.

These 9 codes form the interaction framework; they act as set of *distinguishing characteristics* that can both classify existing interactions, and be enumerated to explore the possibilities for interactions in MINEs.

Characteristic	Value	Count	Example
General Characteristics			
Likelihood	**Guaranteed**	35	LU:"Killing a player"
	Possible	21	LU:"Emptying a Box"
Type	**Mechanical**	52	CS:"Shooting and injuring a player"
	Informational	4	WG:"Moving the cursor"
Synchronicity	**Synchronous**	56	LU:"Killing a player"
	Asynchronous	0	No example classified
Recipient Characteristics			
Explicit Awareness	**Always**	10	LU:"Healing an ally"
	Possibly	12	TS:"Taking control of a unit"
	Never	34	AW2:"Capturing a base"
Deductive Awareness	**Always**	49	FE:"Attack an enemy unit"
	Possibly	7	TS:"Attacking using a unit"
	Never	0	No example classified
Initiator Identifiability	**Always**	36	CS:"Killing a player"
	Possibly	20	LU:"Emptying a box of items"
	Never	0	No example classified
Initiator Characteristics			
Explicit Feedback	**Always**	8	LU:"Shooting at and hitting a player"
	Possibly	8	LU:"Emptying a box of items"
	Never	40	TS:"Queuing up a unit for deployment"
Deductive Feedback	**Always**	34	WG:"Moving the shared view"
	Possibly	22	CS:"Dropping a weapon on the ground"
	Never	0	No example classified
Recipient Identifiability	**Always**	42	LU:"Healing an ally"
	Possibly	14	LU:"Emptying a box of items"
	Never	0	No example classified

Table 3.2: A summary of the characteristics identified in the 17 games analysed

3.2.1 Interaction Characteristics

Likelihood. When a player takes an action, an interaction only occurs if the effect of that action is perceived by another player [69]. Likelihood is the chance that an interaction occurs. It is *guaranteed* if the recipient can notice the effect regardless of their current situation or state, such as a message that always appears when a given action occurs. An interaction is *possible* if the recipient must be in a particular situation or state to experience the effect, such as needing to be visit a box to see that an item has been taken.

Interaction type. An interaction can be Informational or Mechanical. Informational interactions only change the information available to the other player, or enable further interactions that are informational. One clear example from the unclassified game *Team Fortress 2*, is spraying a decal on a surface. Mechanical interactions make more concrete

alterations to the other player or their gameworld, directly impacting the other player's agency.

Synchronicity. Adapted for interactions from Zagal's game-wide definitions [99], a synchronous interaction requires that all interaction participants be participating in the game at the same time. For example, applying a medical kit to a player in *The Last of Us*. In contrast, in an asynchronous interaction it is not a requirement that all players are participating at the time the interaction takes place. Perhaps contrary to intuition, this characteristic doesn't reflect the time disparity between an interaction's action and effect, rather the requirement that all involved players are actively engaging with the experience when the interaction occurs. While no examples of this arose in the analysis, Multi-User Dungeons are known to have asynchronous elements [99].

3.2.2 Recipient Characteristics

Explicit Awareness. A player is explicitly aware of an interaction if the game explicitly informs the recipient that an initiating player was involved. This must always be extradiegetic (not within the narrative or game world) [31], as it must explicitly use the concept of another player. If this information is always perceivable to the recipient, they are *always explicitly aware*, for example a notification stating "Player X has scored a point". If the player may not be able to perceive this information, they are *possibly explicitly aware*, such as a message that only appears to players in a certain location. They may also *never* be *explicitly aware*, if the game does not inform the recipient that another player was involved, and they are left to deduce this by them selves.

Deductive Awareness. The recipient is deductively aware if it is possible to deduce using the game's rules that an effect was triggered by another player. It may *always* possible to deduce an effect was caused by a player. For example, if a territory is captured, and only players are able to capture territories. However, it may only be *possible* to deduce in some situations, such as if a game has both players and environmental factors that can injure the recipient, and the recipient only knows that they have been injured. It is also possible that it may *never* be possible to deduce the source of the effect was a player.

Initiator Identifiability. Identifiability describes whether the recipient knows the identity of the player that has affected them. The initiator is *always* identifiable if the recipient always knows the player that caused the effect, for example if "[Initiator Name] has killed [Recipient Name]" always appears on the recipient's death. They are *possibly* identifiable if their ability to do depends upon their current situation or game state, e.g.

they can observe who it is but are not guaranteed to. They may also *never* be able to identify the initiator.

3.2.3 Initiator Characteristics

Explicit Feedback. The counterpart to *Explicit Awareness*, the initiator receives explicit feedback if the game informs the initiating player that they have affected another player with their action, as opposed to another entity, such as a non-player character. For example, a message stating "You killed ¡Playername¿". Explicit feedback can either occur *always*, *possibly* or *never* in the same manner as *Explicit Awareness*.

Deductive Feedback. The counterpart to *Deductive Awareness*, the initiator receives deductive feedback if they can deduce from the rules and information available that they've affected a player. Deductive Feedback can either *always*, *possibly* or *never* occur in the same manner as *Deductive Awareness*.

Recipient Identifiability. The counterpart to *Initiator Identifiability*, this characteristic addresses whether the initiator can identify the affected recipient, but otherwise functions identically.

3.2.4 Communication, Bots, and Indirect Effects

A number of aspects were removed from consideration during classification, as they added significant ambiguity when assigning values to the framework.

Free-form communication options, such as voice and text based chat channels, are their own medium for player interaction, outside of the set of interaction mechanics implemented within the game. They obfuscate *Feedback*, *Awareness*, *Visibility* and *Identifiability*, by allowing the player to communicate any ideas they desire about other interactions in the game, with the additional potential for a player to deceive others. Therefore free-form communication was removed entirely from the analysis, in order to avoid the additional complexity brought about by its relationship to other interaction mechanics.

Finally, secondary effects arising from the context of an interaction were not considered within the framework. For example, a player may defeat another player, in turn saving the life of a third player, who then goes on to kill a fourth player. This complex chain of interactions arises from several interacting interaction mechanics, and therefore is out of scope of this work.

Interaction Name	Shooting and hitting a named player	Shooting and missing a named player	Killing a player	Capturing Territory
Likelihood	Guaranteed	Possible	Guaranteed	Guaranteed
Type	Mechanical	Informational	Mechanical	Mechanical
Synchronicity	Sync.	Sync.	Sync.	Sync.
Explicit Awareness	Possibly	Never	Always	Possibly
Deductive Awareness	Possibly	Possibly	Possibly	Always
Initiator Identifiability	Possibly	Possibly	Always	Possibly
Explicit Feedback	Possibly	Possibly	Always	Possibly
Deductive Feedback	Possibly	Possibly	Possibly	Always
Recipient Identifiability	Always	Possibly	Always	Always

Table 3.3: Example Interactions from "Ratchet & Clank: Up Your Arsenal", Siege Mode

3.2.5 Example Classification

Due to size limitations the full classification cannot be shown, but as an example consider the interactions for *Ratchet & Clank* shown in Table 3.3.

In "Capturing Territory", the initiator is the player taking the capture action. The recipient can be considered as any other player in the game. Capturing the area enables the initiator's team to revive at that location, making it a mechanical interaction. It is a *guaranteed* interaction, as it updates a persistent user-interface element. The recipient is always *deductively aware*, as only players can capture control points. The *initiator identifiability* is possible as it requires the recipient to be in the vicinity and to observe the capture. For the initiator, they can *deduce* that they've affected every player, as every player either gains or loses access to a control point. The initiator can *identify* every recipient, as everyone in the game is affected.

It can be seen from Table 3.3 that the collection of interactions that make up this game mode have different profiles. This demonstrates why it is important to classify individual interactions rather than the game as a whole, as the aggregate of the interactions fails to capture these interesting differences, and would tend to converge on a value of 'possibly' for most of the characteristics. Modelling the interactions increases complexity but maintains the fidelity of the analysis, and allows for more meaningful comparisons.

3.3 Framework Testing through Application to Distinct Games

While the framework suitably classified the sample set of games, it needed validating with games outside of this set. Games were selected that are known for their interesting approach to multiplayer, in order to test the expressive power of the framework. Each game forms a small case study that helps reveal the framework's value and limitations.

3.3.1 Case Study 1: Dark Souls

Dark Souls is an action RPG, developed by FromSoftware and published by Namco in 2011 on a variety of 7th generation platforms. Dark Souls has a novel multiplayer system in which each player plays the game within their own version of the game's world. Various interactions exist that allow players to interact with the worlds of others, with "Signs" being one of the most prevalent.

"Signs" are runic symbols placed on the ground by players that have a chance to appear in other players' worlds. Signs allow the player to summon another player to their world, view a message, or invade the other player's world. The Gravelord Soul Sign, a type of invasion sign, also creates powerful opponents in the other player's world. The interesting interactions associated with these signs is when the initiator places the sign, which then appears in the recipient's world. Placing a sign has unusual characteristics according to our framework. Two types of sign (Message and Gravelord) are *asynchronous*. When placing all of these signs, *feedback* never occurs nor is the *recipient identifiable*.

Many interactions within Dark Souls are either a secondary result of the player's actions or are unintentionally triggered. For example, each death has a chance of leaving a "bloodstain" in the worlds of other players, which they can use to glean information about potentially dangerous areas. These passive interactions were also unusual in our original sample; the initiator in these cases is not *identifiable* nor is the recipient, and no *feedback* occurs. These characteristic values are unique to Dark Souls out of the twenty games classified in total, demonstrating a certain novelty in the games approach to multiplayer.

3.3.2 Case Study 2: Journey

Journey is an exploratory adventure game, developed by thatgamecompany and published by Sony Computer Entertainment in 2012 on 7th generation platforms[93]. Its multiplayer system is notable in that it connects strangers, and limits their ability to communicate to in-game actions.

In Journey, players communicate in a limited sense by briefly creating a variable-size sphere above their avatar. Energy is restored to the other player if they touch the sphere. We categorised this as two interactions, one when the sphere is only seen and another when energy is restored. Both are *synchronous* with recipient and initiator *identifiable*. However, while the first is *informational*, *possible interaction* with *possibly deducible awareness* and *feedback*, the energy interaction is *mechanical* and *guaranteed* with *always deducible awareness* and *feedback*. However, in practice both interactions are frequently used to provide information to the other player. This suggests that in the second interaction the mechanical function is hiding the equally significant informational one.

A novel mechanic within Journey is that each player's energy is recharged when players are in very close proximity. Triggering this was categorised as a *guaranteed*, *mechanical*, *synchronous*, *always identifiable* interaction with *always deductive awareness* and *feedback*, this is an identical classification to interactions in both *IL-2 Sturmovik* and *World of Goo*. The novelty stems from Journey's design, which uses this subtle interaction to encourage a collaborative experience.

The most novel element of Journey is the way in which players are matched without explicit effort. As a player progresses, another player will simply appear, and many players fail to realise the newcomer is another player. Despite the significance of this matchmaking it cannot be considered an interaction (no triggering action) and therefore does not appear in our framework. This suggests that further study of the way in which players are matched in games is needed.

3.3.3 Case Study 3: Dead by Daylight

Dead by Daylight is a survival horror game, developed by Behavior Interactive and published by Starbreeze Studios in 2016 for 8th generation platforms. It is notable as it assigns different roles to players (survivors and killers).

The asymmetry between the roles results in interactions where a single action can have different effects on different players. For example, when a survivor fails a skill check. Other survivors perceive this as a loud noise and bright flash when nearby. However, the killer receives an extradiegetic indicator of the direction and distance. To classify this within the framework, the interaction was divided into two, survivor to survivor (S to S) and survivor to killer (S to K).

The S to S is a *possible interaction* that is *mechanical* and *synchronous* with *always deducible awareness*, *always deducible feedback*, *possible initiator identification* and an *always identifiable recipient*.

The S to K interaction differs in that it is *guaranteed* to be perceived by the killer. Thus the survivor can *always deduce* they've affected the killer. While the framework captured this asymmetry of perception by splitting the interaction, the relationship between the interactions is lost.

Asymmetry of agency is also a key aspect. The killer has the ability to significantly impact survivors, while survivors have little power against the killer. This is not reflected in our framework, in part due to the absence of roles, but also as there is no measurement of the impact of each interaction.

3.4 Designing Multiplayer Narratives using Framework Characteristics

To demonstrate the applicability of our framework to multiplayer narrative, a number of different narrative premises were created, inspired by the different characteristics identified in the framework. These premises are abstract descriptions of a possible narrative, with an overall structure and interactions based on a specific selection of characteristics from the framework.

These proposed narratives may contain both interactions of the same type as the one that inspired the narrative, as well as other types of interaction.

Premise 1. *A spree of killings has recently occurred in London. Two detectives are working the case - one from the local police station, another a private investigator, hired by a relative of the victims. Each character is played by a different player. The two will never meet, but their interactions with the crime scene and victims will change the course of the other's investigation.*

This narrative is inspired by an interaction using possible *deductive awareness* and no *feedback*, with *guaranteed* interactions and no ability to *identify* initiator or recipient. The players may deduce someone is interfering with their investigation, but will be unaware of the effect their actions have on the other. This creates two intertwined narratives but with notably different experiences.

Premise 2. *The Research and Development department of a large corporation is on the verge of a new technological breakthrough. Player one follows the head of this department who must oversee the final stages of the research. Player two follows one of their employees, who unbeknown to the head is a corporate spy whose job it is to steal and then sabotage the research.*

Likelihood	Guaranteed
Type	Mechanical
Synchronicity	Sync.
Explicit Awareness	Never
Deductive Awareness	Possible
Initiator Identifiability	Never
Explicit Feedback	Never
Deductive Feedback	Never
Recipient Identifiability	Never

Table 3.4: A summary of the characteristics used to inspire narrative premise 1

This premise has clear asymmetry. The spy is *always aware* and always receives *feedback* on their attempts to undermine the department, while the head has only *possible deductive awareness* and *possible deductive feedback*, and will never *identify* the spy.

Likelihood	Guaranteed
Type	Mechanical
Synchronicity	Sync.
Explicit Awareness	Never
Deductive Awareness	Possible
Initiator Identifiability	Never
Explicit Feedback	Always
Deductive Feedback	Always
Recipient Identifiability	Always

Table 3.5: A summary of the characteristics used to inspire narrative premise 2

Premise 3. *The first player listens to the conversation of two women sitting in a bar. The older woman reminisces on the critical decisions and mistakes she has made in her life, interspersed with revelations about the younger women's life that are directed by the first player, perhaps in reaction to the experiences of the older women. The younger women's story culminates in her having aged, finding herself back at the bar explaining her life story to a different younger woman. This telling of the life story is then used for the next player.*

This cyclic premise is inspired by an *asynchronous* interaction in which the initiator possibly receives *deductive feedback*, but as a recipient only has *deductive awareness*, as they are never told how their experience has been affected by the decisions of another player, but might figure this out by reflecting on the decisions that they themselves have made. The other player is *never identified*. The time aspect element of asynchronous storytelling in this case facilitate time advancing at different rates for different players, and means they can interact independently much as they would with a single player narrative.

Likelihood	Guaranteed
Type	Informational
Synchronicity	Async.
Explicit Awareness	Never
Deductive Awareness	Possible
Initiator Identifiability	Possible
Explicit Feedback	Never
Deductive Feedback	Possible
Recipient Identifiability	Possible

Table 3.6: A summary of the characteristics used to inspire narrative premise 2

3.5 Further Validation using Independently Sourced Interactions

In order to check for issues in the framework and to ensure interactions hadn't been selected to fit the framework and reduce the change of subconscious bias, a set of external participants were asked to identify interactions in the same set of multiplayer games.

3.5.1 Methodology

These interactions were sourced by asking a set of 8 participants to identify interactions in two to three games each (depending on the participants availability) using two videos of each game. A 150 second clip was used from each video, beginning at the first point in the video where multiplayer gameplay begins. Originally this clip was intended to be 300 seconds long, however this resulted in participants taking too long to complete the study. The videos themselves were sourced from YouTube, using search terms documented in the data provided with this thesis.

The first video of the correct game was selected from the search results. Videos were eliminated for being of too low quality to understand, for being of the incorrect game, and for having overlays which blocked access to on-screen information. The exact position of each video within the results list is also available in the data.

Participants were provided with the definition of interaction used in this paper (consisting of an initiator, an action, a recipient and an effect) and asked to identify interactions between players in the games selected, breaking those interactions down into their four component parts. Participants were also asked to provide timestamps of where the interaction is in the video to allow them to be verified. Participants were told that they do not have to document duplicate interactions.

In order to help the players understand how to split interactions into their component parts, an example using the game 'Treadnauts' was provided. This game was selected

due to it not being in the main games list and having easily demonstrable interactions. While it is possible this affected the result of the study, the example was necessary to ensure participants had an understanding of how to breakdown interactions. The example classifications and interaction were also provided.

Participants were required to have played at least 2 multiplayer games, so that they stood a better chance of successfully identifying player interactions.

Once it had been explained to participants how to breakdown interactions, participants were left to watch the video clips of each game and identify interactions using their own judgement, with no further input from the researchers.

Once a list of interactions had been created, sourced from the participants, the framework was applied to each interaction instance by myself. Some interactions were eliminated due to being misidentified, however the reasons for each elimination were documented and are available with the full list of interactions.

3.5.2 Results

158 instances of interactions were identified, with 94 remaining after eliminating interactions that were unclear or mis-recorded by participants. The reason for each interaction's elimination is provided in the data, which is shown in full in Appendix B.

Overall, the interactions fit within the characteristics identified by the earlier framework. However, it was challenging to classify interactions that were recorded per-instance. The original framework was constructed by aggregating data across multiple videos, to build up a full picture of individual game mechanics from both perspectives. However, the mechanics here were frequently witness from only one perspective, resulting in missing information on one side of the classification.

3.6 Conclusions

This chapter has described a framework for characterising inter-player interaction in a medium independent way. It has put forward nine characteristics that when combined create clear distinctions between different interactions found in multiplayer games: Interaction Likelihood, Type, Synchronicity, Explicit Awareness, Deductive Awareness, Explicit Feedback, Deductive Feedback, Initiator Identifiability, and Recipient Identifiability.

The robustness of this framework was then tested by applying it to a set of interactions identified by volunteers in the same set of games that was originally coded. This test showed that the framework was capable of classifying these interactions, however it also

showed a requirement that multiple instances of each interaction need to be considered using multiple perspectives, in order to create an adequate classification of the interaction within the framework.

The framework was applied to three games identified as having unusual multiplayer mechanics, to explore the extent to which the unusual aspects of interactions in these games could be identified. While the framework was capable of classifying these interactions, it did not capture all of the elements that made these interactions interesting within their respective games, suggesting that its ability to describe novel interactions by itself is limited. During the analysis of *Journey* and *Dead by Daylight*, the distinction between *mechanical* and *informational* interactions was not always clear, suggesting this definition may need further refinement. One possibility is that Interaction Type is not binary, but rather more of a spectrum, making it harder to classify.

Similarly, the framework missed something important when describing games where interactions varied between players playing different roles, particularly in cases where the relative power of players was noticeably different. It further became clear that by taking interactions an individual level, potentially interesting aspects of the experience produced by combinations of interactions over time have also been missed.

The prevalence of perception within the framework leaves open the question of whether providing the illusion of other players' agency on your story would be sufficient. Similar to how the illusion of agency can prove equally engaging to the real thing [24].

However, while the capacity of this framework to understand interactions in multiplayer games is undoubtedly limited, this was also not the core goal of this study. The core goal of the study was to convert the large and varied set of interactions present in multiplayer games into an initial understanding of the different types of interaction that may be created within multiplayer interactive narrative experiences.

The ability of the framework to do this was demonstrated in section 3.4, which showed three distinct narrative premises based on three distinct sets of interaction characteristics. This suggests that the framework is viable as a tool for designing and understanding interactions within multiplayer interactive narrative experiences. While this framework may not exhaustively cover all types of different interactions, it does provide an important first stepping stone to being able to create multiplayer interactive narratives that can be used to explore the impact of player interactions on the narrative experience.

Chapter 4

Enabling Multiplayer Interactive Narrative Experiences using Sculptural Hypertext

For research into MINEs to occur, there needs to be a multiplayer narrative platform capable of supporting each of their distinct properties: *multiplayer differentiability*, *inter-player agency* and *authorability*. However, no such platforms are available for public use.

There are a number of platforms that support authored interactive narrative[96, 46, 91, 40] but do not have any form of inter-player interaction. There are a number of platforms that exist to create multiplayer games, but have no inherent support for interactive narrative.

Platforms and models of interactive narrative that can support multiplayer interactive narrative have previously been created within the literature, such as the case based story engine of Fairclough and Cunningham [23] or MuSE by Riedl et al. [75]. However, Fairclough and Cunningham's case based story engine lacks authorability, being driven by an AI story director. Riedl et al.'s MuSE is a model based on petri nets that can theoretically support MINEs, as it supports all three required properties. However, their design does not explicitly consider how players may interact with each other within the narrative.

To address this problem, I developed a model for multiplayer interactive narratives based on sculptural hypertext [7, 58] that supports *multiplayer differentiability*, *authorability* and explicitly considers how player interaction and *inter-player agency* may be achieved within the narrative structure.

This extended sculptural hypertext model is then applied to the StoryPlaces[40] open-source narrative platform, to create a new, publicly available platform 'StoryMINE' capable of supporting multiplayer interactive narrative experiences.

This model supports interactions featuring any of the characteristics identified in chapter 3, as demonstrated in section 4.2.

This chapter is structured as follows: section 4.1 provides an overview of the model and extensions to Sculptural hypertext. Section 4.1.3 describes the implementation of the model within StoryPlaces. Finally, section 4.2 demonstrates the model's support for all interaction characteristics and discusses its use for multiplayer interactive narrative experiences.

4.1 Extending the Sculptural Model to Multiple Players

4.1.1 Design of the Model

4.1.1.1 An Overview of Sculptural Hypertext

Hypertext is typically conceptualised as a directed graph: a set of nodes containing content, connected by a series of edges that represent the links between content. In the most common type of hypertext, calligraphic hypertext, these links are explicitly specified by the author.

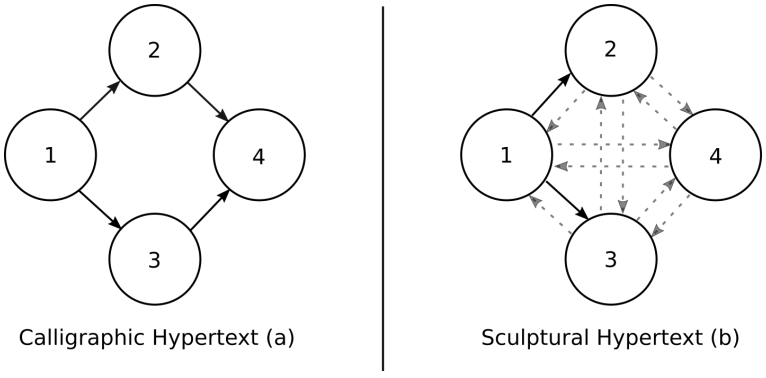

Figure 4.1: Calligraphic compared to Sculptural Hypertext

Sculptural hypertext inverts this model by implicitly connecting every node to every other node, instead of having links be explicitly specified. It has a state, consisting of a set of facts specific to the current reading of the hypertext. For example, these facts could be predicates (e.g. "ball is on the table"), or arbitrary items of data, such as key-value pairs (e.g. "ball is on the table: yes"). Each node is assigned a set of preconditions that must be satisfied by this state in order for that node to be visited (e.g. "ball is on the table == yes"). By changing this state and therefore whether these preconditions

are satisfied, nodes are rendered unavailable or available. In effect, links to unavailable nodes are sculpted away, leaving only the links to the next valid nodes in the narrative. Therefore, when talking about the current state of a sculptural hypertext, it can be thought of in two ways: the set of all facts that are currently true, or the set of nodes currently available to be visited.

In order to move through the hypertext however, that state needs to change so that new nodes are unlocked. This achieved through actions that are attached to each node, and trigger when the node is visited. These actions modify the state of the hypertext; for example, an action might set the predicate "ball is on the table". This then changes the availability of nodes, allowing the story to progress.

Figure 4.1 presents a comparison of calligraphic hypertext (a) and sculptural hypertext (b). Part (a) shows a calligraphic hypertext, with the explicit links between nodes represented by solid arrows. A player must visit 1, then either 2 or 3, followed by 4. Part (b) shows an equivalent sculptural hypertext, with the implicit links between nodes represented by dashed lines. The two solid lines in part (b) represent the currently available set of links: in this case, from node 1 to both 2 and 3. In this example, the player has just read node 1, modifying the state to meet the preconditions for nodes 2 and 3.

4.1.1.2 Required Extensions to Sculptural Hypertext

Multiplayer sculptural hypertext is the extension of sculptural hypertext to multiple players. This is done by sharing the state of the hypertext between players, so that the actions taken by either player change the shape of the hypertext for both. This reshaping forms the basis of player interaction.

However, if all of the state is shared between the players, then they will all see the exact same set of choices. When one player makes a choice, it modifies the state in the same way for everyone, resulting in the next set of choices being the same for everyone. In this way, every player takes the same path through the sculptural hypertext, and it's not possible to achieve *multiplayer differentiability*.

Therefore, in a multiplayer sculptural hypertext model, only some state is shared, and some state remains specific to each player. This allows players to see different sets of available choices, visit different nodes and have distinct experiences, fulfilling the criteria for *multiplayer differentiability*.

Sculptural hypertext is inherently a medium with authorability: all paths through the narrative are pre-determined by the author, and the author is in full control of the experience. The addition of shared state enables *inter-player agency*, and the retention of

private state enables *multiplayer differentiability*. With these three properties satisfied, this extended model of sculptural hypertext is capable of supporting MINEs.

4.1.1.3 Shared State Model

Within a singleplayer sculptural hypertext, each player has their own state: their own set of facts that applies only to their current reading of the hypertext. Their story begins in an initial state, that determines the set of nodes initially available.

The players advance through the hypertext by visiting a node, which modifies the current state. The hypertext can be reset back to the beginning by setting the state back to its initial values.

However, in multiplayer sculptural hypertext, at least some of the facts within the player's state must be shared with other players in order for interaction to be possible. The *shared state model* describes which parts of the player's state are shared with other players.

The first question: who should the state be shared between? Suppose the simplest shared state model possible, where all facts are shared with all players of the hypertext. Consider then that such a hypertext was hosted on a globally accessible website: all state would be shared with all visitors to the website! This means that any player who wishes to read the hypertext would begin with an already populated shared state, and it would be impossible to read the narrative from the very start!

In some stories, this sort of behaviour may be desirable, as evidence of this type of storytelling exists in select multiplayer games. For example, Dark Souls' orange sign soapstone[1], which allows a player to place down a message that can be seen in the current games of other players'. In this example, a small part of the game's state is shared between every player of the game. In the game Moirai[2], the player's experience is changed depending on the choices made one of the previous players.

However, it may not be desirable in every story. For example, some stories may be authored for two players to play through from the very beginning. To allow this, the idea of an 'instance' of a multiplayer sculptural hypertext is added to the model. An instance is a single playthrough of the hypertext shared by multiple players, where all players within that instance have some state which is shared between only them, and no other players outside of that instance. This shared state shared between only a subset of players is termed 'instance state', while the global state shared between all players of a hypertext is termed 'story state'. If a hypertext is designed to be played by only a

[1] http://darksouls.wikidot.com/orange-guidance-soapstone - Accessed 18/05/31

[2] https://kotaku.com/moirai-is-an-adventure-game-with-a-killer-twist-1795897859 - Accessed 18/05/31

small number of people at the same time, it can use instance state to achieve this, and restrict the number of players per instance.

The final part of the shared state model is the per-player state. This is a part of the state which is only accessible to the individual player of the hypertext, which is required for *multiplayer differentiability*, as described in Section 4.1.1.2.

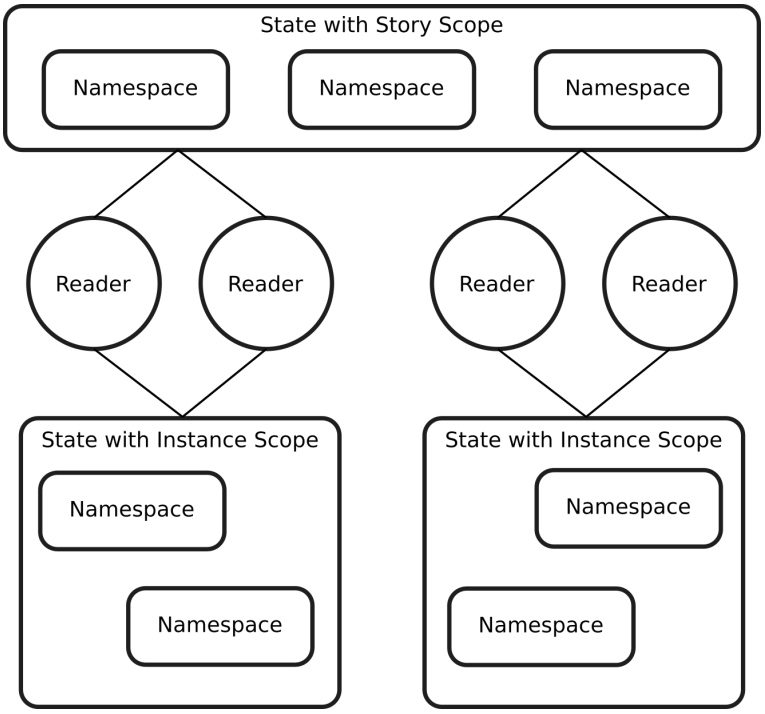

Figure 4.2: Multiplayer StoryPlaces State Model

This leads to the following definitions. A sculptural hypertext consists of nodes, preconditions and actions, which together define all of the possible stories a player may experience. A multiplayer sculptural hypertext consists of sculptural hypertext with story state, instance state and per-player state. Together, these enable the creation of MINEs where inter-player agency only affects the players as they progress through an instance of a narrative, or where inter-player agency has fundamentally shaped the player's story before they have even begun to play.

4.1.1.4 Example Using Narrative Snippets

Short narrative extracts portraying a scene, event or fragment of a story can be a useful tool for guiding discussion. They provide a shared mental image and a common goal.

In many ways, these narrative snippets are analogous to user stories [6], in that they implicitly capture the intended behaviour of a system and requirements of its user, the author.

Snippet 4.1 presents one such event, describing archaeologists raiding a tomb.

A professor and her assistant have located an ancient tomb in the desert, fabled to contain a long-lost treasure. Clearing away the sand, they find a large stone door blocking their entry. Combining their strength, they heave the stone clear of the doorway and enter the tomb. Inside, they find a single chamber filled with gold and riches. Taking as much as they can carry, they leave the tomb and head back to their vehicle.

Narrative Snippet 4.1: Opening the Tomb

There are a number of ways the author could choose to model this as a multiplayer sculptural hypertext. The first decision they would need to make though would be the granularity of their story. Figure 4.3 shows one possible playthrough. The snippet is carved into several nodes, divided between both players.

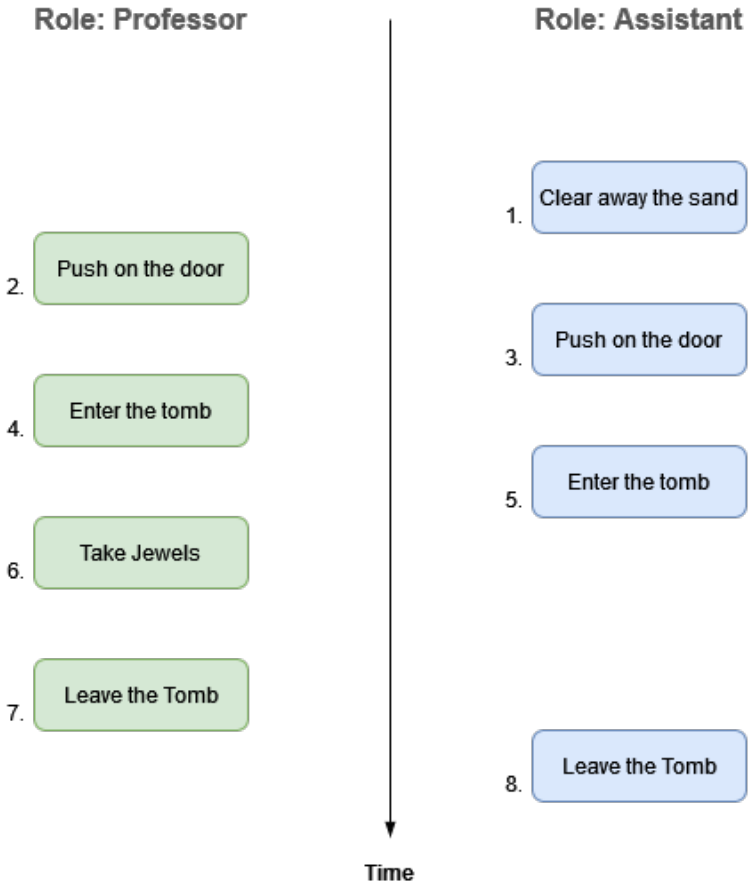

Figure 4.3: Opening the tomb - high granularity playthrough

Figure 4.4 demonstrates a less granular approach, using only 4 nodes with larger amounts of prose per node.

By controlling this granularity, an author can decide the level of the narrative at which actions and interactions take place. They might be at a similar level to game mechanics, where each node is an individual activity of the player's character: "Reload the weapon",

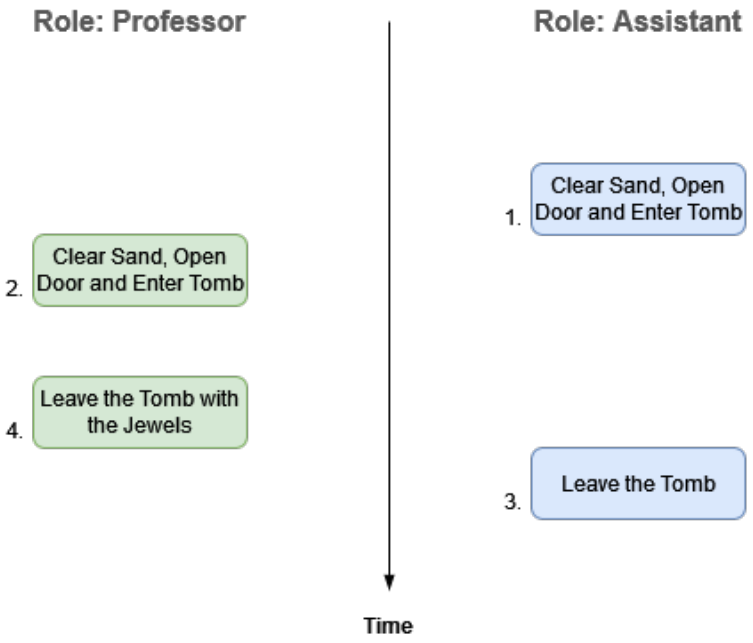

Figure 4.4: Opening the tomb - medium granularity playthrough

"Jump in the air". Alternatively, each node might be equivalent to entire chapters of a novel: "The Heroine's Quests for the Sword", or "The Heroine Investigates a Mysterious Disappearance".

Figure 4.5 shows how the lower granularity example might be translated into a multiplayer sculptural hypertext, using predicates for the state. In addition to the preconditions listed, there is an implicit precondition that restricts the node to either player 1 or player 2.

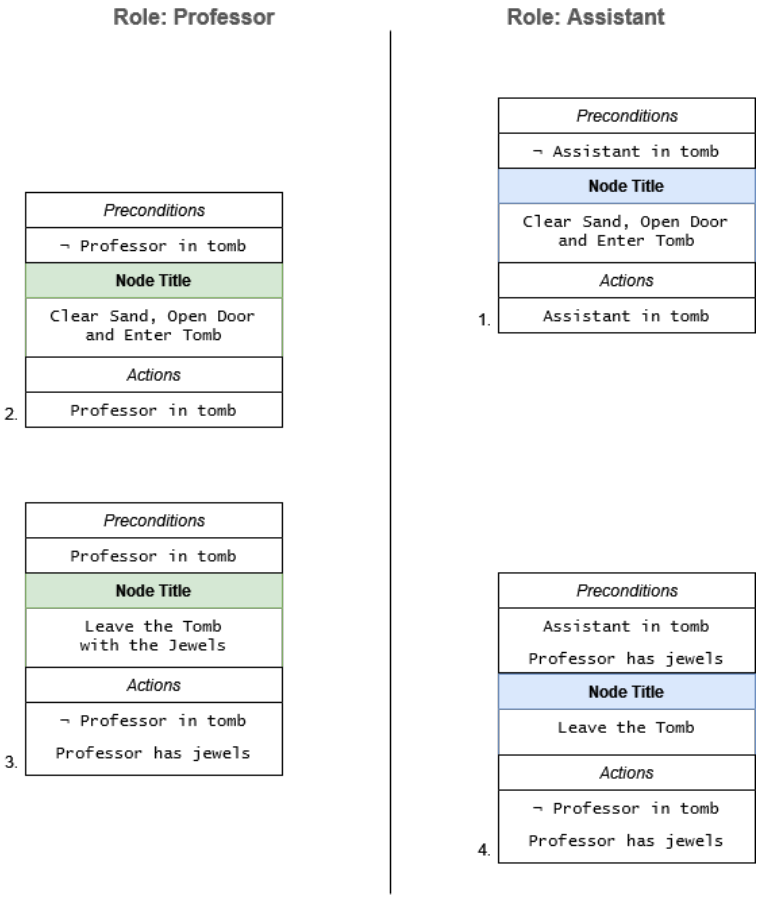

Figure 4.5: Opening the tomb - sculptural hypertext implementation

4.1.2 Additions for Usability

While the previous section has described the additions needed to sculptural hypertext to enable it to support MINEs, two additional elements were added to the model to aid in authoring: roles and namespaces.

4.1.2.1 Multiplayer Differentiability using Roles

Roles are identifiers defined by the author and uniquely assigned to each player. The available nodes can be restricted by specifying a player's role as a precondition on certain nodes. As this role differs between players, each player receives a different set of nodes.

In addition to this, roles are intended to simplify authoring by representing the individual narrative threads experienced by each player; in snippet 4.1, the two roles may be professor and assistant. This should make it easier for authors to build a consistent narrative for each player.

Namespaces With the role-based approach to *multiplayer differentiability*, various nodes may need to be duplicated. Consider snippet 4.1, in which there might be a node "Look around the tomb" that requires the player to be inside the tomb. This would require a node each for both professor and assistant, each with preconditions checking whether that player was inside the tomb. Instead, if the same precondition could evaluate differently for each role, then the same node could be reused.

To achieve both of these properties, both instance state and story state are subdivided into named containers called 'namespaces'. Each role has an associated namespace, storing state associated with that role. Nodes can then be made generic by allowing preconditions to access this role-specific state using a common identifier.

In addition to these role-specific namespaces, authors may also define their own in order to assist them in conceptually grouping state, as can be seen in figure 4.2. While this may help with authoring, it also provides information for use when authoring or analysing narratives.

4.1.3 Implementation

One of the major issues with existing literature on multiplayer interactive narratives is that they do not provide any details about the implementation of their systems, making it hard to replicate their results or re-implement their designs in further explore its possibilities.

The following section describes how the model was implemented within the StoryPlaces platform[40], with the aim of enabling future researchers to further explore multiplayer sculptural hypertext without the need to reinvent the wheel.

The StoryPlaces[3] project was a collaboration between Computer Scientists and English Scholars for the purposes of exploring the poetics of location-based narrative. The project resulted in a web-based platform for the telling of location-based narratives using sculptural hypertext.

Rather than creating a sculptural hypertext engine from scratch for this work, the StoryPlaces platform was extended to support multiplayer narratives. This avoided the need to re-create existing components, while also demonstrating that the multiplayer narrative model is a superset of sculptural hypertext through full backwards compatibility.

4.1.3.1 StoryPlaces Overview

The StoryPlaces platform is made up of three core components: the Reading tool, Server and Authoring tool. The Reading tool is a single-page web application built on the

[3] storyplaces.soton.ac.uk

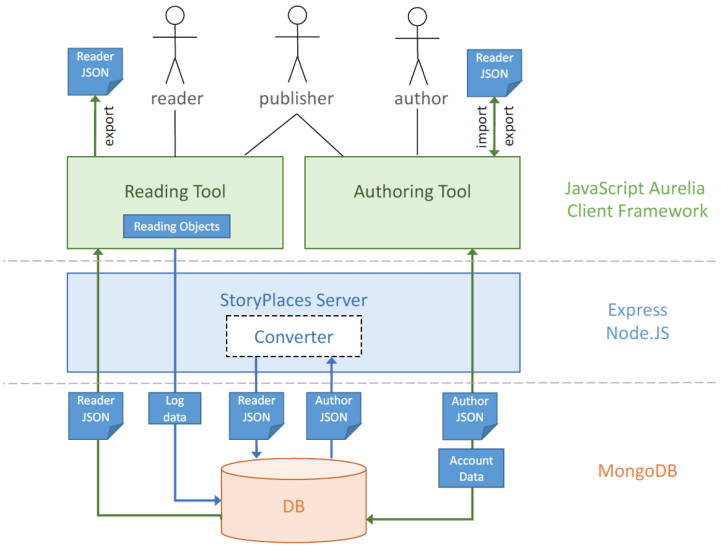

Figure 4.6: StoryPlaces Architecture, User Interaction and Data Flow [40]

Aurelia framework[4] that implements the user-interface and sculptural hypertext engine. The server acts as a host, data store and content validator [40], serving the reading tool to browsers, storing the story templates and backing up player progress. The authoring tool features story creation, editing and management but is out of scope of this work.

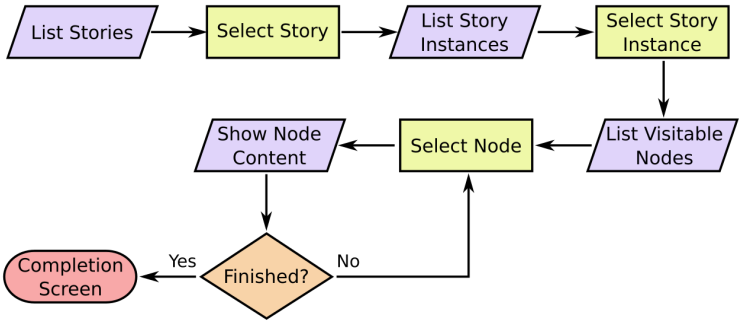

Figure 4.7: StoryPlaces User Flow

Figure 4.7 demonstrates the StoryPlaces workflow. When StoryPlaces is opened in a browser, the system retrieves all available stories from the server and displays them to the user. On selecting a story, all of the story instances associated with that user are retrieved from the server and displayed. As in the model, instances are a combination of a story and state, though the instance's player is also stored. A user may select an existing instance, or create a new one. When the user chooses an instance, the sculptural hypertext engine takes over. The engine presents the user with a list of available nodes and map with markers any location-aware nodes. Selecting a node displays the node's content to the user and triggers its actions, updating the hypertext's state. This state is then backed up to the server, so the player can resume the story at a later date. At

[4]https://aurelia.io/ - Accessed 2018/05/31

the end of the story, the user is taken to a completion screen, then returned to the story list.

A few differences exist in the multiplayer system. Instances may have 1 or more players, with other players able to join later. Therefore the system displays all non-finished instances of a particular story, allowing the player to select one to join. Any further restrictions, such as a maximum number of players, are handled within the hypertext. Once a player has selected an instance and entered the hypertext, the user-facing workflow is the same, although state changes are synchronized between all players of the current instance and the server.

Behind the scenes, there are more significant changes. In order to fully support multiplayer sculptural hypertext, the system must support both instance and story states, each subdivided into namespaces. These states must be synchronised across all players. The system must also support roles that uniquely identify a player and allow those roles to access a "this" namespace, local to the role.

4.1.3.2 Multiplayer State Model

Originally, state in the Storyplaces client was stored as a set of named variables associated with a story instance, forming a key-value store. The multiplayer system instead uses scopes: one for the story state and one for the instance state. These scopes consist of namespaces, which consist of variables. Together, these three tiers create a (key, key, key)-value store of scope name, namespace name and variable name. This triad of keys is termed the *variable reference* and uniquely defines the location of a variable. Objects which can access state, such as scopes and namespaces, implement a *variable accessor* interface which defines two operations: get and save. These operations retrieve data from or save data to the location specified by a *variable reference*. This allows a great deal of flexibility when considering alternative types of scope and namespace in the future.

For a given story instance, all state is accessed through a single root object: the synchronized state container. This container is itself a *variable accessor* and encapsulates both story and instance scopes, augmenting them with synchronisation between the client and the server. It does this in two ways: updating the local state with the server state and updating the server with the local state whenever it's modified.

The local state is kept up to date by retrieving the state from the server at a set interval. The server is treated as a canonical data source, overwriting the entire local state on each update, provided it is more recent than the local copy; this prevents old copies delayed due to network traffic from reverting the story state. The recency of a scope is measured by a version number, incremented every time the state on the server is successfully updated. With this technique alone, it's possible for two differing states to

have the same version number, causing updates from the server to be ignored. This is resolved by the pushing mechanism.

Whenever local state is modified by a node's actions, the client attempts to push it to the server. The user is prevented from making further choices, the polling for updates is stopped, and the state is serialized as JSON and sent to the server. In order for this pushing to be correct, it needs to maintain some of the underlying assumptions of sculptural hypertext. First, transitioning between nodes occurs sequentially; i.e there is a strict, total ordering on transitions. To examine why this is necessary, consider two players who select nodes simultaneously. The first player's node locks a door. The second player's node opens that door, with the precondition it is unlocked. If these events occur simultaneously, the second player finds themselves opening the door, despite it being locked. In a strict, totally ordered system this isn't an issue, as the second player's node becomes unavailable once the door is locked. The second assumption is that visiting a node and triggering its actions must be atomic: all of the actions must be performed, or none of them.

To guarantee these assumptions, the system implements a form of compare-and-swap [43] when pushing updates. Each scope is given a version number and a hash. During a push, the current state of each scope, along with a hash of its previous state, are sent to the server. The server compares this hash with the hash of that scope's current state on the server. On a match, the server increments the scope's version number, hashes the scope's state and saves it, before returning the server's state to the client. If the match fails, the current state of the server is returned to the client, and the client begins conflict resolution.

To resolve conflicts, the client first replaces the local state with the state returned by the server. The client then attempts to replay the last node navigated to by the user, if that node is available. If this replaying succeeds, the client attempts another push. If either the second push or replay fail, the client adopts the current state of the server, the user interface is updated and the user left to make a new choice.

One limitation of this resolution mechanism is it doesn't give the user the option of selecting a new node that may have opened, as a result of changes by other clients. This could be mitigated by detecting this situation in the future, and avoiding re-applying the user's previous choice.

4.1.3.3 Role Assignment

As discussed in section 4.1.2.1, roles are a mechanism to distinguish between players, allowing node conditions to target different individuals. The system doesn't provide a role-selection tool by itself, instead providing the action *SetRole* and condition *IsRole* to

the hypertext. This allows the author the freedom to integrate role selection into their story, in addition to enabling role changes as the story progresses.

However, in order to ensure the "this" pseudo-namespace functions correctly, each player is provided with an anonymous namespace on joining the story instance. This temporary namespace cannot be referenced, except with the "this" keyword, and cannot be returned to once a role is assigned.

4.1.3.4 Schema

```
{
    "conditions": [
          "id": "rope_thrown",
          "type": "check",
          "variable": {
            "scope": "shared",
            "namespace": "tomb",
            "variable": "rope_thrown"
          }
    ],
    "pages": [
        {
          "id": "Role Selection - Helper",
          "hint": {
            "direction": "I want to be the helper",
            "locations": []
          },
          "name": "Be the Helper",
          "pageTransition": "next",
          "conditions": [
            "no_role",
            "no_helper"
          ],
          "functions": [
            "assign_helper_role",
            "mark_helper_taken"
          ],
          "contentRef": "ChooseHelper"
        }
    ],
    "content": {
        "ChooseHelper": "...Content goes here..."
    },
    "roles": [
        {
          "id": "Helper"
        },
        {
          "id": "Explorer"
        }
    ]
}
```

Figure 4.8: An Extract of a Multiplayer Storyplaces Story

A minimal number of changes to the existing StoryPlaces schema are needed to support multiplayer sculptural hypertext, each of which is demonstrated in figure 4.8.

Firstly, elements of the schema that specify variables may now be Variable References (as defined in Section 4.1.3.2) or strings of characters. Strings are assumed to refer to a variable in the instance state, within the "this" namespace. This assumption enables variables in singleplayer StoryPlaces stories to work as-is.

In order for the *SetRole* and *IsRole* primitives to function correctly, the schema requires a list of roles used within the narrative. However, this restriction may be lifted in future versions, as alternative implementations of these primitives may be possible.

Finally, first-class content was introduced to the schema, to allow node content to be re-used. This reduces duplication, making the story more maintainable for the author. However, this is not specific to multiplayer narratives.

Support has been added to the StoryPlaces schema upgrading tool to re-format StoryPlaces stories for the multiplayer system, allowing older singleplayer narratives to be experienced. This allows for the introduction of possible multiplayer elements into these stories, while demonstrating that multiplayer sculptural hypertext supports a superset of the singleplayer stories.

4.2 Evaluation and Discussion of Model

Chapter 4 presented a extension of the sculptural hypertext model and accompanying platform that combined allow for the creation of multiplayer interactive narrative experience. This system is capable of supporting interactions that exhibit each of the characteristics outlined in chapter 3.

In this section, the system's ability to support these characteristics is demonstrated, followed by a discussion of the system, model and their limitations.

4.2.1 Support for Inter-Player Interaction

Outlined below are each of the characteristics identified in chapter 3, with a short explanation of how each can be demonstrated within the system.

Likelihood. An interaction occurs when an action is taken by one player that results in the current or future choices available to that player changing. An interaction can be *guaranteed* by requiring the recipient to eventually be in a state where the changes to those choices are visible. Any action by the initiator that means the recipient may enter that state, but is not guaranteed to, makes an interaction *possible*.

Interaction type. Informational interactions are achieved by opening up alternative nodes with node content that provides additional information about the story, without changing the future choices otherwise available to the player. By definition, any non-informational interaction is mechanical.

Synchronicity. Interactions are asynchronous by default, not requiring any other player to be online. Use of story scoped state enables asynchronous interaction between instances of the story. Synchronous interactions are achieved by using the *TimePassed* condition to create a window of time in which a node is available, forcing the other player to be online in order to act. Alternatively, progress in the story can be blocked by another player, requiring their active participation to progress.

Feedback and Awareness. Explicit and deductive feedback/awareness are accomplished through the author's use of both node content and hypertext structure. To achieve awareness, the author can include messages on nodes made available through an interaction, informing the interaction's recipient they've been impacted. Visiting this node can make a node available to the initiator, informing them of their effect on another player.

Identifiability. Within an instance, identifiability can be achieved using a similar method to Feedback and Awareness, adding the names of roles or characters to the node content to uniquely identify players. However, there's no means of achieving identifiability between story instances (such as in subsequent retellings) as there's no global identifier associated with players, nor a means to insert dynamic content into nodes.

4.2.2 Evaluation through Exemplar Narrative Segments

Several exemplar narrative segments are presented below that demonstrate one or more of the characteristics identified in chapter 3 using the techniques outlined above. The structure of these narrative segments is outlined using a graph consisting of *nodes*, *locking relationships* and *unlocking relationships*. An *unlocking relationship* specifies that a node (the dependent) requires another node (the trigger) to have been visited before it is available. A *locking relationship* specifies that the dependent node is unavailable if the trigger node has been visited.

4.2.2.1 Exemplar 1: Guaranteed Likelihood, Awareness and Initiator Identifiability

Exemplar 1 demonstrates an interaction that's guaranteed to occur. By requiring the *adventurer* to pass through the node unlocked by the *king*, the *adventurer* will always

One player is a king, *the other an* adventurer. *The* king *chooses to have a child with the queen, then locks the child in a tower guarded by a dragon, as is tradition in their land. The* adventurer *sets out to find an adventure. The* adventurer *has the option to set out on a quest to save the child, but only after the child has been locked in the tower.*

Narrative Snippet 4.2: The Tower

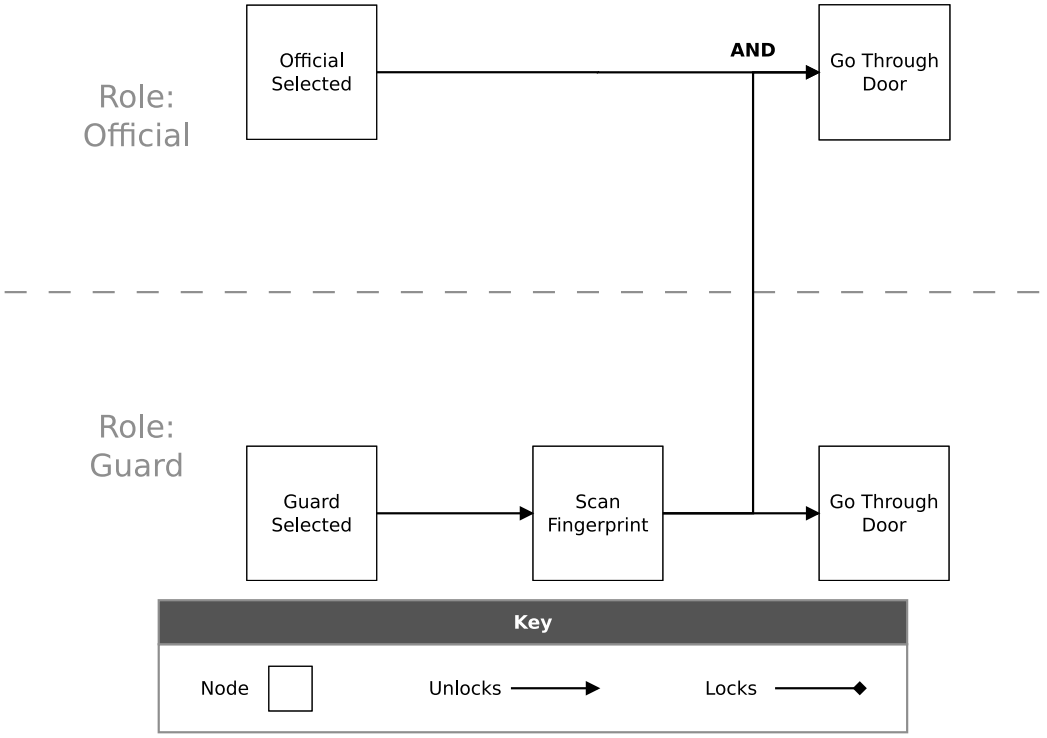

Figure 4.9: Structure of Exemplar 1

experience the interaction. However, overuse of this technique may lead to a poor experience for the *adventurer*, if their narrative is frequently blocked by the other player.

This gating technique [39] can also be used to synchronise players that may be reading at different rates. In this instance, it allows a slow *king* to catch up to a quick-reading *adventurer*, although the same structure could be used in reverse to synchronise both.

In order to achieve explicit awareness, an extra-diegetic message can be added to the content of the "Go Through Door" node, as seen in figure 4.10. By including the name of the initiator's role in this message, the initiator can be uniquely identified.

4.2.2.2 Exemplar 2: Synchronous Interactions

Stories in Multiplayer StoryPlaces are asynchronous by default, allowing players to experience the narrative at their own pace. While the system doesn't force another player

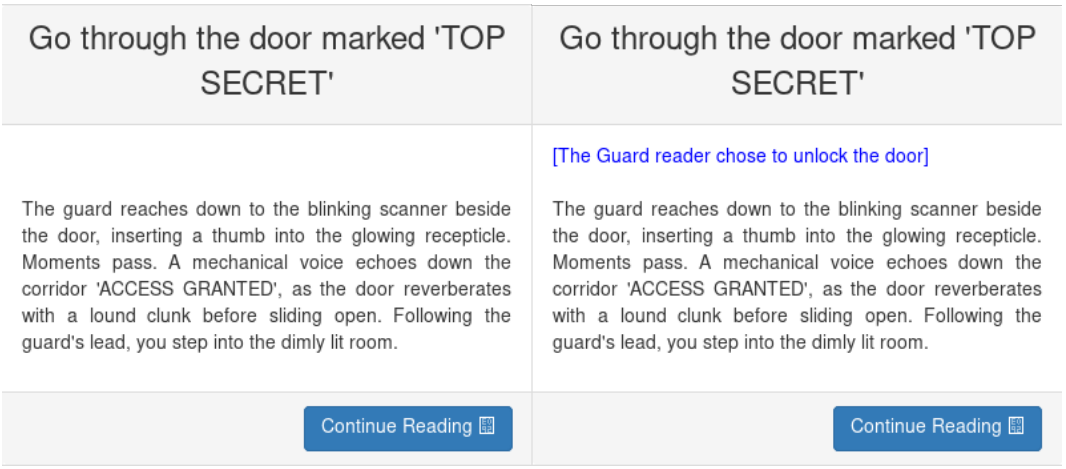

Figure 4.10: Deductive vs Explicit Awareness

The Official *and the* Guard *enter the 'TOP SECRET' room to find the other meeting attendees waiting around a large table that takes up the center of the room. As the* Official *goes to sit down, they knock some precariously perched files off of the table edge. The* Guard *has a short time to catch the files in order to avoid picking them up from the floor.*

Narrative Snippet 4.3: The Meeting - Synchronous Interaction

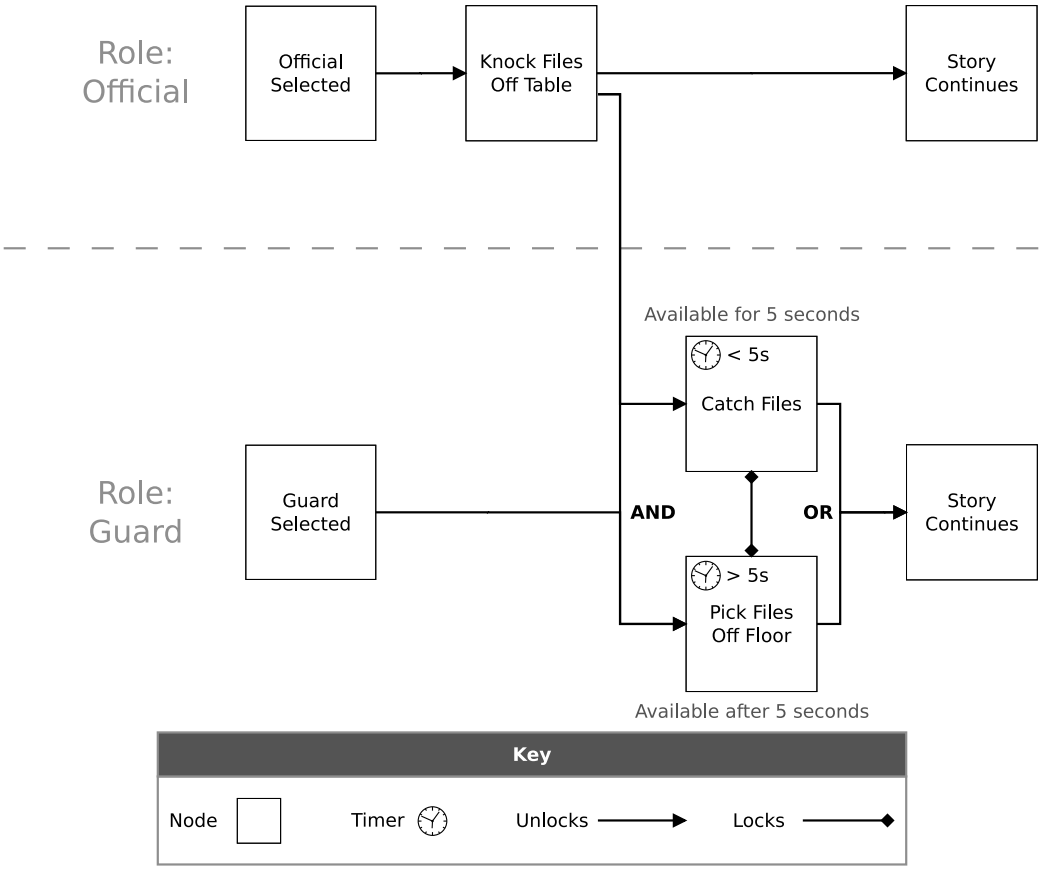

Figure 4.11: Structure of Exemplar 2

to be actively participating, Exemplar 2 demonstrates how a narrative might contain synchronous interactions. When the *Official* in narrative segment 4.3 knocks the files from the desk, a new node is opened up to the *Guard* for 5 seconds, allowing them to catch the files mid-air. This time has to be sufficiently large to account for reading the node's description, in addition to network and system latency.

With this mechanism, the time-limited node may expire before the player is able to view it due to them being too far behind in the narrative. This could be mitigated by frequent use of synchronisation mechanisms, such as the gating used in Exemplar 1.

4.2.2.3 Exemplar 3: Feedback and Information Type

Files in hand, the Guard *places them back down on the table, reading out the title of the top file as they do so. The* Official *either listens to the chairman of the meeting talk, or listens to the guard, gaining the* Guard*'s attention if they do so. Having placed the files back on the table, the* Guard *goes and stands by the door.*

Narrative Snippet 4.4: The Important File - Possible Explicit Feedback

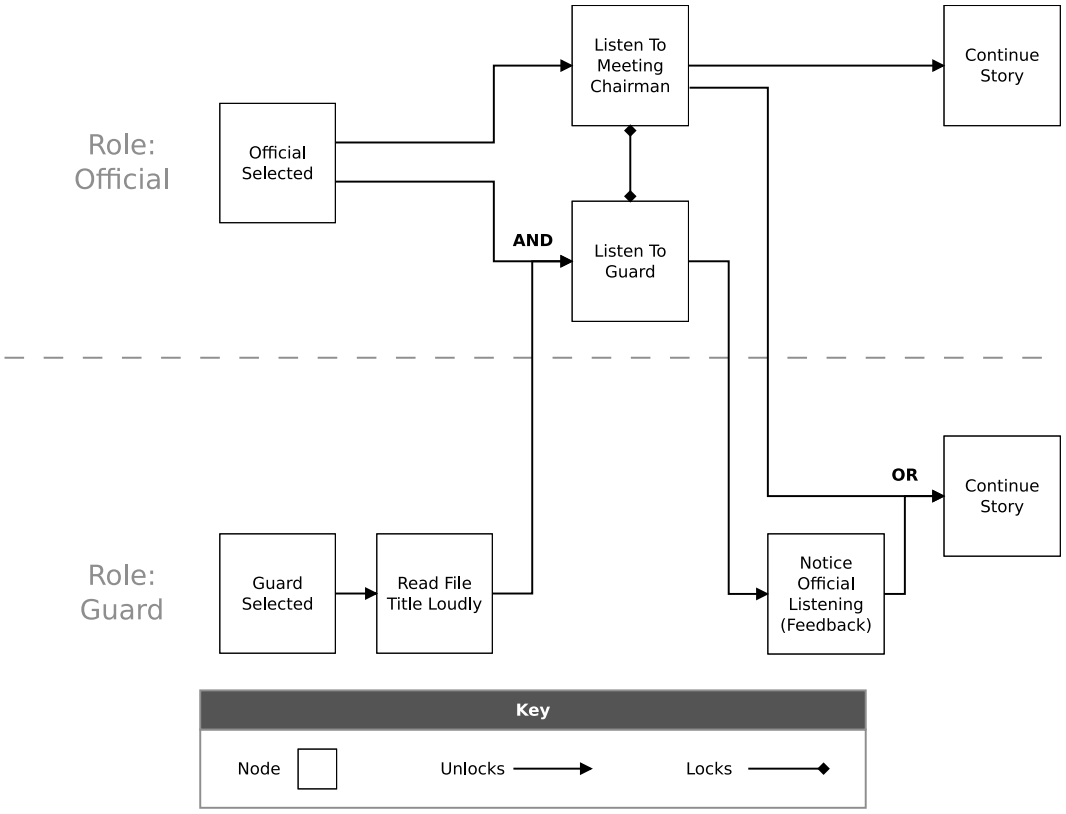

Figure 4.12: Structure of Exemplar 2

Feedback can be provided to the initiator before or after an action. When an action is guaranteed to result in an interaction, the initiator can be informed immediately that

their action will impact another player. However, if the interaction is not guaranteed to happen, feedback can still be achieved by making a new node available to the initiator.

In Exemplar 3, an interaction occurs when the *Guard* creates the opportunity for the *Official* to listen to them. If the *Official* chooses to the listen to the *Guard*, a new node is opened up for the *Guard* which informs them of their impact on the *Official's* narrative, providing *explicit feedback*. However, if the *Official* is presented with the choice but chooses not to listen to the *Guard*, an interaction has still occurred. In this situation, the *Guard* won't receive the feedback. The result is it's only *possible* the *Guard* receives any feedback.

This exemplar also demonstrates an informational interaction. The narrative past this point isn't structurally impacted, however the *Official* is provided with more information which may influence their decisions at a later point.

4.2.3 Discussion

The system represents, to the author's knowledge, the first usable platform for MINEs, providing a basis for future work that explores the possibilities for multiplayer stories. By using a sculptural hypertext model, the system benefits from existing research into authoring [60] and a known ability to support a variety of interactive narratives. When compared with existing models, this the first model that can fully describe both the overall narrative structure and interactions between players.

One consequence of modelling individual interactions and narrative threads is an increase of authorial complexity. Each additional role requires its own narrative and interactions with other roles. This results in a linear increase in author-produced content, and a possible exponential increase in content due to inter-player agency. This increase in interaction count increases both content required and the challenge of reasoning about the narrative.

These increased content requirements are best demonstrated by the example story created in Chapter 5. This story took a few months for a team of 3 people to create and consists of 579 nodes, resulting in a story of around 1 hour. However, much as in singleplayer interactive narratives, these times will vary significantly based on the type of story, number of players and amount of agency afforded to each player.

Adding to the existing authoring challenges are concurrency problems such as starvation and deadlock. If gating is not employed, with one player able to finish the narrative before another, then the second player will be starved of agency over the first. However, if gating is employed the possibility of a deadlock may be increased, where the narrative cannot progress due to a lack of available nodes. The system hands responsibility for these challenges to the author, adding additional authorial complexity.

This increase in authorial complexity is particularly problematic, given authoring remains an open challenge for both sculptural hypertext and interactive narrative.

Scalability is also a challenge for the system presented here. There are limitations in the rate at which state can be changed, due to the need for changes to be shared, atomic and sequential. This is particularly true for persistent state, which is shared between all players of a story, rather than instance. While this challenge is unlikely to be encountered in research deployments, it is unknown whether the model will scale sufficiently to be used with the hundreds or thousands of simultaneous players experienced in many modern games.

4.3 Conclusions

This chapter has presented an extension to the sculptural hypertext narrative model that enables it be used to design MINEs. It described the requirements for a narrative model to be capable of supporting MINEs, and then explained how this extension to sculptural hypertext meets these requirements. An example was then given of a short narrative snippet and how it can be transformed into a set of nodes in a multiplayer sculptural hypertext.

Following this, a high level description was given of StoryMINE: an open-source system implementing this model. This description enables other researchers to not only understand how the system works, but to be able to re-create the system should the need arise and conduct their own research.

The model and system were then connected to the framework described in Chapter 3, with descriptions and examples of how each of the characteristics can be supported within its design. This demonstrated that the model is capable of supporting MINEs.

Finally, the challenges and limitations of the model and system were discussed, particularly emphasising the challenge of increased authorial complexity introduced by additional content requirements and need for inter-player interaction.

However, despite these limitations, this provision of a model and a usable, open-source system enables the creation of publicly readable MINEs. For the first time, this allows for the exploration into the possibilities for multiplayer stories, particularly in terms of structure, poetics and authoring. It is the author's hope this will enable and encourage further research into this novel area of modern storytelling.

Chapter 5

Designing an Experimental MINE

One of the largest challenges facing research into MINEs is the lack of works to analyse. Few works exist that meet the criteria for a MINE: multiplayer differentiability and inter-player agency, and those that do exist are challenging to study, due to unclear structuring and the presence of other game mechanics. In order to understand the impact of the characteristics outlined in Chapter 3, the MINE would also need to vary each characteristic.

In order to remedy this, using a *research through design* approach [101, 100, 30] and the help of two experienced authors, I set out to create a MINE. This goal of this MINE was to allow the exploration of how the narrative experience would be impacted by multiplayer differentiability, inter-player agency and the various interaction characteristics explored earlier in this thesis. With this MINE, we also aimed to create an engaging multiplayer interactive experience, in order to demonstrate some of the narrative possibilities afforded by multiplayer differentiability and inter-player agency.

This chapter outlines the design of that MINE, entitled "Honour Between Thieves", and how both the structure and story are designed to emphasise the multiplayer aspects of the experience. In places, this description is augmented by knowledge gained from running the study as described in chapter 6.

This chapter begins with an overview of the MINE's structure, displayed in figure 5.1. This is followed by a deeper explanation of individual sections and the interaction patterns that are used in them. It then briefly describes areas where the implementation of the MINE differed from the design and the way in which we collaborated on the narrative, before finishing with a description of some of the key design considerations from an authorial perspective.

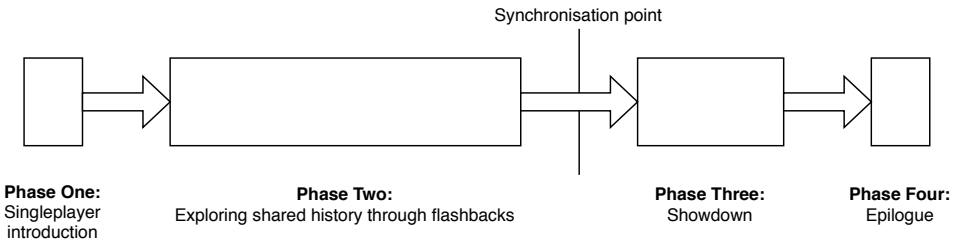

Figure 5.1: An overview of the phases of the experimental MINE.

5.1 Overview

"Honour Between Thieves" is two-player MINE built using the sculptural hypertext engine described in Chapter 4. Each player controls one of the two main characters, Todd and Sarah, both members of a criminal organisation that tasks them with various illicit jobs. The players collaboratively explore the history between the characters, which leads up to a showdown between Todd and Sarah, where the players are tasked with deciding the final path the characters will take.

The MINE is designed to support an accompanying experiment (see Chapter 6), which explores the experiential changes brought about by the interactions with the other player. The story was therefore carved up in two major and two minor phases, each created with different types of interaction in mind. This was done to allow players to contrast their experiences between the different phases and different types of interaction.

Phase one of the story is a brief introduction to the character the player would be controlling. Ideally, this was a short, single-player section of narrative to benchmark the remainder of the narrative experience against. However, this was reduced to a single node for the final experiment in order to reduce the runtime of the experiment. Narratively, it allows the player to understand a little about their character, while also providing context and tone for the story going forward.

Phase two is the first multiplayer section of the story, in which players explore the shared history of the characters. This is presented a selection of flashbacks to each player, in which players are asked to make decisions as to the outcome of each flashback. These flashbacks were focused on exploring the relationship between the characters, with the aim of providing players with the opportunity to collaboratively build that relationship. This phase is focused on providing quasi-asynchronous interaction, in which a synchronous narrative attempts to simulate aspects of an asynchronous experience. Asynchronicity was avoided due to the additional complexity mixing asynchronous and synchronous narrative would have on the playing experience. At the end of phase two is a synchronisation point. Both players must have read everything in phase two, before they can continue to phase three.

Phase three is the second multiplayer section of the story, centred around a tense showdown between the characters. Todd catches Sarah red-handed attempting to leave town, and two characters are left to resolve their situation. This phase consists of a turn-based dialog between the characters, accompanied by a set of always available options that only one player could choose. These options would immediately move the narrative into phase 4, its conclusion. As the players continue down the dialog, new options with alternative endings become available This turn-based structure provides a tightly-synchronous environment, in which players are rapidly interacting and prevented from progressing by the other player.

Phase four is the singleplayer epilogue to the story, that describes the final outcome to each player for their character. This outcome directly follows on from the final decision made by the players in phase 3, and is designed to make the players feel like their shared agency has had dramatic consequences for their character.

The following sections describe each of these phases in more detail.

5.1.1 Phase One - Introduction

Phase one is an entirely singleplayer phase of the narrative, designed to introduce the players to the system and to the story. Players are given time to become familiar with StoryMINE, and understand its user-interface, before being exposed to changes introduced by interaction with the other player.

Narratively, Todd's player experiences an introduction as to how Todd became initially involved with the organisation, while Sarah experiences a a view of present day, with Sarah reflecting on her time with the organisation. This provides a brief introduction to both characters, while presenting players with different contexts in which to situate the rest of the story.

For the experiment, this section of the story was reduced to a single node for both players, as it contained the least relevant aspects of the story to the multiplayer experience.

5.1.2 Phase Two - Exploring the Shared History

The goal of phase two is to present a quasi-asynchronous narrative, with increasing levels of awareness and feedback. It does this through a flashback structure, which seems the players collaboratively build the shared history of their characters.

Phase two consists of twelve flashbacks[1], divided into three scenes of four flashbacks each. Each scene is separated by a present day node, that gradually advances the present-day

[1]For the experiment, the total number of flashbacks was reduced to six, two per scene, due to time constraints. However, the remainder of this section will discuss the narrative in its original form of twelve flashbacks.

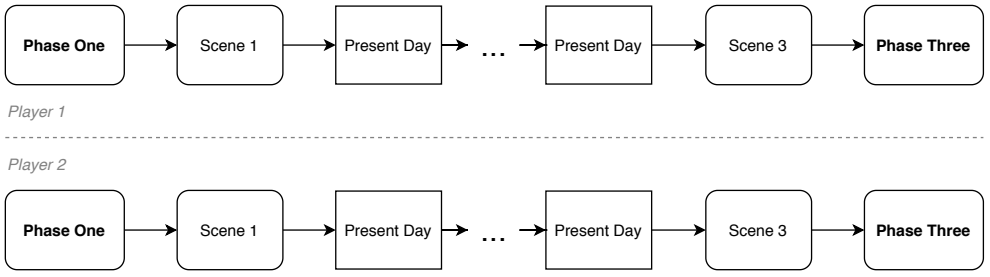

Figure 5.2: An overview of phase two, showing the progression through the scenes

story over the course of the phase, and provides context to the flashbacks. Figure 5.2 shows this alternating structure of scenes and present day nodes.

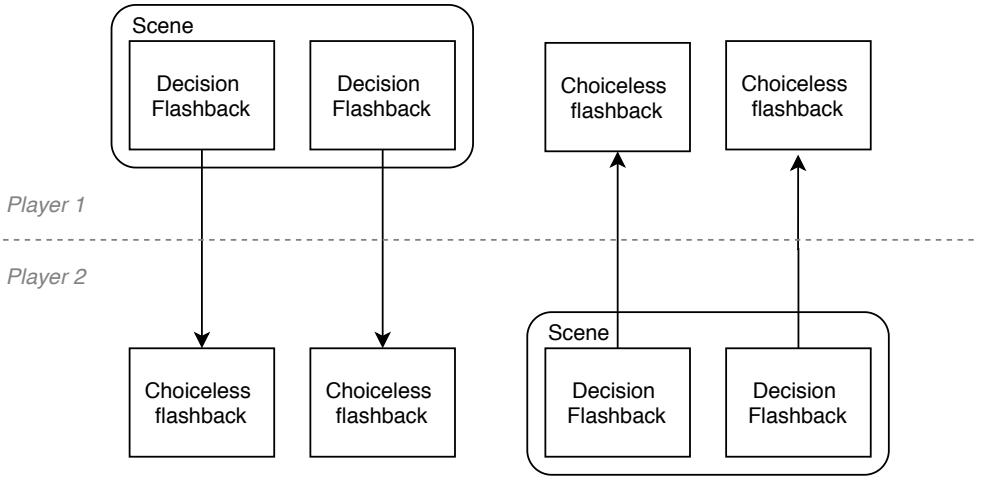

Figure 5.3: An overview of two scenes, one for each player, and how the flashbacks in those scenes unlock flashbacks for the other player.

In each scene, each flashback is assigned to one character or the other; this character is responsible for choosing the outcome of the flashback. The number of flashbacks for each player are equal: two flashbacks are assigned to each character. This is to ensure each player as exactly the same amount of agency in phase two, and to aid deductive awareness and feedback through symmetry. Figure 5.3 displays how the flashbacks fit into each scene, show how an equivalent flashback is unlocked for the other player, after a player reads one of their own flashbacks.

Flashbacks consist of two sections: a preparatory node, followed by a choice. The preparatory node was added quite late in the design process, in order to provide context for the decision the player would be making. The preparatory node would describe the situation, then the player would make a choice based on the title of each choice node and a short, one-line description. Upon making a choice, the player would be presented with the full text of the node.

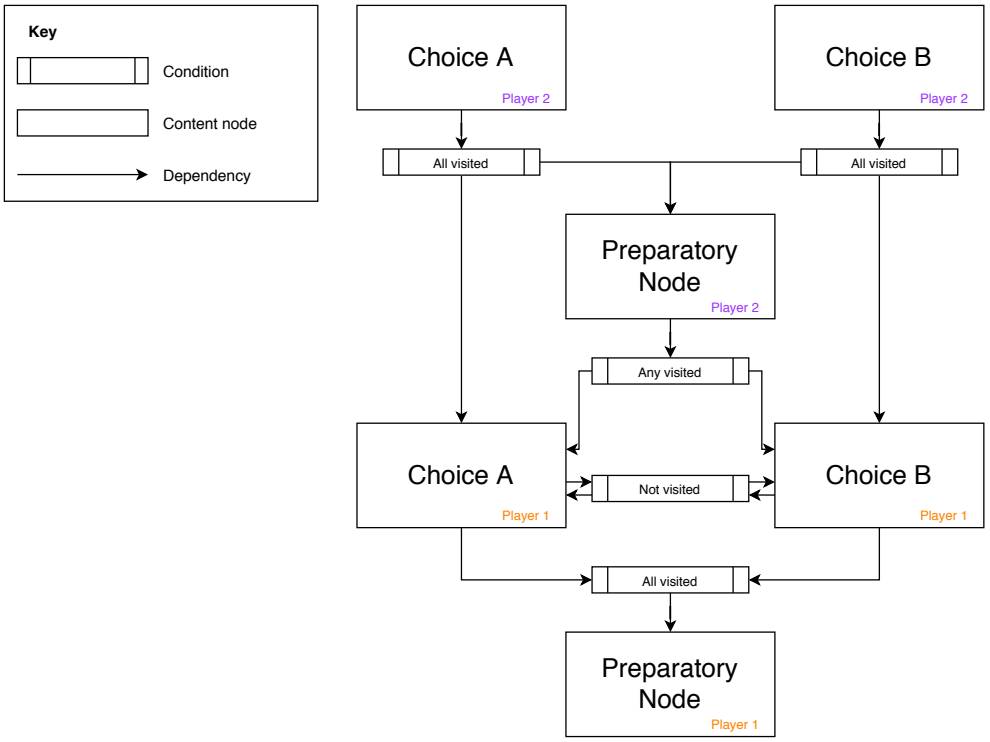

Figure 5.4: The structure of both the decision and choiceless flashbacks.

After a player has read either a preparatory node or a choice node, that node becomes available for the other player to read. This forms the basis of the inter-player interaction in this phase. As each player progresses through their own set of flashbacks, the outcome of those flashbacks become available for the other player to read. Figure 5.4 shows this structure for a single flashback. Player 1 initially reads a preparatory node, unlocking choices A and B. Once the player has made their choice, the preparatory node is unlocked for the other player. Once the other player has read their preparatory node, they can read the choice made by the first player. In this diagram, it assumed each node can be read only once.

Awareness and feedback are carefully controlled throughout phase two. Scene one has only deductive awareness and feedback, through watching new nodes open up, and the symmetry of the interaction model. Scene two has explicit awareness, with nodes that have been opened up by the other player marked with blue text, stating "The other player made this decision". However, this meant that the player would only be able to know that the appearance of that node was due to the other player once they had selected it. This could cause a delay between the interaction happening, and the user becoming aware that it's an interaction. While this potentially denied the player from focusing on choices the other player had made, this delayed awareness may be more representative of an asynchronous narrative.

The final scene has explicit feedback: a new option appears for the player when the other player has read the node associated with one of their choices. This option explicitly

informs the player that the other player has read that node in no uncertain terms, with the title of the new option being "The other player has read a page". This makes it likely that the player would receive the feedback next time they read the list of options. An alternative approach to achieving explicit feedback would have been to make the player aware that their decision would affect the other player before they made it, by including a message in the initial description of the choice. While this would change the feedback from occurring after it has affected the other player to before, as the other player wouldn't have yet read the node, it would allow the player to incorporate feedback into their decision-making.

The delays in awareness and feedback were combined with the ability to progress through the narrative at a player's own pace in an attempt to simulate aspects of an asynchronous experience. However, this experience is only quasi-asynchronous, as players are engaging with the narrative and the other player at the same time, and able to witness the changes each is performing on the other's narrative. The aim of this quasi-asynchronous experience was to gain some insight into an asynchronous experience, without significantly increasing the complexity of the narrative or exceeding the bounds of planned study.

In practice, this quasi-asynchronous experience comes to an abrupt end if one player is substantially further ahead than the other, as that player will exhaust all of their available nodes in phase 2, except for those locked behind the other player's decisions. This results in a highly synchronous waiting period, discussed further in Chapter 6. The challenges raised by reading speed, and potential mitigations, are discussed further in section 5.3.

Once both players have completed all of the available flashbacks and present-day nodes, both players were provided a single node that advanced them to phase three: the showdown.

5.1.3 Phase Three - The Showdown

The goal of phase 3 is to present a tightly synchronous narrative, with clear awareness and feedback for each interaction, with a view to exploring the multiplayer interactive narrative experience when the presence of the other player is clear.

It achieves this by instigating a conversation between the two players in the form of a branching conversation tree. We chose a conversation tree as it's a common mechanic found in both video games and interactive narrative. However, to the best of our knowledge this style of multiplayer conversation tree hadn't been explored, and neither myself nor the other authors had encountered one before. This suggested it would be an interesting avenue to explore, both due to its novelty and its grounding in a well-known mechanic.

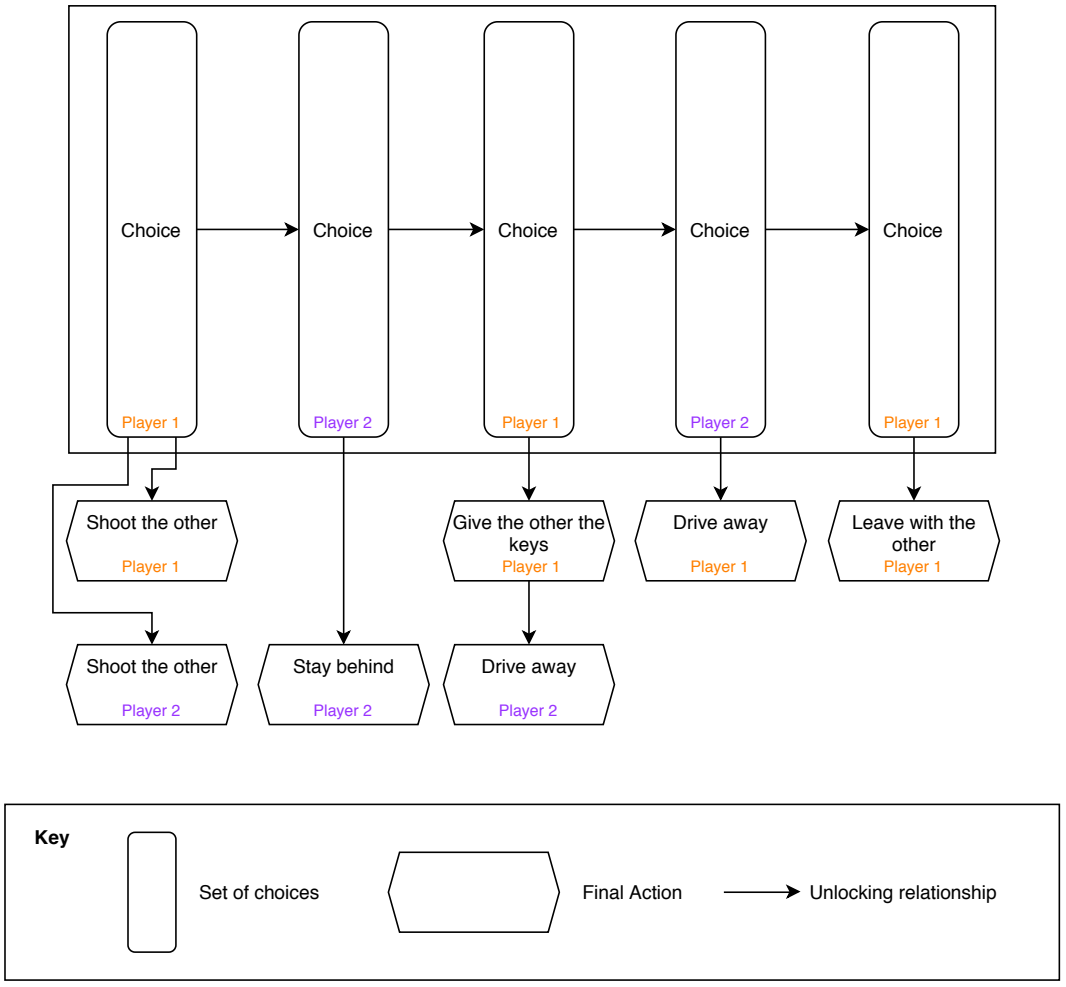

Figure 5.5: The overall structure of phase three, showing both alternating choices and the unlocking of ‘’final actions’.

The conversation tree used is turn based: on their turn, players are presented with a number of sentences for their character to say. Each sentence will advance the dialog and allow the other player to speak. When it isn't a player's turn, they have an option available that states “Todd/Sarah is thinking about what to say. Sarah/Todd will be able to speak once Todd/Sarah has spoken.”.

By progressing through the dialog, a number of other options are unlocked which are different for both players. These ‘final actions’ are always available, even on the other player's turn, and immediately end the conversation. Each choice is prefixed with “¿ Make a decision”, to make it distinct from the standard dialog choices and emphasise that these choices are likely to impactful. See figure 5.5 for when each choice is unlocked. More friendly options that lead to more positive outcomes are present later in the conversation, to reward players for cooperating. The first two choices are provided at exactly the same time, as during initial testing of the narrative, it was found that providing only a single option lead to players clicking it immediately, due to not being aware of the existence of other possibilities.

On making a choice, all other options are removed for the other player, with the outcome of the choice remaining as the only available node. This choice explains the outcome of the other player's actions, and leads on to the epilogue.

Figure 5.5 displays this structure visually. The players alternate between making choices in the conversation tree, while new 'final actions' are periodically unlocked, the further they progress through the tree.

The narrative goal of phase three was to present a tense situation to the players, that would test the relationship formed over the course of phase two. Both players were capable of ending the narrative at any point, making the decision to not take action inherently rely on the player's trust in their relationship with the other player. This was exacerbated by giving both players the option to shoot the other almost immediately. We made the choice not to grant the players that option at the very beginning of phase three, to prevent the players from choosing it before the conversation had begun and they had intuited the structure of the phase.

This section of the narrative is structurally different to phase two in a couple of ways. The most obvious being the tightly synchronous experience created by the turn-based structure. This results in players being fixed at the exact same point in the narrative at all times, while the "thinking" option provides frequent reminders of the other player's presence. The decision nodes are designed to work in tandem with the turn-based structure, tempting the player while they're waiting for their turn. This is also why the player has nothing else to do while waiting: to emphasise their lack of control, and the continued risk of waiting on the other player.

The second major difference is that all of the interactions presented are *mechanical*, with effects that change the future conversation tree. This is in contrast to the *informational* interactions in phase two, which were entirely standalone, having no direct impact on any of the options that will be available in the future. As was predicted, this higher degree of agency caused a substantial increase in the number of nodes required, which was mitigated by reusing sections of the conversation as end points for several branches; a practice which is similar to a combination of the sieve and split/join patterns from calligraphic hypertext [8]. Though in many ways, the entire structure of phase three is similar to the counterpoint pattern, in which the narrative switches between two viewpoints. However, here two players fill the roles.

Awareness and feedback are primarily achieved deductively through the symmetrical design of this phase: the amount and type of agency was identical for both players, allowing for easy deductive awareness and feedback. This is combined with the logical structure of the conversation: the player says a line, the other character thinks, then the other character says a line.

5.1.4 Phase Four - Epilogue

The epilogue serves as the conclusion to the story, displayed after one the players makes the final choice. Each decision has two nodes associated with it, one shown to each player from their own character's point of view. These nodes resolve the present day situation for their respective character characters, and hopefully serve as a satisfying end to the narrative.

5.1.5 Implementation Differences

While the above sections describe the narrative as it was designed, an issue exists within the implementation in StoryMINE that manifested during the study in Chapter 6.

During phase two, awareness and feedback are gradually increased through explicit messages added to nodes in scenes two and three. However, in the implementation, once a flashback was visited by the player, it appeared immediately for the other player. While this isn't an issue if the players are progressing at roughly the same rate, if one player is progressing significantly faster than the other, flashbacks for later scenes can intrude on earlier ones. For example, in one player is in scene three and reads a flashback, that may appear to the other player in scene one. This means that awareness and feedback aren't guaranteed to increase over the course of phase two, although it remains likely.

5.2 Implementation in StoryMINE

The design described above was implemented into StoryMINE, the system for MINEs described in Chapter 4. The resulting story had 30 flashback nodes (10 preparatory nodes, 20 choice nodes), 286 conversation nodes, 13 introduction nodes and 10 epilogue nodes. There were additional supporting nodes necessary for the experiment or to maintain the flow of the narrative, such as the nodes during the finale stating ""Sarah is waiting for Todd to speak", or to implement character selection at the start. In terms of prose, the story was approximately 7000 words long, and typically takes 40-60 minutes to read.

In order to reduce the authorial complexity discussed in Chapter 4, a custom domain specific language was created that supported reuse of uncommon patterns found within the structure (for more on uncommon patterns, see appendix A).

The resulting story could be accessed using the StoryMINE web interface. There, a player would be able to access an instance of the story, select a character, and begin playing. During play, the player would alternate between a choice view showing all of the available nodes (Figure 5.6) and a node view showing the title and content of the current node (Figure 5.7).

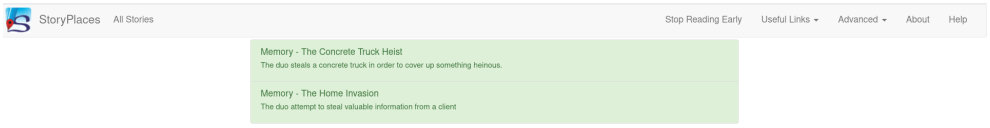

Figure 5.6: A player's view of the StoryMINE choice screen.

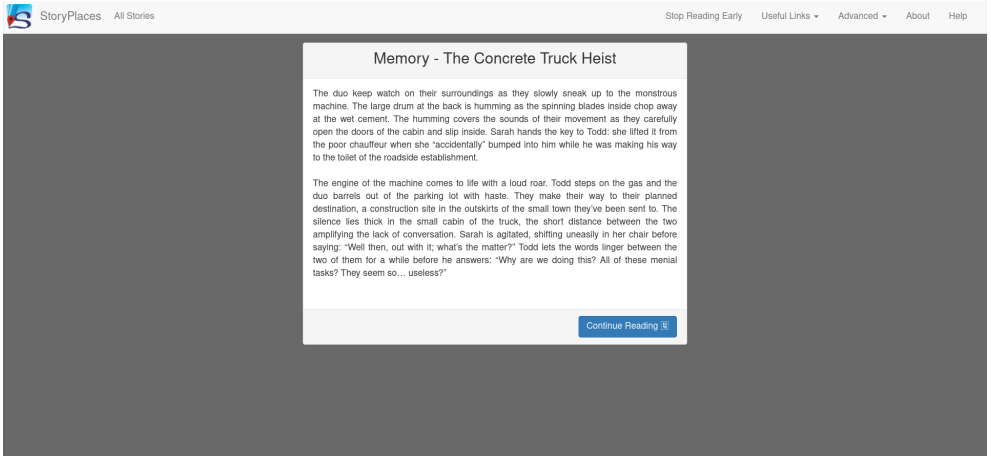

Figure 5.7: A player's view of the StoryMINE node content screen.

5.3 Design Considerations for MINEs

Over the course of creating the MINE, we were faced with a number of design challenges and decisions unique to multiplayer interactive narratives. This section describes these challenges, and the approach we took towards solving them.

5.3.1 Agency Theft

Inter-player agency, the ability to alter the other player's narrative, is a key aspect of any MINE. However, it's possible for inter-player agency to alter the *amount* of agency another player has. For example, if either player can make a decision that locks off a decision for the other player, then one player has reduced the agency of the other. When designing the narrative we defined this as *agency theft*, based on the premise that the faster reader might race ahead a 'steal' all of the agency for themselves, leaving the other player with a significantly reduced experience.

In particular, we considered that a player that has a significant number of decisions locked by the other player may be dissatisfied with the experience, or feel negatively about their interactions with the other player - ideally, we wanted players of the narrative to enjoy their experience.

To combat this in "Honour Between Thieves", we made sure all agency in the narrative was 'additive': it only ever adds options for the other player, expanding their agency. The sole exception to this rule is the final decision in the narrative, which was positioned as a type of prisoner's dilemma. In that case, we deliberately used agency theft as a narrative device, in order to have the players experience tension through the constant risk of being deprived that final choice.

5.3.2 Narrative Synchronisation

The rate at which a player progresses through phases one and two of "Honour Between Thieves" is determined solely by the speed at which they read, and the speed with which they make choices. This poses the potential problem of long wait times, as the narrative re-synchronises at the end of phase two. A player might be waiting for several minutes for the other player to catch up, depending on their relative reading speeds.

While we chose to leave this in as an interesting aspect of the multiplayer experience to be investigated, we considered mitigating this issue using *delay blocks*. These are a non-jarring way to slow down the player that is currently ahead in the narrative, by placing additional, non-essential nodes along the critical path that their narrative takes. This way, in order to reach the end of phase two, the fastest reader would have to read more content, and therefore the two players would finish at roughly the same time.

However, this mechanism has the drawback of requiring additional non-essential content to fill this gap. Not only is this extra work for the author, but the non-essential content needs to be interesting enough to feel like an important part of the story, rather than the temporal padding that it actually is.

5.3.3 Interaction Ordering

Interaction ordering is something that was briefly discussed in implementation differences (section 5.1.5). It refers to the idea that when player is given more freedom to explore the narrative in the order of their choosing, inevitably it changes the order in which interactions occur with the other player. This has potential repercussions in their story. For example, if a plot detail is revealed early due to an interaction, that was intended as a twist later in the narrative. This suggests that creating a satisfying story with a clear dramatic arc may be challenging in the presence of large numbers of interaction, or large amounts of player freedom in navigating the story.

As the implementation differences section shows, this wasn't something that we fully anticipated in our narrative, and as such no real mitigation was put in place. One option may be to force interactions that depend on a specific amount of progress to only become available after all players have progressed sufficiently, but this may not be true at the point where the interaction is required. Further research into mitigations is required.

5.3.4 Branching Complexity

As predicted, the two player narrative was prone to significant branching due to changes occurring in both narratives whenever an interaction occurred. This resulted in additional complexity (particularly during phase three) and increased content requirements.

The first mitigation used was to adopt a third person perspective for the narrative's prose. This allowed re-use of much of the prose between both players, reducing the additional content requirements incurred by having multiplayer players.

During phase two, the potential for increased complexity was mitigated by focusing the narrative on the relationship between the characters, with choices designed to affect the player and their future choices rather than the fabula as authored.

During phase three, a partial mitigation was applied by constructing the conversation graph recursively, with small, self-contained sections that then lead into other self-contained sections. Sections were frequently linked to from several other sections, to maximise reuse.

Another technique employed was that of exploiting uncommon patterns[86], which are patterns that are repeatedly re-used within a narrative, but aren't generally applicable outside of that scope. Support for these was added to the authoring tool used to create "Honour Among Thieves", which reduced the amount of effort needed to create the structure of the narrative, although the amount of content required remained the same.

Overall, the structural complexity and overall quantity of content remain outstanding challenges for authored interactive multiplayer narratives.

5.3.5 Exploiting the Player

One concept that we frequently attempted to use within the narrative's design is "exploiting the player". This means attempting to use the other player to full effect. For example, as mentioned in section 5.3.4, we attempted to use actions that manipulated the players feelings and opinions towards the other character, in order to minimise the amount of branching (and therefore content required) early in the narrative.

In addition to this, we adopted a philosophy of "the player knows best", which was an assumption that the players will always the choice that most appeals to them in any given situation. This was emphasised in phase three, where the other player responded to every action taken by the first, in the hopes of creating a highly engaging narrative.

5.4 Conclusions

This chapter has presented a detailed description of an experimental MINE designed to explore the impact that another player with inter-player agency has on the narrative experience; the MINE features a range of interactions with variations of the characteristics described in the framework from Chapter 3.

It further describes several design considerations that arose during the authoring process that are specific to multiplayer interactive narrative, and the ways in which those design considerations were addressed.

Overall, this chapter presents two contributions to the field of interactive narrative research: a two player multiplayer interactive narrative experience and a set of design considerations for future authors of MINEs.

These design considerations, arising from reflection on the design and authoring process, have the potential to help guide future authors in MINEs in creating engaging interactive experiences while avoiding potential pitfalls. It provides authors with an opportunity to consider the impact of phenomena such as "Agency Theft" prior to the design of their work, and either mitigate it, or even deliberately introduce it into their narrative to amplify some dramatic effect.

The MINE itself, "Honour Between Thieves", as a product of design research, is an informal representation of design knowledge[15]. It is a demonstration of how sculptural hypertext can support multiplayer narratives with multiplayer differentiability and inter-player agency. It's a tool for future researchers to explore the experiential ramifications of MINEs, of how the combination of multiplayer differentiability and inter-player agency affect the dramatic experience. It's a chance to future authors to understand techniques for creating inter-player agency in sculptural hypertext, and for engaging with the characteristics from Chapter 3.

But I think most importantly, "Honour Among Thieves" is a chance to imbue authors and researchers with an understanding of the new possibilities for storytelling enabled by the new and emerging medium that is the multiplayer interactive narrative experience.

Chapter 6 continues this train of thought, exploring the ways in which inter-player interaction has substantially altered the experience of reading interaction narrative.

Chapter 6

Exploring the Impact of Multiple Players on Interactive Narrative

In Chapter 3, I outlined a framework for understanding different types of interactions in multiplayer games. Chapter 4 explained how a Sculptural Hypertext engine could be extended to support these types of player interactions. Following on from this work, Chapter 5 described the design of a MINE that explores those interaction types and its implementation in a sculptural hypertext system.

In this Chapter, I look at answering the fourth research question: "What impact do inter-player interactions have on players' experience of interactive narrative?". This question implies a broader, and perhaps more important question: Are multiplayer interactive narrative experiences worth further study?

In order to answer this question, I conducted an exploratory study with the goal of gaining a broad overview of the experiential changes brought about by the presence of the other player, and the aspects of the narrative's design that worked to facilitate those changes in experience. The ethics approval for this study is filed under reference ERGO/FEPS/52442.

The study asked pairs of participants to play through the experimental MINE described in Chapter 5 and then discuss their experiences during a semi-structured interview.

22 participants took part in the study, producing approximately 46000 words of interview transcript, with slightly fewer than 300 tagged areas of interest.

Analysis of these interviews produced five themes which impact the player's narrative experience four supporting factors that modify the impact of these themes. I then infer the relationships between these themes and the interaction characteristics from Chapter 3, and further conjecture about other ways MINEs are distinct from singleplayer interactive narratives.

6.1 Methodology

6.1.1 Participants

The participants for this study were volunteers that expressed an interest in taking part. Any participants over 18 years of age were permitted to be part of the study, although differing levels of experience with interactive narrative were sought after. Participants were selected to ensure a range of relationships were represented, from complete strangers to close friends. This ensures the data reflects a range of different experiences.

Overall, 22 participants took part in the study, with 2 participants per session. 6 pairs of participants had a pre-existing relationship to each other, while 5 pairs had not met prior to the experiment. 17 participants had experienced a form of interactive narrative[1] before, on multiple occasions. 5 participants had limited[2] or no prior exposure to interactive narrative.

6.1.2 Procedure

At the beginning of each session, participants were taken into the same room and briefly introduced, if they hadn't previously met. This was done with the intention of making it clear to the participants that the experience would be multiplayer, in order to increase the chances of the multiplayer elements of the narrative affecting the participants' experiences.

In order to remove the effect of physical co-presence on the narrative experience, participants were then separated, and placed at separate computers in different rooms. These computers were preloaded with the interactive narrative, and participants were assigned a character at random.

Once both participants were ready, they were informed that they could begin playing through the narrative. Each player was informed no more than 30 seconds after the other player, in order to ensure that at the start of the experiment, both players would be synchronised at approximately the same point in the narrative. This was intended to keep any results relating to *synchronicity* and the players' experiences comparable.

During the experiment both participants were observed in turn, alternating between them every few minutes. Participants were permitted to ask questions in case they ran into issues, although questions regarding the narrative, other participant or functioning of the system were not answered, in order to avoid influencing the study.

[1] These included, but were not limited to, massively multiplayer online role-playing games, narrative-oriented video games and Choose Your Own Adventure books.

[2] Participants characterised as having limited experience claimed to have interacted with no more than one interactive narrative in recent memory

After both participants had completed the narrative, they were brought through into the same room and jointly interviewed. Participants were interviewed together to allow them to discuss and contrast their experiences, particularly given both participants were likely to have unique perspectives on the narrative, given that they experienced different choices, and had different introductions and finales.

Given that the study's main goal was to explore an unknown set of experiential differences caused by the multiplayer elements of the narrative, the interview itself was semi-structured. While questions were initially drawn from a prepared list, the conversation frequently deviated from this list so that interesting elements of the players' experiences could be explored.

6.1.3 Analysis

The interviews were recorded and later transcribed. Anonymous extracts have been used as illustrative examples throughout the rest of this chapter, and a full example of a transcript is available in appendix D. Due to the unknown nature of the area, the results were inductively coded using the tool Taguette[3], designed to support qualitative analysis, particularly using a coding based approach. The coding had a focus on identifying how the presence of another player had affected the multiplayer experience. An initial pass was done over each of the transcripts, and with any quotes regarding the multiplayer experience being highlighted and tagged with an initial code. A second pass was then done over these codes, with the goal of identifying both how the experience had changed, and what had caused that change, where possible. However, in some cases there was insufficient evidence to identify both of these factors, in which case codes remained overly broad or phenomenological in nature.

After this pass, I attempted to identify concepts common to multiple codes and group these codes into themes, further increasing the specificity of the codes as the important elements became apparent.

6.2 Results and Discussion

Inductively coding the transcripts resulted in 39 codes, divided into 5 broad themes and 4 supporting factors

This analysis covers 5 themes that emerged from the codes as key factors affecting the multiplayer experience. These were accompanied by 4 supporting factors that modified the way in which these themes changed the experience for the player. These themes

[3]https://www.taguette.org/ - Accessed 2021/08/11

and factors are discussed further in the following sections, after which the relationship between the multiplayer experience and the characteristics of interaction are discussed.

Category	Number of Codes	Total Instances
Influence	4	45
Character-Player Duality	7	72
Shared Agency	11	59
Intention	2	15
Empathy	3	25
Supporting Factors	5	49
Awareness Mechanisms	6	71
Multiplayer Epiphany	1	22
Total	39	358

Table 6.1: The breakdown of codes per category

6.2.1 Themes

6.2.1.1 Influence

At its heart, *influence* is the idea of narrative agency through human memory and human relationships. When people make decisions that they know will affect others, a part of that decision will inevitably be based on their relationship to that person. In turn, this relationship is founded on their history of interactions. This forms a cycle of players interacting, influencing and building a relationship over time.

Players sometimes exploited this concept to manipulate the other player (Code: *Intention to influence*), or theorise as to how actions were likely to affect them (Code: *Awareness of potential to influence*).

> *Participant 3*: [T]here was one question where I could potentially show Sarah something, or not show something, and decided that ... it was potentially best if they didn't know ... that I'd seen something about them, as a kind of a way of protecting, or making sure they still felt comfortable with me, but not ... making them feel a bit hesitant against me, as in, like, I might be working against them type of thing. (*Awareness of potential to influence*)

The opposite is also true, with players acknowledging that the way the other player had acted towards them influenced their own decision-making later in the narrative (Code: *Reaction to influence*).

> *Participant 20*: [O]h at one point, I was having trouble deciding whether the data on Sarah, whether I should tell her or not, so I'll [read the node] meet the boss, see if he says anything interesting, or... or dodgy, and because Sarah defends me in that storyline, I'll tell Sarah because I trust her now. (*Reaction to influence*)

In many cases, a simple awareness of *influence* is sufficient to affect the player's narrative experience. When a player has an awareness or belief that their past decisions have contributed to their current situation, it can alter the way players feel about that situation (Code: *Awareness of past influence*). In some cases, when players felt they had successfully convinced the other player through their actions, they felt a sense of achievement. In another instance, when a player got shot, they explained that behaviour as a result of them pushing the other character too hard.

> [Discussing how Participant 12 felt about their character being shot]
> *Participaant 12*: I was a bit surprised, I will say, I was a bit shocked ... because obviously at the start of the story, all the way through, they'd very much been like a team, and then all of a sudden. But then through my choices before, trying to probe into what was going on, and given the previous actions, I wasn't super shocked. But I was a little surprised, that I got shot. (*Awareness of past influence*)

Interestingly, this core idea behind *influence* isn't omitted from single-player narratives. Telltale's "The Walking Dead" series famously uses the phrase "X will remember this" to inform the player that they've made a choice that will affect what a character thinks of them. Structurally, this manifests as the system automatically selecting later branches, based on the previous decisions of the player[94]. Whereas in multiplayer narratives, there is no check, instead the player may remember the previous decisions of the other player and make a choice accordingly. In this way, *influence* emerges organically from the player's awareness of the other player and understanding of their interactions with them. In one sense, singleplayer narratives are trying to simulate this *influence* that occurs naturally in multiplayer narratives.

This natural emergence of *influence* raises the question of whether it might be useful to combat combinatorial explosion[10], which is the the tendency for increased agency to non-linearly increase the amount of content required in the narrative. For example, *influence* could replace decisions that would typically cause branching. Instead, decisions could be designed to affect the other player's view of the narrative. This then affects that player's decision-making for the rest of the narrative, effectively granting long-term agency with a minimal need for additional content. However, given that multiplayer interactive narratives inherently require more content than an equal length single-player

narrative, and are affected more severely by this non-linear increase of required content, it's questionable whether or not any mitigation provided by *influence* is sufficient to compensate for this.

Overall, *influence* seems to add an additional dimension to decision-making within a multiplayer interactive narrative, and may be a contribute towards the character of the other player feeling more human (Code: *Character humanity*).

Code	Instances	Unique Participants
Awareness of past influence	10	8
The player shows awareness that their past actions may have influenced the decisions of the other player.		
Awareness of potential to influence	3	2
The player shows awareness that their previous actions may have influenced the decisions of the other player.		
Reaction to influence	13	9
One or more previous decisions made by the other player affects the player's decision-making.		
Intention to influence	19	8
The player makes a decision with the intention of influencing the other player's behaviour		

Table 6.2: Codes related to *Influence*

6.2.1.2 Character-Player Duality

When playing a MINE, who is it that you're playing with? The intuitive answer to this question might seem to be "the other player", or "the person I met earlier"; however, the data produced by this study suggest that there may be more complexity to the topic than that answer would suggest.

During the interview, players were asked if they were thinking about the other player at specific points in the narrative. They often answered with "No, I was thinking about the character" (Code: *Character over player*):

> *Participant 5*: I wasn't so much thinking about ... [Participant 6] as the player, I was more thinking about the narrative and Todd as a character. (*Character over player*)

However, this wasn't always true. Players often addressed the notion of the other player when it would be helpful, such when trying to influence them (Codes: *Player over character* and *Intention to influence*):

> *Participant 10*: [A]nd I was like, "I've got to convince [Participant 9]/Todd".
>
> *Researcher*: Okay, so, were you trying to convince Todd or [Participant 9]?
>
> *Participant 10*: Maybe like, as it went on, more [Participant 9], because I was like, picking, [they'd] probably want a less violent outcome, which maybe is wrong, but. (*Player over character*)

It would seem the player alternates: sometimes thinking about the character, and sometimes thinking about the player, depending on their current situation. For example, it was not uncommon for people to think about the presence of the other player when being forced to wait, either for a new option to appear (as happened towards the end of Act 2), or for the other player to make a decision (as happened as part of the turn-based structure in Act 3).

However, other evidence suggests this may be a false dichotomy. The code *Character Humanity* captures the idea that, even though a player may not be thought about directly, they give a sense of humanity to the character that they're controlling. This is well demonstrated by the following quote:

> *Participant 5*: I thought that, even if I wasn't thinking about the player, in the decisions, and when thinking about the story, I was thinking that Sarah was a real person. I was thinking of the character as being a real person, far more than if it hadn't been a multiplayer thing. (*Character humanity*)

Other codes also suggest that the lines between character and player become blurred. When players talk about *influence*, they often talked about the influence of a character, with their language firmly in the context of the narrative:

> *Researcher*: Why did you choose not to shoot him?
> *Participant*: Because I thought I could convince him to let me go. Because I'd been nice to him, because he'd been nice back, so that affirmed my belief we were getting along well, and he was a rookie underneath me.

Here, the player is clearly discussing influencing the character, yet being able to *influence* the character presupposes a level of humanity - at least the capability of remembering and reacting to their earlier choices in a human way.

Moral inclination further suggests support for this idea. The predisposition towards more moral courses of action, may suggest that the player sees the other character as something more real, more human, than they were before.

> *Researcher*: So why didn't you want to make any of those decisions? *Participant 5*: Because Todd was, like, a nice person, I think: he doesn't deserve to be shot. (*Moral inclination*)

Based on this character-player duality, I suggest that the player sees the other character as a *character-player composite*. That is, a being that is both the character and the player simultaneously. A character that is more human, or a player driven by the character's goals and personality.

This phenomena is likely related to concept of "Bleed" found in Live Action Roleplay Games (LARPs). Described by Montola [61] as when a player's "thoughts and feelings are influenced by those of her character and vice-versa". Bleed seems similar to the idea of a character-player composite within a single person, while the notion of character-player duality identified here refers to others perception of that person as both character and player.

One key factor in this study that may have driven this duality is the lack of free-form communication between participants. Participants were only capable of communicating through actions within the narrative. This may have had the effect of limiting the extent to which the other player was visible, instead forcing them only to be perceived as the character in the narrative.

In any case, at a minimum, this *character-player composite* offers interactive narrative authors the opportunity to truly humanise their characters and further play on their players' emotions and morals.

6.2.1.3 Shared Agency

In a singleplayer narrative, agency is shared between two parties: the player and the system[41]. In a multiplayer narrative, agency is shared between three or more parties: the system, and each of the players. In the sense used here, *shared agency* is this distribution of agency among multiple players.

In hypertextual narratives (both calligraphic and sculptural), during play the underlying mechanical system typically has low-levels of agency compared to the user, in that the experience is driven by the user: the user makes a choice, which advances the narrative and presents new choices to the user. The mechanical system has little capacity to progress the narrative independently, or modify the story world in unexpected ways to meet some goal of its own.

With this in mind, shared agency is a significant deviation from hypertextual norms, in that other players are fully independent actors within the narrative: they have their own goals, desires and agency. This means the narrative no longer exists purely to service

Code	Instances	Unique Participants
Character over player	17	12
The player perceives the other character as a character, rather than as a player (or the avatar of a player).		
Player over character	5	4
The player perceives the other character as a player or avatar of a player, rather than as a character in the narrative.		
Character humanity	6	6
The other character seems more human to the player.		
Personal	6	4
The player describes the experience as being more personal.		
Roleplaying	24	11
The player acts as they believe their character would in a given situation, or acts in order to fulfil their character's goals.		
Clarity of character-player disposition	9	2
The extent to which a player knows the attitude of the other player towards them.		
Insufficient understanding of other player	5	4
A lack of understanding of the other player reduces their impact on decision-making.		

Table 6.3: Codes related to *Character-player duality*

a single person, it acts in service to multiple simultaneous experiences (in the case of a synchronous narrative).

In practice, this enables an experience that is potentially quite different to that of a traditional hypertext. The other player may alter the narrative in ways that the first player never would, allowing them to see parts of the narrative they would otherwise never have seen (Code: *Other player pushes boundaries*).

> *Participant 20*: Also, [Participant 19] did some risky things, that I probably wouldn't do on my own, so that pushed the story further and I really appreciated that, because I got to see something a bit more exciting. (*Other player pushes boundaries*)

In some ways, this is analogous to the behaviour of some players in tabletop role-playing games: a chaotic player may take an action contrary to the goals or desires of the group, leaving them to deal with the fallout.

This may happen unintentionally, with the agency of the other player inherently acting towards making the story more unpredictable (Code: *Shared agency increases unpredictability*), as the player will never know for certain what the other player will do next. While mechanically, this may seem no different to a random number generator or algorithm making the decision behind the scenes, it may be that the knowledge that a player has made that decision according to their own desires fundamentally alters the experience of this unpredictability (See *Intention*, Section 6.2.1.4).

This logic may extend to other types of interactive narrative where the system has more agency, and is capable of dynamic responses to the user's actions through changes to narration or character behaviour. Even though such a system would be more unpredictable, the way the user feels about that unpredictability may not be the same, although this is speculation and further study in this area is needed.

Along similar lines is the idea that the other player makes each individual playthrough of the narrative more unique (Code: *Shared agency makes experience more distinct*), due to the inability of the player to entirely control the narrative experience. This means that a player could replay the narrative, make exactly the same choices (where possible), and still have a substantially different experience. While this is theoretically replicable in a single-player narrative, much like unpredictability, it is an open question whether the experience would remain the same.

In fact, simply recognising this shared agency exists can create new experiences for a player. Knowledge that another player has control over their narrative can provoke an emotional response in the player, for example, causing them to experience hope that the other player would make the decision they wanted (Code: *Hopeful interaction*). Equally, it can affect the player's behaviour, such as deliberately yielding control to allow the other player to make decisions unimpeded (Code: *Trust in decisionmaking*), or leading them to act faster, in case the other player affects their choices, or makes it for them (Code: *Player applies pressure*).

> *Participant 17*: Yeah, I think at some point it put me in sort of a competition mindset, because I knew that, you know, once the control [had been] taken away from me, maybe I just need to try and read faster. To be able to make my decisions more quickly before [they] make [their] decisions.
>
> *Researcher*: Interesting, so why were you making them faster, what were you aiming for?
>
> *Participant 17*: Just having more control, I think? (*Player applies pressure*)

This is particularly true where the player is able to see the other player's agency affecting their narrative in real time (Code *Real-time visibility of shared agency*), which was most prevalent during phase three, when the players were locked in a turn-based structure.

This made the other player seem more "real", and made the narrative more exciting. It also applied further pressure to players to act quickly.

> *Researcher*: Interesting, what do you think made it unpredictable?
>
> *Participant 20*: I didn't know how much the other player could affect the story, and it was in real time, and I had to act quickly. (*Real-time visibility of shared agency*)

The idea that the other player causes the player act quickly also reflects an awareness that the player is able, to some extent, control how much agency they are given compared to the other player (Code: *Recognition of control of shared agency*). In the experimental MINE, the options to do this were limited to the final act, where players could interrupt the conversation at any point. The awareness of this lead to players making decisions about whether they should act now, or allow the conversation to continue and risk the other player making that choice. This helped emphasise the human aspects of the narrative:

> *Participant 9*: But towards the end, when I was realising I was playing against [Participant 10], I was like, "They're smart, they know how to make this story go the way it should go, and have a good outcome". Then I was more like "Okay, I'll actually talk to Todd for a while", and like, wait for him to convince me. (*Recognition of control of shared agency*)

Overall, the most interesting aspect of *shared agency* is that it turns the narrative into a type of negotiation between players. Each player has their own desires and goals, but the ultimate path the narrative takes is decided by the actions of both players.

Code	Instances	Unique Participants
Recognition of shared agency	10	6
The player recognises that the other player also has control over the story.		
Recognition of control over shared agency	3	3
The player recognises that they have the ability to control the amount of agency afforded to themselves or the other player.		
Shared agency makes experience more distinct	7	4
The other player's agency over the narrative makes each playthrough of the narrative more unique.		
Shared agency increases unpredictability	11	6
The other player's agency over the narrative makes the narrative less predictable to the player.		
Awareness of other player's current options	5	4
Knowledge of the actions available to the other player would change the player's behaviour.		
Speculate on choices of other player	4	4
The player expressed an interest in the choices the other has made, or had available to them.		
Other player pushes boundaries	1	1
The other player changes the narrative in ways that the player wouldn't have if the experience had been singleplayer.		
Hopeful interaction	1	1
The player hopes that the other player will alter the narrative in the way they want.		
Trust in decision-making	1	1
The player waits for the other player to act (cedes agency) because they trust their judgement.		
Player applies pressure	8	5
The presence of the other player applies pressure for the player to read and act quickly.		
Real-time visibility of shared agency	8	8
The player perceives the other player changing their narrative in real-time.		

Table 6.4: Codes related to *Shared agency*

6.2.1.4 Intention

Intention is the idea that an action or event is experienced differently if you believe that another human deliberately caused it. Matthieu Ricard provides a poetic example of this in his book, The Art of Happiness:

> You are napping peacefully in a boat in the middle of a lake. Another craft bumps into yours and wakes you with a start. Thinking that a clumsy or prankish boater has crashed into you, you leap up furious, ready to curse him out, only to find the boat is empty. You laugh at your own mistake and return peaceably to your nap. ([70])

Similar situations can be seen in participant's responses, where they expressed feelings of intrigue or betrayal due to the perception that the other player has made a deliberate choice (Code: *Intention provokes emotional response*).

> *Participant 21*: That's why I kept on trying to pull the information from them.
>
> *Researcher*: So, were you trying to see the story from a different perspective?
>
> *Participant 21*: Hrm ... I just wanted to know the story of why the other person did the things that I saw, and felt the consequences of. (*Intention provokes emotional response*)

One interesting aspect of this is the players seem to make the assumption that the choice was deliberate, and backed by some form of human reasoning (Code: *Assumption of intention*), even when it's not. In one instance, a player shot the other player by complete accident, and even wasn't initially aware that this was the choice they had made. When interviewed, the other player said that "it felt that then I was playing against someone", suggesting they may view the other player as acting maliciously deliberately.

This *intention* may also be a key part of *Character-player duality*, and the feeling that a character controlled by the player is more human. Part of the reason for this sensation may be that the player now believes that the actions of the other character are backed by human reasoning and intent.

However, the intention of the other player is not the only intent that exists within their actions. The actions of the character are also a reflection of the author's intent. In fact, in a highly authored narrative, where the player is limited to fixed set of choices pre-defined by the author, the intentions of the player are always subject to the intent of the author. An author might restrict the choices of one player to being hostile to the other player. However, this may result in the other player, in absence of further information, assuming hostility was a deliberate choice by the first.

This suggests the author is not only a facilitator of agency, but also a facilitator of intention. With this in mind, intention is not only a tool the author can use to enhance their narrative; intention seems to be inherent aspect of the multiplayer experience, and as such there is a need for the author to always consider its impact.

Code	Instances	Unique Participants
Assumption of intention	8	7
Upon noticing the result of a perceived interaction, the player assumes it was made deliberately and with reason.		
Intention provokes emotional response	7	5
Believing that there is human intention behind a decision provokes an emotional response in the player.		

Table 6.5: Codes related to *Intention*

6.2.1.5 Empathy

Most definitions of *Empathy* in social psychology refer to the notion of one person considering another person's current experience [5], and its use as a theme here is no different. Over the course of the study, there were many instances of players speculating on the experience of the other player (Code: *Speculate on other player's perceptions*).

Most frequently, this took the form of players speculating on how their own actions have impacted the other player, or may impact the other player in the future. In some cases, this affected the decision-making of the player, particularly where they would be concerned about their own actions have a negative impact of the experience the other player was having (Code: *Concern for other player's experience*).

> *Participant 4*: I mean, definitely after that initial lie I said that I had second thoughts about it ... maybe worrying that I'd cut off some options for the other player. I don't know how much of that is because we're friends or not. But I definitely had those thoughts. (*Concern for the other player's experience*)

In some situations, where players were aware of an interaction caused by the other player, they would also speculate on the other options that player had available to them. This is quite closely tied to the notion of *intention*, with players being interested in the decision-making underlying the other player's choice. It has particular implications for author facilitated intention: if one player believes that the other was given no choice but to take a specific course of action, it may detract from the sense that other player's actions are a reflection of their disposition towards them. In this sense, it could be seen as the

player considering the other player's experience, in order to contextualise that player's actions towards them.

In situations where *empathy* has occurred, it suggests the player has been well aware of the *presence* of the other player, and the way in which the two are engaged in a shared experience. In this way, instances of *empathy* may act as markers for when a player is feeling a sense of *presence*.

From an authorial perspective, *empathy* presents an opportunity to add emotional weight to decisions, by deliberately engineering choices that affect the other player's reading experience. It is also something for authors to be wary of, as players may be less likely to make decisions that they believe will negatively impact the other player.

Code	Instances	Unique Participants
Concern for other player's experience	12	5
A player expresses extra-diegetic concern about how their actions impact the other player's experience.		
Moral inclination	6	4
The presence of the other player has affected the likelihood of the player choosing moral/immoral actions.		
Speculate on other player's perceptions	7	5
The player expressed an interest in what the other player was seeing.		

Table 6.6: Codes related to *Empathy*

6.2.2 Supporting Factors

A small number of the codes identified during the analysis didn't fit in any of the conceptual themes identified. These codes are generally not a single, well-defined phenomena, so much as general aspects of the experience that facilitate and enhance the other concepts and codes identified.

6.2.2.1 Clarity of Interaction

This captures the extent to which the player clearly understands how they are interacting with the other player and how the other player is interacting with them. This understanding is likely a commentary on other concepts, such as *awareness*, *shared agency* and *character-player duality*.

Participants often noted that the extent to which they noticed and understood interactions with the other player affected their perception of the narrative:

> *Participant 14*: I don't know, I'm not sure. It was, it's hard to tell because it's not necessarily clear how much I was interacting with the other player, versus just the general storyline, how much input they had into that decision, so it's hard to tell, but it made me more cautious of what decisions I was making. (*Clarity of Interaction*)

When this level of understanding is low, it seems to reduce the effect of elements such as *intention* or *empathy*, possibly because it's unclear to the player which changes in their narrative they can directly attribute to the other player.

It may be that when players aren't clear about what interactions are occurring, it reduces the player's feeling of social presence [82], in turn making it feel like the other player is more distant, and less involved in their own narrative.

6.2.2.2 Knowledge of Multiplayer

One key aspect of this experience is that participants went into it with the expectation of a multiplayer narrative. While this was a deliberate design choice to increase the likelihood of interesting multiplayer interactions, it also means that all of the themes and codes identified in this analysis need to interpreted in this light. It's particularly relevant to the idea of *deductive awareness*, as it is predicated on this notion. Two players highlighted this knowledge as one of the main reasons for their awareness (Code: *Knowledge of multiplayer*).

> Researcher: Okay, so when you were playing through the narrative, how often did you think about the other player in general?
>
> *Participant 11*: Me, quite a lot. Just because, obviously I knew that that was going to happen, like, obviously we sat down, we wrote the participation agreement out together, I knew very much that this was a two player game, so I was very much aware of the presence of the other person. (*Knowledge of multiplayer*)

Furthermore, *knowledge of multiplayer* would logically be a necessary precursor for other awareness mechanisms, such as *waiting*. It's reasonable to assume that if a player believes the narrative to be singleplayer, a long pause in the narrative wouldn't be attributed to waiting on another player.

However, that said, it's clearly possible for a player to recognise that the experience is multiplayer even without any initial knowledge, as evidenced by the video game "Journey"[93]. "Journey" consists of entirely *deductive awareness* and does not inform the player that it's multiplayer, leaving them acquire that knowledge on their own through

their own deductions, until the presence of the other player is confirmed at the end of the game.

In any case, it's vital the *knowledge of multiplayer* is considered as a supporting factor of this multiplayer interactive narrative experience. Without the knowledge that the experience is designed to be multiplayer, it's impossible for players to actively seek to understand that experience as a whole.

6.2.2.3 Relationship

One characteristic that arose from my initial analysis of multiplayer games, was whether or not the other person in an interaction is identifiable (see Chapter 3). This raised the question of whether or not the identity of the other player is significant to the narrative experience.

This question is one that was actively explored during the study, in which 5 pairs had never met before, and 6 pairs had a pre-existing relationship. Feedback from players on this topic was mixed, with some players claiming that their relationship with the other player didn't affect the play experience, while for others it made a substantial difference, directly affecting the way they acted and experienced the narrative. This means identity is clearly a factor worth considering when designing MINEs, though it may not affect everyone.

When the relationship did impact the experience, it seemed to affect several aspects of the multiplayer experience, rather than creating a whole new experience by itself. In some cases, the relationship affected the player's decision-making. It affected the player's use of *influence*, as they use their understanding of the other player to attempt to manipulate them. In other cases, it influenced the player to choose a more friendly, team-based approach.

In other instances, the relationship had a purely experiential impact. For one player, it made the experience more fun, knowing that their friend was acting as the other character. For another, they felt it made the experience a little more predictable, because they feel they know the way the other player is likely to play. It also changed the effect that the other player's actions had on the person. It enhanced feelings of betrayal when a player was shot, with the same player supposing they would have been angry instead of betrayed, had their been shot by a random person. For that same player, it also enhanced the effect of *character over player*, as they felt it wasn't a choice the other player would normally make, causing them to perceive the other character more as a player.

Overall, it seems like the relationship a player has to other player acts an experiential modifier, influencing the way in which the other concepts identified in this study behave.

Significantly, it also clearly demonstrates that the presence of another player has altered the experience: because if it hadn't, changing the identity of the other player wouldn't have made an impact at all.

6.2.2.4 Storyteller

The final supporting factor is the player's role as a storyteller (Code: *Player as storyteller*). This refers to a player's propensity to take into consideration the narrative as a whole, and how their actions would affect it. Most commonly, this manifested as players attempting to maintain consistency in the narrative and their character's actions; however, it also manifested as players attempting to keep the narrative from being boring, or exploring an aspect of the narrative that most interested them. For example, at the beginning of the story, the two characters are presented as being part of a team. This influenced some players to continue down that road, and attempt to reinforce the sense that they were a team. This tendency to follow the story is exemplified in the following quote:

> *Researcher*: So why didn't you want to make any of those decisions?
>
> *Participant*: Because Todd was, like, a nice person, I think he doesn't deserve to be shot. And going back with him is just... weird, it just doesn't feel good, because Sarah would go all through trouble to fool him, and then try to steal the keys and then go away on her own... but then just decides to kind of go back with him. It just doesn't feel natural to the storyline.

This also demonstrates a key difference between multiplayer interactive narrative experiences and multiplayer games: that players may follow the story, even if it doesn't directly align to their goals.

6.2.3 Relationship to Framework Characteristics

Chapter 3 laid out a framework containing several characteristics that can be used to distinguish different types of interactions. In this section, I discuss the ways in which those characteristics related to the themes and codes identified during the analysis.

6.2.3.1 Awareness and Feedback

In the interaction framework, *awareness* and *feedback* describe the way in which a player realises that an effect they've perceived in a game is caused by another player. Each is divided into two categories: explicit and deductive. These categories refer to how the player came to understand the other player was the cause. Where an interaction

Code	Instances	Unique Participants
Knowledge of multiplayer	2	2
The player talks about how their prior knowledge the narrative is multiplayer has affected their experience.		
Clarity of interaction	9	7
The extent to which the interaction with the other player is clearly present and understandable to the player.		
Effect of relationship on behaviour	16	14
The impact the pre-existing relationship between players has had on the player's behaviour.		
Effect of relationship on experience	9	9
The impact the pre-existing relationship between players has had on the player's experience.		
Player as storyteller	13	11
The player acts in a way that they believe fits in with or improves the story.		

Table 6.7: Codes related to *Supporting factors*

is explicit, the game informs the recipient player of the association between the effect and the initiating player. For deductive interactions, the player is left to come to this conclusion themselves. As concepts, they are highly focused on categorising a particular interaction, rather than considering the game as a whole.

In this exploratory study, the focus has been primarily on the experience as a whole; in turn, this has suggested a number of ways in which *awareness* and *feedback* interact with that experience, as well as how those concepts apply to the entire narrative. Table 6.8 describes the mechanisms by which awareness of the other player was achieved.

To begin with, in almost every case, players started the narrative with no awareness or understanding of how they were interacting with the other player, even after a number of interactions occurred (Code: *No initial awareness*). This was a slightly surprising result, but may be be due to the lack of wider examples of MINEs: players were typically entering the narrative with no past experience to begin building an understanding on. This is very unlike multiplayer games, in which many mechanics are similar across games within the same genres, allowing an understanding to more easily achieved.

In spite of this lack of initial awareness, players began building an understanding of interaction inductively through observations. By observing their available choices changing (Code: *Awareness through changing choices*) or through prolonged periods of waiting (Code: *Awareness through waiting*), players began to realise they were interacting with the other player. This may be due to these being less common in single-player narratives, although further research needs to be done to validate this hypothesis. To a lesser

extent, players were informed by the way the narrative was structured, with its emphasis on two characters, particularly during the ending (Code *Awareness through structure*).

The most significant impact on awareness however were the explicit mechanisms: blue messages placed on later nodes in act 2 stating "The other player made this decision", nodes appearing stating "The other player has read a page" and a node stating "Sarah/-Todd is thinking about what to say" during the finale (Code: *Message*). The blue message in particular was cited frequently as the first time players became aware of the other player's presence, likely due to it being the first explicit awareness mechanism encountered.

This has particular implications for deductive *awareness* and *feedback*. It suggests that by bootstrapping a player's understanding with explicit *awareness*, helping them to achieve this initial realisation of multiplayer interaction, it may help the player to build a foundation that allows them to deductively identify further interactions. In the absence of explicit *awareness* and *feedback*, the deductive equivalent may prove insufficient if the player lacks prior experience to draw on.

Once these realisations had occurred, it seemed players began to build an understanding of how interactions were occurring. This chiefly manifested in the analysis as players making assumptions about when interactions occurred, and what the other player might perceive (Codes: *Interaction assumption*). One curious assumption however was that of *symmetry*. Players sometimes assumed that because they have certain options, the other player had similar options; or that because the other player's interactions with them manifested in a certain way, it would likely manifest for the other player in a similar way. There's no evidence of why players made this assumption, however it manifested independently across four pairs of participants.

In any case, the presence of these assumptions demonstrates that an understanding of the way interaction was used within the narrative grew over time (after an initial realisation of interaction was achieved).

On the whole, it's clear that *awareness* and *feedback* at the interaction level has a significant impact on the experience. They're necessary to achieve that initial realisation of the multiplayer experience, and to aid the player in understanding the ways in which they interact with the other player. Deductive and explicit awareness build this understanding in different ways, and careful curation of how these are used could lead an author to cultivate substantially different experiences. This understanding in turn, supports many other experiential factors, such as *presence*, *influence* and *intention*, which seem to rely on the overall *clarity of interaction* to achieve full effect.

Code	Instances	Unique Participants
Message (Explicit)	22	20
A message explicitly mentioning the other player appeared. (E.g "The other player has made this decision"		
Message (Deductive)	5	7
An message addressing the other character. ("Please wait for Sarah to finish thinking")		
Changing Choices (Deductive)	4	3
New choices appear or old choices change, and the player infers it's because of the other player.		
Waiting (Deductive)	16	10
The player is forced to wait, or is allowed to continue after a wait.		
Structure (Deductive)	2	2
The structure of the narrative, such as the presence of only two recurring characters.		
No Initial Awareness	22	16
The player is not aware of the first interactions with the other player.		

Table 6.8: Codes for awareness mechanisms

6.2.3.2 Synchronicity

In the interaction framework, synchronicity considers the active participation at any point in time of players experiencing an interaction. If all players are actively taking part in the game or narrative when the interaction occurs, it's considered synchronous. If one or more participants of the interaction is not partaking in the game when the interaction takes place, it's considered asynchronous.

It is challenging to understanding the full effects of synchronicity on this multiplayer interactive narrative experience, given the inherently synchronous nature of the narrative used: all players were partaking at the same time. However, the way in which players perceived phase three (the turn based finale), may offer some insight into this matter. Phase three had frequent interactions and small amounts of time (typically less than a minute, often only a few seconds) between action and response.

During phase three, players sometimes mentioned that "it feels more like playing with another person", it was more "more lively", "more exciting". I would speculate that a part of this is due to rapidity of interactions between the players, and perhaps an increased sense of "immediacy", which is the closeness of the psychological distance between the players [37].

A frequent mention was the additional pressure placed on placed by the knowledge that the other player had a degree of agency over their narrative, and was currently, in real-time, making decisions that would directly impact their future. Players sometimes felt a need to act faster, in order to achieve the most control of the narrative.

This suggests that *synchronicity* is important to the interactive narrative experience, although the exact ways in which it changes that experience is unclear and requires further research.

6.2.3.3 Identifiability

Identifiability is the anonymity of an interaction. Given that a player understands that an interaction has happened, do they understand who caused it?

This is something that's challenging to measure in this narrative, as it's a two player narrative. That means that by having awareness of an interaction, the player inherently knows the person behind it: anonymity isn't possible.

Nonetheless, it's possible to infer some of the effect that identifiability might have on the narrative experience, by looking at the effect the relationship between the players has had on the experience.

This study suggests that the *relationship* between the players acts a modifying effect on other aspects of the experience: changing how players utilise *influence*, altering how players perceive the other character (*player-character duality*) and shifting emotional reactions to events.

The fact that the pre-existing relationship between players can have this impact suggests, at least, that *identifiability* is an important aspect of the framework worthy of further exploration. As presumably, if a player didn't know the identity of the other in their interaction, these effects wouldn't manifest. That said, in a hypothetical three player narrative, the experience isn't quite the same as not knowing the other in an interaction - it's knowing that the other is one of two people, which in turn may result in a whole new experience. In any case, the impact of *identifiability* on multiplayer interactive narrative experiences is worth investigating.

6.2.3.4 Likelihood

Likelihood is the consideration that upon a player taking an action, it may or may not turn into an interaction. In the MINE played in this study, every interaction was guaranteed to occur. There were no actions a player could take that may or may not result in an interaction. This is by design, as a key part of this study was investigating the impact that multiplayer has on the interactive narrative experiences when combined

with the presence of multiplayer differentiability and inter-player agency; it's challenging to investigate an interaction that never occurs.

Even so, one common theme throughout this analysis has been perception. Players seem to be more affected by their perception of reality, than what is necessarily true. Consider that players had no initial awareness of their interactions with the other player, it was only after they had begun to understand these interactions were occurring that the presence of the other player began to make a difference.

With this idea in mind, it's reasonable to consider that the impact of likelihood might be also affected by this. For example, if a player were to lay a trap behind them, does it matter if the other player walks into it? Is the knowledge that another player may fall into the trap sufficient to alter the experience? While this study doesn't directly answer any questions that may exist around this characteristic, it raises interesting avenues to explore in another.

6.2.3.5 Interaction Type

Interaction type is a characteristic that attempts to distinguish between two different forms of interaction: the informational and the mechanical. An informational interaction is one that doesn't directly affect the other player's agency. For example, leaving them a message. A mechanical interaction is any other kind of interaction.

In the MINE used in this study, the flashback sequences can be considered a type of informational interaction. While they do technically open up another node for viewing for the other player, they have no other impact on the future of the story. This leaves the player to make the choice as to whether or not that information affects them. In essence, an informational interaction can be considered a pure form of *influence*. That is, an informational interaction only serves to influence the other player's experience, it has no further role to play within their narrative. This provides a much cleaner definition of an informational interaction to use in the future, and demonstrates that as a characteristic, *interaction type* provides a useful distinction within MINEs.

6.2.4 Further Discussion

According to Aarseth, players of hypertexts experience 'aporias': a challenge that prevents the player from making sense of the whole of a work, as fragments of the work remain undiscovered. These are accompanied by 'epiphanies', moments of realization which allow a player to understand the piece, in the form of links to previously unread parts of the work[1].

I propose that multiplayer interactive narrative features a new form of *multiplayer aporia*, whereby the player is unable to make sense of the work as they fail to understand the

interrelationship between the players. It is a lack of understanding of the interactions between the players, the decisions each has made, the consequences of those decisions and the meaning behind them. Without this understanding, the events and choices the player experiences are sapped of meaning.

However, much as Aarseth's epiphanies are the discovery of a link out, of the missing part of the hypertext, *multiplayer epiphanies* are the discovery of the other player, the realisation of the interactions between them, and an understanding of their significance. It is when the player realises the shared nature of the experience that they can begin to understand the narrative as a whole.

It is after this epiphany, that the experience of the player seems to shift to something noticeably different from that of a singleplayer narrative. After this realisation, players seem to actively try to build their understanding of this shared space, and how they and the other player are interacting within the narrative (Code: *Multiplayer epiphany*). It is the growing understanding of the other player, and the ways in which they interact with them, that seems to make the multiplayer narrative experience truly different from its singleplayer counterpart.

This reinforces the importance of the factor *knowledge of multiplayer*, as it's only after the realisation that the experience is multiplayer that the player can begin to contextualise the experience, and build an understanding of it as a whole. Although *knowledge of multiplayer* is demonstrably not enough by itself to create this epiphany. It's only after the player begins to understand their interactions that they can begin to understand the significance of the other player's role in their narrative, and therefore make sense of the piece as a whole.

Code	Instances	Unique Participants
Multiplayer epiphany	22	17
The player actively seeks to understand the interactions that are occurring between the players.		

Table 6.9: Codes related to *Multiplayer epiphany*

The evidence further suggests that after this *multiplayer epiphany*, players can begin to experience a sense of social presence. While definitions of social presence vary, the most pertinent here is perhaps "the degree to which a person is perceived as a 'real person' in mediated communication". Over the course of this analysis, we've seen multiple instances where a sense of social presence seems likely, although the majority of these are centred around the character (Codes: *character humanity*, *personal*, *moral inclination*). Similarly, the themes of *empathy* and *influence* which arose organically from the codes and contents of these interviews, reflect two of three factors of social presence that emerged from an analysis of the "social presence gaming questionnaire", one possible measure of social presence in games [18].

This has interesting implications for multiplayer interactive narrative as a whole. Firstly, it suggests that even without verbal communication, MINEs are potentially an effective medium at conveying social presence, a key factor in online interaction, and literature in that area may be particularly pertinent to understanding the social psychology involved in MINEs. Secondly, it presents an extremely novel form of social presence; instead of sensing that another, human person is more "real" as would be typical for computer-mediated communication, we instead see that the fictional character is lifted, at least partially, from the world of the story into reality.

It may also be that we see the opposite happen, as more of the player's humanity is dragged further into the fiction, with the barriers between fiction and reality more transparent than in a single-player narrative. Friedrich Nietzsche [64] famously said:

> [W]hen you look long into an abyss, the abyss also looks into you.

During a singleplayer interactive narrative experience, the player looks into the abyss: they peer from the real world into the narrative world, and immerse themselves in it. However, the abyss does not look back; the others characters and story will only ever perceive the actions of the character. Like a 3D object in a 2D world, the fiction will only accommodate a slice of the player.

The same is not true in multiplayer interactive narratives. When the player peers into the fictional world and mingles among the characters, another player is looking in too. And while that second player may still only see a 2D slice of the first, they are capable of understanding the 3D object, the player, behind it. In this way, when the first player looks into the abyss, the second player looks back. The player is *seen*.

This is very atypical of interactive narrative. An interactive narrative is typically a very private experience. The player is free to do as they please, without any impact on reality. In many ways, this is similar to its non-interactive counterpart, where the reader of any story is free to experience what they like in their own mind.

The presence of the other player fundamentally alters this. The player has now found themselves in a shared experience, with potential real-world consequences for their actions. This may even explain the significant shifts in player behaviour, and codes such as *moral inclination*. What was formerly a one-way mirror, is now a window. The player can't pass through, but they can still be seen.

This involvement and visibility of the other player now raises new and challenging ethical questions for authors. Consider for a moment, the act of torturing or sexually assaulting a character in a singleplayer narrative, either as a direct or indirect consequence of a player's actions. Such an act is arguably ethically permissible within a singleplayer narrative, or as a part of the narrative's artistic license. In fact, many video games

feature behaviour that is "ethically questionable" behaviour in real life, such as the series Grand Theft Auto.

In comparison, consider now inflicting any of those acts on a character controlled by another player. Is it still ethically acceptable? This isn't a question that I propose to answer, but it's an important consideration as multiplayer interactive narrative experiences begin to grow in number and scope.

6.3 Conclusions

In this study 22 participants, in pairs, took part in playthroughs of an experimental interactive MINE designed to explore the ways in which the presence of another player, inter-player agency and characteristics of interactions affect the player's experience of interactive narrative. These participants were interviewed after their experience, and these interviews were inductively coded and thematically analysed.

From this analysis, 5 themes emerged as significant elements that alter the player's experience of interactive narrative, supported by 4 factors that seem to modify the manifestation of these themes. I then inferred possible relationships between these themes and the framework of interaction characteristics described in Chapter 3.

The themes that emerged suggest that the addition of another player to interactive narrative in the form of a MINE has a substantial impact on how players experience those narratives. The second player added an additional depth to the decision-making of players, with players deliberately influencing the actions of the other player to achieve their own ends (Theme: *influence*) and being differently inclined to take moral actions and actions that they perceived as having a risk of negatively impacting the other player's experience (Theme: *empathy*).

Players recognised they shared agency over the experience, which in turn affected how they acted, the speed at which they acted and the perceived unpredictability and uniqueness of the narrative (Theme: *shared agency*).

The addition of the other player as controlling a single character also seemed to significantly alter the player's perception of that character, changing them from being purely a character in the fiction to a *player-character composite*, that seems both more 'real' and more human (Theme: *character-player duality*), with intention ascribed to their action that may not have been present had they been a computer controlled character (Theme: *intention*).

These effects were seemingly modified by the level of visibility and understanding of player interaction (Factor: *clarity of interaction*), the foreknowledge that the experience (Factor: *knowledge of multiplayer*), the pre-existing relationship between players

(Factor: *relationship*) and the propensity of players to act as authors and storytellers within both their own narrative experience and that of the other player (Factor: *storyteller*).

Based on these themes, I define the notion of *multiplayer epiphany*, which is defined as the realisation of multiplayer presence and inter-player agency, and the growing understanding of what that agency means over the course of the narrative.

The characteristics of interaction play an important role in creating the effects described by the above themes and factors. *Awareness* and *feedback* seem fundamental in enabling *multiplayer epiphany*, enabling the player to understand the interactions that are occurring and grow their understanding of inter-player agency. *Identifiability* is also a significant element, due to the modifying effect that the pre-existing relationship between players seems to have on the other multiplayer elements of the experience, and the presumption that this modifying effect could not occur without knowledge of the other player's identity. *Synchronicity* may affect the 'immediacy' of the experience and the perceived psychological distance between players, although significantly more research needs to be done on this topic. It's unclear the role that interaction type and likelihood have on the experience. However, by considering the idea of *influence*, we are presented with a much clearer definition of *interaction type*: in terms of the impact on the player's agency, 'informational' interactions solely exert influence on the player, while 'mechanical' interactions directly modify the choices available to the player in the future.

From these themes, we can further infer that MINEs may be effective at communicating a novel form of social presence, where the player experiences a sense of interacting closely with a real human, however rather than this human being the other player, it's the *character-player composite*: in other words, the player receives a sense of social presence from interacting with the character.

This evidence suggests that MINEs fundamentally alter the way that the player experiences interactive narrative by allowing them, as a human, to be 'seen' within the narrative, as opposed to the player being entirely isolated from the characters, as is the case in single-player narrative.

When taken together, these results imply that MINEs are different from singleplayer narratives due to the presence and agency of the other player. These properties add depth to decision-making and modify the way each player perceives the experience. These results imply that MINEs are different from multiplayer games due to the player's immersion into and agency over the narrative, their experience of interacting with characters that feel like humans and the players' propensity to see the experience first and foremost as a story while acting as a storyteller and character within that story, rather than attempting to achieve a specific non-narrative goal.

However, this study can only be said to strongly suggest these results for a two player narrative. Expanding the narrative to three or more players may impact each of the themes and factors identified here in any number of ways. On the other hand, there's no evidence to suggest that effects such as influence, intention, the player as storyteller or shared agency wouldn't extend to a narrative with three, four or even more players; although many these effects would undoubtedly change. Perhaps intention is harder to glean, or the impact of shared agency more pronounced. This is one possible avenue for future research.

Despite this caveat, two players still undoubtedly makes for a multiplayer interactive narrative experience. With this in mind, based on the observations presented in this chapter, it is strongly suggested that MINEs are a distinct experience from both single-player narratives and multiplayer games, and represent a new addition to the world of interactive narratives.

Chapter 7

Conclusions

The focus of this thesis has been on exploring multiplayer interactive narrative experiences (MINEs), which are multiplayer interactive narratives that have the properties of authorability, multiplayer differentiability[75] and inter-player agency. These properties require that the author have the ability to easily define how each player's experience should unfold, and that each player should have a distinct experience from the other players and the ability to influence the dramatic storyline of both themselves and others through their actions. MINEs are defined as being primarily authored, rather than emerging from simulations or agent interaction, in order to focus on exploring a more curated experience.

Existing interactive narrative research has focused primarily on singleplayer narratives, with little work in the area of multiplayer interactive narratives, and even less that considers MINEs. This state of affairs is mirrored within the realm of commercial interactive narrative, with few examples of MINEs.

Of the research that does exist, very little focuses on interactions and inter-player agency, and how they affect the play experience. No research that I'm aware of has looked at how the play experience is changed from that of a singleplayer interactive narrative, or why MINEs deserve investigation.

In this thesis, I explore the nature of interactions in MINEs, how they can be created and the experiential differences that result from multiplayer differentiability, inter-player agency and the presence of another player.

7.1 Summary

This thesis begins by recognising that little theory exists around interactions in in multiplayer interactive narratives and how to conceptualise them and distinguish between

them. Chapter 3 constructs an initial set of distinguishing characteristics by analysing interactions found in popular multiplayer games.

It then moves on to consider how to construct MINEs, by considering how existing models of interactive narrative might be enhanced to support MINEs. Chapter 4 extends the existing model of sculptural hypertext[7, 58] to support MINEs, describes an implementation of this model (StoryMINE) by extending the existing StoryPlaces[59] system, and discusses how the model supports the characteristics defined in chapter 3.

Chapter 5 details an experimental MINE, collaboratively created with two authors with experience in creative writing and narrative research, and a set of design considerations that arose during the authoring process.

Finally, chapter 6 evaluates this experimental mine with 11 playthroughs with 22 participants, and explores the experiential changes present in MINEs and how they relate to the identified characteristics of interaction.

7.1.1 A Framework for Modelling Interactions in Multiplayer Video Games

17 multiplayer games were analysed to produce a set of 56 unique interactions. From these 56 interactions, iterative coding was used to produce nine characteristics that provided clear distinctions between the interactions. While these characteristics proved sufficient for this purpose, it undoubtedly didn't capture interesting elements of the players' roles, goals and relationships that may be pertinent to MINEs.

These characteristics were then validated by conducting a second study which saw 8 participants identify instances of interactions in all of the original games. These newly sources interactions then had the framework applied to them, to see if any failed to fit. The framework successfully categorised all of the identified interactions that were valid, although minor issues were raised.

These characteristics were combined in different ways to construct three narrative premises, demonstrating that they have the potential to be a useful tool for constructing and understanding MINEs.

7.1.2 A Model and Implementation for MINEs using Sculptural Hypertext

In order to address the lack of available systems that can support MINEs, a model that can support MINEs was created using sculptural hypertext as a base. This model was then implemented in the open-source sculptural hypertext platform StoryPlaces[40],

creating StoryMINE - an open source platform that supports multiplayer interactive narrative experiences.

It's demonstrated by example how this enhanced sculptural hypertext model can support all of the interaction characteristics identified in the previous chapter.

7.1.3 An Example MINE

In order to study the experiential distinctiveness of MINEs when compared to single-player narratives, an experimental MINE was designed that uses a number of interactions in order to explore different variations of the interaction characteristics identified in chapter 3. This experimental MINE was then implemented in StoryMINE, an extension of the StoryPlaces[40] open source platform to support MINEs.

Finally, a number of design considerations for MINEs are presented that explore both challenges and opportunities encountered during the design of the MINE, in the hope that these will be useful to future authors of MINEs.

7.1.4 Exploring the Impact of Multiple Players on Interactive Narrative

A study was conducted that saw 22 participants conduct 11 playthroughs of the experimental MINE in pairs. After this experience, the participants were interviewed to identify how the multiplayer elements had affected their experience. These interviews were inductively coded and analysed, from which 5 themes that altered the narrative experience emerged, alongside 4 supporting factors that modified the impact these themes had on the narrative.

The relationship between these themes and the framework characteristics are explored, highlighting the importance of *awareness* and *feedback*, though coming to no strong conclusions about *synchronicity*, *interaction type* and *likelihood*.

A theory relating social presence and MINEs is proposed, suggesting MINEs can convey social presence in a novel way. Ethical considerations raised by MINEs are briefly discussed, before finally it's conjectured that the nature of the relationship between player and narrative is changed by MINEs, now that the extra-diegetic player is perceivable by other actors in the narrative.

7.2 Research Questions

In this thesis, I set out to answer four research questions around the topic of multiplayer interactive narratives. This section provides evidence as to how these questions are answered by the content of this thesis.

7.2.1 What low-level characteristics distinguish between types of player interaction?

Chapter 3 addresses this question by analysing a set of multiplayer games and using iterative coding to identify distinguishing characteristics between interactions in those games, that are not inherently tied to the mechanics of the game or the presence of a virtual world.

From this analysis, nine characteristics were identified: likelihood, type, synchronicity, explicit awareness, deductive awareness, explicit feedback, deductive feedback, initiator identifiability and recipient identifiability. Each of these characeristics is described in detail in Section 3.2, although they are briefly summarised below.

Likelihood is the chance that an interaction occurs, for a specific action and accompanying effect. In a broader sense, it's whether or not a player will have the opportunity to notice the effect, creating an interaction.

Type was defined in the framework as whether or not an interaction provides only information to the other player, or impacts their experience in some other way, such as altering the decisions available to them in the future. In Section 6.2.3.5, an alternative definition is proposed based on the idea of *influence* (explored in Section 6.2.1.1), where *informational* interactions serve only to *influence* the other player, while *mechanical* interactions change the narrative in other ways.

Synchronicity is inspired by Zagal, Nussbaum, and Rosas[99], and is whether or not an interaction requires both players to be actively participating in the game at the same time.

Awareness is whether or not a player is aware that another player has caused an interaction to occur with them. Awareness is either achieved via *explicit* means or *deductively*, both of which are characteristics. *Explicit* awareness results from the system directly informing the player that an affect was caused by another player. *Deductive* awareness results from a player deducing an interaction has occurred through their understanding of the system's rules.

Feedback is the opposite of *awareness*, and considers whether a player knows their actions have affected another player. Much like *awareness*, two types exist: both *explicit* or *deductive* awareness.

Identifiability considers whether the player can identify the other player that is part of the interaction. Two identifiability characteristics exist for interactions: *recipient* identifiability and *initiator* identifiability. The former considers where the player taking the actions knows who that action has impacted. The latter considers whether the player affected by an action knows the source of that interaction.

These characteristics have been shown to be applicable to multiplayer interactive narratives through a multiple parts of this thesis. The characteristics are shown to be capable of inspiring narrative premises in chapter 3, of being usable in interactions in MINEs based on sculptural hypertext in chapter 4 and of being varied to create different narrative experiences in chapter 5.

Although these characteristics inevitably do not capture every interesting or useful distinction between interactions in multiplayer interactive narratives, they provide an initial framework for authors on which to base both interactions and narratives, and a tool for improving understanding of existing interactive narrative works.

7.2.2 To what extent could existing narrative systems model MINEs?

Chapter 2 addresses this question by identifying existing narrative systems and showing that of the multiplayer narrative systems available, only one of them meets the criteria for MINEs[75]. However, this system uses AI to adapt story plans to the behaviour of the players, meaning it is not fully authored, and it inherently requires a logical model of a game world in order to function and provide interactions between players. This system also has no available implementation or implementation details, making it non-viable for MINE research.

Based on this, I'm forced to conclude that existing systems offer limited to no support for MINEs, and that new systems are needed to support this type of narrative.

7.2.3 How can existing narratives systems be extended to support MINEs which feature the previously identified characteristics of interaction?

Chapter 4 addresses this question by extending the sculptural hypertext model to support multiple players, multiplayer differentiability and inter-player agency. This extended model is then implemented using the StoryPlaces[40] open-source platform, and evaluated using a series of exemplar narratives that demonstrate support for each characteristic.

In doing this, it's demonstrated that sculptural hypertext needs few changes in order to support MINEs that feature all of the identified characteristic. However, this doesn't

necessarily make it the best model for MINEs, based on the combinatorial explosion of content required as the number of players and amount of agency increases.

7.2.4 What impact do inter-player interactions have on players' experience of interactive narrative?

Chapters 5 and 6 answer this question by describing the design and implementation of an experimental MINE, that uses a variety of characteristics drawn from the framework in chapter 3.

I then ran a study using this mine, to explore the way in which the multiplayer aspects of the MINE including inter-player interaction impacted the players' experiences of the narrative.

Based on the interviews from this study, I found five broad themes revolving around the the presence of and interactions with another player. These themes were *influence*, *character-player duality*, *shared agency*, *intention* and *empathy*.

Influence is the ability of one player to impact the decision making of another through their actions, such as withholding information or playing on their emotions. Broadly speaking, it occurs in two directions: proactive and retroactive. Proactive *influence* sees *influence* as adding depth and strategy to the narrative, by using the other player to achieve their own ends or acknowledging that their actions may have hidden consequences. Retroactive *influence* sees a player acknowledging that their past actions will have impacted the other player, and therefore brought about the current situation. In this sense, it changes the way the player feels about the narrative, affecting the player in ways they otherwise might not have been.

Character-player duality considers the way the player perceives the other characters that inhabit the narrative: specially, the character that is controlled by the other player. The interviews suggested that many players saw that character as more than just a character, they were a character imbued with a sense of humanity that otherwise may not have been present. Players would often alternate between thinking about this characters as a character and as a player, suggesting they are both: a *character-player composite*. In turn, this seems to change that players interact with that character, treating them as a human, rather than as simply a part of the story. This seems closely related to the notion of Bleed identified in Live Action Roleplaying Games [61].

Shared agency sees players acknowledge they are no longer the focal-point of the narrative experience. In a traditional, singleplayer, hypertextual narrative, only the player has the capacity to drive the narrative forward; the narrative revolves around the player and their experience. However, the addition of another player changes that. The other player's experience is also a key concern of the narrative: they have the ability to exert

their own agency in the narrative. This results in the other player steering the narrative in ways the first may not have intended, making the experience more unpredictable, or encouraging the player to explore areas of the narrative they otherwise may not have considered. However, the most interesting aspects it that the agency of both players is not independent: players are capable of adding or removing agency from the other player, through taking actions that alter the other player's available choices. This turns the narrative into a type of negotiation between players, with both players deciding the ultimate fate of the narrative.

Intention is the change in experience that occurs when a player believes an event has occurred as a result of another player's deliberate decision. In essence, it considers an action to have human reasoning behind it, which leads to players experiencing the results of that action differently. It can leave players curious about why that decision was made, or create feelings of betrayal or hurt, if the action was detrimental to the player. In some cases, players would make an assumption that intention exists: even if the action was an accident, or the other player had no other choice. In this latter case, it's possible to see that it's not only the other player's intention that is manifest, but the intention of the author as well. In this sense, the author's intention is always present in the narrative, as they prescribe the choices available to the players. As a result, intention seems an important aspect for authors to consider within their narratives.

Uniting these five themes is the idea of *multiplayer epiphany*: the idea that a player must first understand they are interacting with another person, and that over the course of the narrative players actively grow this understanding. It's this understanding that unifies these themes, as the one criteria they all inherently depend upon, resulting in a gradually shifting experience over the course of the narrative.

Beyond these themes, there's evidence to suggest that the players begin to experience a sense of *social presence*, whereby they experience the sense of interacting with a 'real person" throughout their narrative. This implies that interactive narrative has the potential to be a novel means of creating a social experience between players.

Based on this, I propose that MINEs alter the experience of singleplayer interactive narrative in a very fundamental way: they enable the player to be 'seen'. In a singleplayer narrative, the player is invisible to the characters within the fiction, they can only see the player's character, their avatar, which acts as their one-way link into the fiction.

However, in multiplayer narrative, the player themselves can now be seen. Other players look through the medium of the narrative, the lens of their character, and see a distorted view of the player in the real world. The one-way link is now two-way, and their actions within the narrative may have real-world consequences: a very private experience has become a shared one. This may be one explanation for the significant shifts in player behaviour, such as their tendency to act more ethically.

This, combined with the other experiential changes, suggests that MINEs are distinct from both singleplayer interactive narrative and multiplayer games. They significantly change the way players make decisions, they fundamentally change the players' perceptions of other characters, and they turn a private, secluded experience into a shared experience, in which the player themselves is seen through the lens of the narrative.

7.3 Limitations

One important aspect to note about the work within this thesis, is that it has entirely focused on two player MINEs. This is true for the definition of interactions within the framework in Chapter 1, the design of the story artefact described in Chapter 5 and the study conducted in Chapter 6.

While this was necessary to reduce complexity, as a result it's challenging to generalise these findings to MINEs with three or more players. This is particularly true for the findings from Chapter 6, where the addition of further players would have an unknown impact on the experience.

The other significant factor impacting 6 is the artefact itself. A different story would undoubtedly generate at least slightly different results. For example, perhaps many of these effects would be reduced if the story had failed to hold the interest of the players.

Finally, the work within this thesis is intended to be exploratory in nature. The aim of this work was to explore the experiences and possibilities surrounding multiplayer interactive narrative experiences. As such, few of the phenomena identified within are confirmed to exist. Many are simply observations and suppositions based on the available evidence.

Despite this however, all of the effects, themes and factors observed within a two player MINE act as fascinating stepping stones that provide some initial insight into the field, and pave the way for further research.

7.4 Future Work

As much of the work this thesis has been exploratory, looking to gain an initial understanding of how MINEs alter the players' experiences, many more questions have been raised than answered. The following questions represent only some of the potential avenues that that could be pursued conducting further research into MINEs.

MINEs seem to have the potential to convey a sense of social presence. In distance learning contexts, social presence is an essential component to engaging learners and

improving learning outcomes [36, 37]. However, social presence is typically associated with communications technologies, and existing models may not apply to new mediums [18]. Therefore, research needs to be done into the manifestation of social presence in multiplayer interactive narrative, and the specific communication mechanisms employed by it. This is particularly relevant, due to the unusual blurring of social presence and player perceptions of the other character.

Further development needs to be done on understanding the nature of interactions in MINEs. The interaction framework presented in this thesis was an initial first step in this direction of understanding the types of interaction that might be present in multiplayer interactive narrative, however, the generalised nature of that framework that allowed it to be transliterated onto multiplayer interactive narrative, also means it provides a very high level and non-specific means of understanding those interactions. A more specific analysis that looks at how interactions can manifest in ways unique to multiplayer interactive narrative would be a valuable contribution.

While sculptural hypertext has served as a satisfactory base for multiplayer interactive narratives, it isn't without its challenges. From my experience designing "Honour Between Thieves", the exponential increase in content required is challenging to mitigate, as agency and player count increase. Further mitigations for this effect need to be investigated, or alternative models for MINEs found that are less prone to this effect.

Chapter 6 presented a number of themes and factors that seem pertinent the players experience of MINEs. Each and every on of these themes and factors presents an avenue for further development. *Character-player duality*, *intention*, *empathy*, *relationship* and *storyteller* are the standout themes and factors in this regard, as they each contain an element of the social multiplayer experience that seems likely to be unique to interactive narrative experiences. I personally feel like *character-player duality*, and this concept of merging both player and character into a single conceptual entity is both a novel area of research, and a testament to the power of storytelling, such that the fiction is capable of blending with and overriding the reality.

By themselves, the paths outlined above offer many intriguing opportunities for further research. However, many offer additional opportunities around studying the extent to which they're impacted by additional players. For example, the complexities around pre-existing relationships when a MINE has several people, some who know each other, and some who don't.

Overall, I believe that the full content of this thesis and the analysis within it providing a stepping stone to a greater understanding of multiplayer interactive narrative experiences. It's my hope that it inspires and assists future researchers exploring the field of multiplayer interactive experiences.

7.5 Conclusions

This thesis has broadly considered the notion of Multiplayer Interactive Narrative Experiences: how they might be built, the types of interaction they might contain, and the changes to experience brought about by multiplayer differentiability and inter-player agency.

To me, one of the fundamental, underlying questions behind all of this research was: do multiplayer interactive narrative experiences offer something that is truly distinct to singleplayer narratives and multiplayer games.

Reviewing the analysis of participant experiences from chapter 6, I can definitively say: yes, MINEs are their own, unique experience, different to books, films, games and even singleplayer interactive narrative.

This blend of character and player strikes me as something special: a fusion of traits from both the character and the player, a true act of co-authorship between narrative designer and participant that creates something new and exciting in the eyes of the other players.

Not only is this composite new and exciting, but if the characters that the author has created can provide a genuine sense of social presence, it breaths life into a character in a way quite unlike that of conventional narratives.

Finally, after all of the consideration for multiplayer games and interactions that's happened within this thesis, I'm reminded of the power of storytelling. Players had the foreknowledge that the other player was a part of the experience, the opportunity to pursue extra-diegetic goals, yet ultimately players chose to be storytellers, putting the characters and narrative ahead of all else. Ultimately, I believe it's storytelling that makes MINEs fundamentally different from other multiplayer experiences that exist in the world today.

I'd like to conclude with a short, slightly tidied quote from one of the experiment's participants, that to me expresses why stories are powerful, and why MINEs have the potential to be such fascinating and engaging experiences:

> If ... you'd told me ... this is the winning state for the game, and if that had differed from my opinion about what the characters would have wanted to do, I probably would have intentionally lost the game, because it would feel wrong.

Appendix A

Authoring with Uncommon Patterns

A.1 Introduction

In interactive narrative, patterns are common structures that can be used as a means of critically analysing and better understanding existing works, examples in hypertext include *cycles*, *foldbacks*, and *mirrorworlds* [8], as well as a tool to guide authors in the construction of new stories[39]. These patterns can be incorporated into authoring tools in order to provide high-level narrative constructs that can be used as building blocks, instead of requiring the author to immerse themselves in implementation details[59]. However, we propose these stories also contain uncommon patterns which are unique to that story, yet repeatedly used within it. These uncommon patterns can themselves be useful building blocks within a given story, however they are challenging to incorporate into an authoring tool precisely because they're unique to specific stories.

In this paper, we identify uncommon patterns in example interactive story designs. We then report on our initial work to support them through a Domain Specific Language (DSL) which allows authors to create and easily reproduce author-defined patterns during authoring.

A.2 Background

Patterns as a term for mid-level structures was first used by Bernstein to describe the structure and topology of node-link hypertexts, sometimes referred to as calligraphic hypertexts. [8, 7]. His work identified several common patterns that were heavily used in the hypertext fiction of the time, but still remain applicable. Since then, the idea of patterns has been used to analyse existing narratives [67] but also to assist in authoring,

particularly in the Sculptural Hypertext space. Sculptural hypertext is a constraint (or quality based [81]) model originally proposed by Bernstein [7], where content nodes are made available based on the satisfaction of conditions associated with each node. When a node is visited, it is capable of making changes to the state of the story, in turn determining which nodes will subsequently be accessible. Millard et al. [58] and Hargood et al. [39] identified a number of common patterns in sculptural hypertext and based on this work proposed the notion of pattern-centric authoring [59]. Pattern-centric authoring attempts to increase the accessibility and reduce the complexity of sculptural hypertext by using high-level patterns as building blocks for the narrative, as opposed to individual constraints.

However, while incorporating common patterns into authoring tools may provide useful structure to new authors and can simplify the authoring of narratives that conform to these common patterns, it does little to help the authors of novel narratives that deviate from these norms.

A.3 Examples of Uncommon Patterns

We've identified uncommon patterns in several of the stories that we have worked on in the past.

For example, Isle of Brine, is a locative narrative created as part of a co-operative inquiry into authoring [60]. It makes heavy use of phasing, a common pattern where nodes are grouped into phases and the reader can only see the nodes in the phase that is currently active [39]. Isle of Brine is divided into three major acts, with each act having a pair of phases: an introduction phase and a content phase. Whilst phasing itself is a common pattern, the notion of a an introduction phase (that in Isle of Brine leads people to the location of the next act) is an example of a simple uncommon pattern which appears three times in the overall structure (once for each of the three Acts).

Another example is Fallen Branches [66], which is also bases around phases - but this time rather than a phase representing an Act, it represents one of eleven chapters. Each chapter has the same structure, it contains a single node that progresses the main story to the next chapter, and a set of optional additional nodes (representing letters in the landscape that fill in additional details around the story).

Recently we have been working on Multiplayer Interactive Narrative Experiences (MINEs)[85], these tend to have complex structures (as a result of the interactions of multiple participants) and this makes uncommon patterns even more important.

A.3.1 Patterns in MINEs

Multiplayer Interactive Narrative Experiences (MINEs) are interactive authored narratives with multiple players that demonstrate the properties of multiplayer differentiability and inter-player agency [85]. Multiplayer differentiability is where each player has a potentially distinct narrative experience [75], while inter-player agency is the ability of each player to affect the experiences of other players.

MINEs can support stories with a wide range of structures, but one example would be where different readers follow different characters (Points of View) through an interactive story, and choose actions for their character that impact the options and outcomes of the other characters being followed by other readers.

As a part of our exploration into the possibilities for MINEs, we designed and began implementing a two player narrative using sculptural hypertext and the StoryMINE engine [85]. This narrative was based around the idea of collaboratively creating the events of the narrative leading up to the characters' current situation.

This narrative was structured in three phases - morning, afternoon and a finale. In each of the morning and afternoon phases, each player would be presented with a number of events they could choose from. These events would either occur in the present day, or be flashbacks to the past, adding something to the shared history of the characters.

For each flashback, both players would be presented with multiple choices for what happened from the perspective of their character. When a player chooses an event it becomes part of the narrative, and the other player is then only able to choose the event that matches the one the first player has chosen. For example, if the first player chooses the 'good' option for an event, the second player would then only be able to choose the 'good' option. In turn, these historical events would unlock new possibilities in future phases.

In this way the players co-create the history of their characters, and by doing so define the possible options for their relationship going forward in the story, and a unique shared history that gives them context for the finale.

Figure A.1 shows how this interaction might be implemented. There are 4 nodes: two for each player; one good, one bad. Each good node locks both bad nodes and vice-versa. This structure is repeatedly reused throughout each of the phases, making it a story-specific pattern. By recognising this and abstracting it into a form that facilitates reuse, we can reduce the time taken to recreate the structure and potentially increase the legibility of our narrative, by making it easier to think about at a more conceptual level.

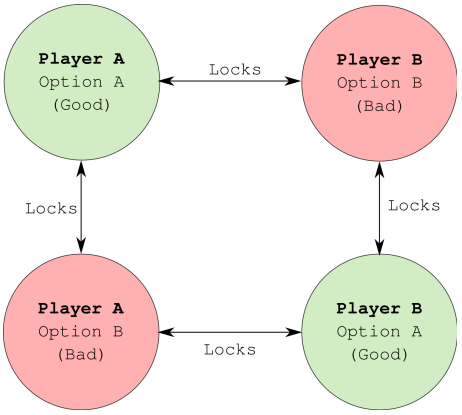

Figure A.1: Locking structure used by the flashbacks in the two-player narrative.

A.4 Supporting Uncommon Patterns

Much like common patterns, uncommon patterns should be quick and easy to reuse in a narrative. However, unlike common patterns, they also need to be easy for the author to generate from an existing narrative structure. In order to facilitate this, we adopted a Domain Specific Language (DSL) based approach and created a prototype software library for authoring sculptural hypertext using the Typescript programming language. This allowed us to leverage the existing constructs inherent to Typescript such as loops, functions and conditionals, as well as our own existing technical expertise.

The library allows an author to describe a story using the core mechanisms of sculptural hypertext, using pages with guard conditions and functions which modify story-state. This is then compiled into the format accepted by the StoryMINE engine.

With this in place, uncommon patterns can be easily supported by using the existing mechanisms in Typescript for code reuse, such as functions and loops. For example, uncommon patterns can be rapidly generated from an existing implementation by turning the existing code into a function, replacing the instance specific items, such as node content, with parameters. If carefully designed, this also allows for the composition of patterns, defining higher level patterns in terms of other, lower level patterns.

```
function flashback(nodes_for_option_A, nodes_for_option_B) {
  locks(nodes_for_option_A, nodes_for_option_B);
  locks(nodes_for_option_B, nodes_for_option_A);
}

let player_a_option_a = story.NewPage(...);
let player_a_option_b = story.NewPage(...);
let player_b_option_a = story.NewPage(...);
let player_b_option_b = story.NewPage(...);

flashback([player_a_option_a, player_b_option_a],
          [player_a_option_b, player_b_option_b]);
```

Listing A.1: Typescript code implementing the flashback mechanism described in Section A.3.1

Listing A.1 demonstrates how the flashback mechanism described in section A.3.1 can be implemented using our library-based approach. It defines the flashback in terms of the locking pattern [39], stating that visiting any of the nodes for option A locks all of option B, while the opposite is also true.

While this library-based approach clearly offers a great deal of power and flexibility by using a general purpose programming language, it suffers from a high barrier to entry due to the technical expertise required. However, other approaches should be possible. For example, a template-based approach could be adopted, in which a selection of nodes and edges are assigned a name and able to be duplicated, while their content is erased. If templates could then contain other templates, users would be able to create their own hierarchies of uncommon patterns, with a far lower barrier to entry than the programming-based technique we've previously outlined.

A.5 Conclusion

In this paper we have outlined the idea of uncommon patterns, which are narrative structures unique to an individual story yet repeatedly used within that story. Following this, we outlined some example story designs and identified uncommon patterns present in each of them. We then described a Domain Specific Language (DSL) approach to authoring uncommon patterns in interactive narratives which has the advantage of defining higher-level patterns using other, lower-level patterns. While there are clear technical barriers to using a complex DSL the principle could be supported by simpler systems - for example, by allowing graphical templates to be defined and reused.

By identifying the existence of uncommon patterns and exploring how they can be used to simplify the authoring of novel stories, we hope to encourage the designers of authoring tools to consider how they might be better supported. In turn, we hope this will result in more accessible authoring systems that better encourage the exploration of new and exciting narrative structures.

Appendix B

Participant-Identified Interactions

This chapter contains all of the interactions identified by participants. It has been published under DOI 10.5258/SOTON/D1970 [83].

1

Initiator	*Triggering Action*	*Effect*	*Recipient*
Any, Steel Fighter	Shooting	Destroys enemy (turret)	All players present

Comment: Several players damage it while it breaks/dies

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid:

2

Initiator	*Triggering Action*	*Effect*	*Recipient*
Snowman player	Interacts with... lever?	Vehicle is summoned (base is captured for team)	POV Player (Ratchet) can use vehicle. Everyone can see score also.

Comment: Any could take vehicle

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid:

3

Initiator	*Triggering Action*	*Effect*	*Recipient*
Snowman	Interacts with level	Base captured, resources appear	Any player

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid:

4

Initiator	*Triggering Action*	*Effect*	*Recipient*
Steel fighter	Approaches Ratchet	Ratchet can (and does) join inside vehicle if he chooses	Ratchet/Nearby players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid:

5

Initiator	*Triggering Action*	*Effect*	*Recipient*
Ratchet	Clicks (“(A) Ride”) Joins steelfighter in vehicle	Ratchet joins inside	Steelfighter

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Possible	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Possible	No	Yes

Reason for not being valid:

6

Initiator	*Triggering Action*	*Effect*	*Recipient*
Ratchet, and snowman ally	Shooting enemy players	Enemy players health goes down until he dies	All nearby players and ally

Comment: Enemy is incapacitated and ally team keep base

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Possible	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Possible		Yes

Reason for not being valid:

7

Initiator	*Triggering Action*	*Effect*	*Recipient*
Ratchet	Breaks box or walks over power up	Picks up power up/weapon, powerup is removed from scene	Ally player

Comment: Other players can no longer take powerup

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Potentially	Mechanical	Sync	Possible	Possible	No

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Possible	No	Yes

Reason for not being valid:

8

Initiator	*Triggering Action*	*Effect*	*Recipient*
Villetzu	Shooting at enemy "spore crazed" until killing	Screen shows message "Villetzu devastated spore crazed"	All players

Comment: Everyone is informed about death/kills

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Informational	Sync	Guaranteed	Yes	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Yes	Yes	Unknown	Unknown

Reason for not being valid:

9

Initiator	*Triggering Action*	*Effect*	*Recipient*
Either	Moving/dodging	Character moves into/out of range	Other player

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

10

Initiator	*Triggering Action*	*Effect*	*Recipient*
Either/both	Charging	Avatar glows with flaming light and resource is generated	Other player

Comment: Other players knows the enemy is more powerful but also vulnerable while charging. Often will take advantage and also charge to keep up

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Informational	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

11

Initiator	*Triggering Action*	*Effect*	*Recipient*
Goku	Hitting Enemy	Enemy health diminished	Other player

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

12

Initiator	*Triggering Action*	*Effect*	*Recipient*
Vegeta	Shields/covers	Vegeta is protected from basic attacks	Other player

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

13

Initiator	*Triggering Action*	*Effect*	*Recipient*
Goku	Breaks shield/cover	Vegeta is staggered, exposed, vulnerable	Both

Comment: goku's reaction to vegeta covering

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

14

Initiator	*Triggering Action*	*Effect*	*Recipient*
Vegeta	Defensive move	Goku is displaced without him moving voluntarily	Both

Comment: Goku can't keep damaging Vegeta

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

15

Initiator	*Triggering Action*	*Effect*	*Recipient*
Goku	Ultimate special move	Goku's resource is depleted. Vegeta is greatly damaged	Other player

Comment: Vegeta could not avoid this damage, unlike on most other occasions. Vegeta could only have prevented it beforehand

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

16

Initiator	*Triggering Action*	*Effect*	*Recipient*
Felipe (Goku)	Changes character	Character changes	Other player

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

17

Initiator	*Triggering Action*	*Effect*	*Recipient*
Felipe (later leo)	Taunts	taunting audio plays	Other player

Comment: Wants to cause enemy to make mistakes, or player is just feeling superviour and cocky

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Informational	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

18

Initiator	*Triggering Action*	*Effect*	*Recipient*
Red player	Choose character	Character is chosen	Other player

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

19

Initiator	*Triggering Action*	*Effect*	*Recipient*
Yoshi player	Do kamehemeha	Enemy kamehemaha is countered and a special fight situation arose	NSFW player

Comment: Yoshi did this as a reaction to nsfw doing his special move

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

20

Initiator	*Triggering Action*	*Effect*	*Recipient*
Stinky pickle	Climb over wall	other climb wall	Stinky, Crisps, P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Possible	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Possible	No	Possible

Reason for not being valid: None

21

Initiator	*Triggering Action*	*Effect*	*Recipient*
Crispy	Gunshot	Move away	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid: None

22

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Team mate down	move towards target	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	No	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid: None

23

Initiator	*Triggering Action*	*Effect*	*Recipient*
El Condobes	Sticks head out of cover	Gets shot (neob)	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Possible	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Possible	No	Yes

Reason for not being valid: None

24

Initiator	*Triggering Action*	*Effect*	*Recipient*
Opponent	Appears on map as arrow	P1 approaches	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Unknown	Sync	Possible	No	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Unknown

Reason for not being valid: None

25

Initiator	*Triggering Action*	*Effect*	*Recipient*
Crispy	Was shot and nearly KO, needs health	P1 approaches crispy to heal	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	No	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Unknown

Reason for not being valid: None

26

Initiator	*Triggering Action*	*Effect*	*Recipient*
Yashamaro	Flashes on minimap as nearby	P1 approaches to shoot them	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	No	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Unknown

Reason for not being valid: None

27

Initiator	*Triggering Action*	*Effect*	*Recipient*
Crispy	Yashamaro kill stolen	Pissed off	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	No					

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

28

Initiator	*Triggering Action*	*Effect*	*Recipient*
Evaported	Was shot	Jumps over nearby ledge for cover	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	No	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Unknown

Reason for not being valid: None

29

Initiator	*Triggering Action*	*Effect*	*Recipient*
fer0311	Ally of P1 shot (Nanndaseer)	P1 takes cover then shoots back when foe distracted	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	No	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Unknown

Reason for not being valid: None

30

Initiator	*Triggering Action*	*Effect*	*Recipient*
Stanper	Appears on screen	Takes cover and runs	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid: None

31

Initiator	*Triggering Action*	*Effect*	*Recipient*
davidpad	Crawls on floor near P1	P1 brings out grenade to kill davidpad	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid: None

32

Initiator	*Triggering Action*	*Effect*	*Recipient*
fer0311, paulo-day	Bunched together	P1 throws molatov cocktail to kill him	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid: None

33

Initiator	*Triggering Action*	*Effect*	*Recipient*
opponent	Close to P1 & stunned	P1 brings out melee weapon	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

34

Initiator	*Triggering Action*	*Effect*	*Recipient*
Xtanker-Thez	Shoots @ P1	Turns back takes cover	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Yes

Reason for not being valid: None

35

Initiator	*Triggering Action*	*Effect*	*Recipient*
Unnamed fo	Approaches in hidden view	P1 waits then tries to flank opponent	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Unknown

Reason for not being valid: None

36

Initiator	*Triggering Action*	*Effect*	*Recipient*
Foe	Appears in screen	P1 shoots	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid: None

37

Initiator	*Triggering Action*	*Effect*	*Recipient*
Foe	Approaching Footstep	P1 equips grenades	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Possible	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Unknown

Reason for not being valid: None

38

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Sees foe through hole in wall after hearing then shoot	Fires at foe	Foe

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	No					

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

39

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	P1 approaches tunnel with two foes	Both foes fire on P1, P1 killed	2x Foes + P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

40

Initiator	*Triggering Action*	*Effect*	*Recipient*
Foe	Hides behind cover	P1 throws grenade, hit player behind cover	P1, Foe, Ally

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Unknown

Reason for not being valid: None

41

Initiator	*Triggering Action*	*Effect*	*Recipient*
Foe	Approaches ticking timebomb in sight of P1	P1 shoots	P1, Foe

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	No

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	No

Reason for not being valid: None

42

Initiator	*Triggering Action*	*Effect*	*Recipient*
Foe	Reveals themselves from cover	Gets shot by p1	P1

Comment: Camper – suckmytoe

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Unknown

Reason for not being valid: None

43

Initiator	*Triggering Action*	*Effect*	*Recipient*
Allies	Smoke grenade explodes	P1 + allies fire blindly into the smoke	P1, Allies, Foe

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid: None

44

Initiator	*Triggering Action*	*Effect*	*Recipient*
Ally	Throws grenade	Foes see other grenade and chuck their own	P1, Allies, Foe

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Possible	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid:

45

Initiator	*Triggering Action*	*Effect*	*Recipient*
Andres	take off	- allows rest of players to take off \n - "starts the game"	- all other players \n -himself

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid:

46

Initiator	*Triggering Action*	*Effect*	*Recipient*
Andres	shoots weapons	- "player 1" sees it (well, they all do)	- all players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid:

47

Initiator	*Triggering Action*	*Effect*	*Recipient*
#9 + #10	Fly / move	a) all players see it b) "player 1" changes course of movement	a) all players b) player 1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid:

48

Initiator	*Triggering Action*	*Effect*	*Recipient*
#11	slows to a stall	a) all players see b) player 1 misses shots	a) all players b) player 1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid:

49

Initiator	*Triggering Action*	*Effect*	*Recipient*
Player 1	shoots weapons	- all players see \n - target player gets hit (and dies)	a) all players b) target player (chill 31)

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Yes	Yes	Yes	Yes

Reason for not being valid:

50

Initiator	*Triggering Action*	*Effect*	*Recipient*
Player 1	shoots weapons	- other players move differently	- opposing player (blue) - archie (ally, red)

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Possible	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

51

Initiator	*Triggering Action*	*Effect*	*Recipient*
Green	moves	- green moves \n - both players see	- both players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

52

Initiator	*Triggering Action*	*Effect*	*Recipient*
Red	jumps	-red moves/jumps \n -both players see	- red - both players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

53

Initiator	*Triggering Action*	*Effect*	*Recipient*
Green	jumps	a) Pow block hit b) red gets hit: drops item + gets stunned	a) both players b) red

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

54

Initiator	*Triggering Action*	*Effect*	*Recipient*
Red	jumps	lands on green, hitting them	green

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

55

Initiator	*Triggering Action*	*Effect*	*Recipient*
Red	moves	picks up item, others see	- red - all others

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

56

Initiator	*Triggering Action*	*Effect*	*Recipient*
Red	jumps	hits block, killing enemy, all players see	- all players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

57

Initiator	*Triggering Action*	*Effect*	*Recipient*
Red	moves	touches creep corpse, gets 1 gold	- red

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

58

Initiator	*Triggering Action*	*Effect*	*Recipient*
Green	moves/jumps lands on enemy	player takes damage, dies	Green, but also red

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

59

Initiator	*Triggering Action*	*Effect*	*Recipient*
Green	finishes level	Level + vanity score goes up	Green

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

60

Initiator	*Triggering Action*	*Effect*	*Recipient*
White player	Places balloon	Moves structures	all players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

61

Initiator	*Triggering Action*	*Effect*	*Recipient*
White player	Places balloon	Causes balloons to pop	all players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

62

Initiator	*Triggering Action*	*Effect*	*Recipient*
Black player	Building tower higher	other player can build higher	orange player

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

63

Initiator	*Triggering Action*	*Effect*	*Recipient*
Black player	Selects level	screen goes to loading	all players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

64

Initiator	*Triggering Action*	*Effect*	*Recipient*
Black player	Moves screens	moves screens view for all players	all players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

65

Initiator	*Triggering Action*	*Effect*	*Recipient*
Silver car (right of screen)	accelerating sooner	Green car pulls behind	green car

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Unknown

Reason for not being valid: None

66

Initiator	*Triggering Action*	*Effect*	*Recipient*
Silver car	drives through power up	Green car drives through different powerup	green car

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid: None

67

Initiator	*Triggering Action*	*Effect*	*Recipient*
Silver car	rams into player car	player car turns to compensate for shove	player car

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid: None

68

Initiator	*Triggering Action*	*Effect*	*Recipient*
Silver car	crashes	forces player car off the track	player car

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

69

Initiator	*Triggering Action*	*Effect*	*Recipient*
Passing car	Turns infront of centre car	Centre car turns to avoid	center car

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	Unknown	Possible

Reason for not being valid: None

70

Initiator	*Triggering Action*	*Effect*	*Recipient*
Mario	Movement	Both players observe movement, both characters move	All players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Informational	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

71

Initiator	*Triggering Action*	*Effect*	*Recipient*
Mario	Jump	Mario jumps, both players observe	All players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

72

Initiator	*Triggering Action*	*Effect*	*Recipient*
Mario	Jumps into yellow box	Box turns green, Box moves right, collect coin	All players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

73

Initiator	*Triggering Action*	*Effect*	*Recipient*
Luigi	Jumps into green box	Box turns red, box moves ????, collects coin	All players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

74

Initiator	*Triggering Action*	*Effect*	*Recipient*
Mario	Jumps into red box	Box turns red, box moves ????, collects coin	All players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

75

Initiator	*Triggering Action*	*Effect*	*Recipient*
Mario	Moves off screen	Both characters transition scene	All players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

76

Initiator	*Triggering Action*	*Effect*	*Recipient*
Mario	Initiates dialog with NPC	All players observe ????	All players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

77

Initiator	*Triggering Action*	*Effect*	*Recipient*
Mario	Ends dialog with NPC	All players observe ????	All players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

78

Initiator	*Triggering Action*	*Effect*	*Recipient*
???	Presses select	All players observe inventory	All players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

79

Initiator	*Triggering Action*	*Effect*	*Recipient*
Mario	Players presses button	Mario poses, players observe	All

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Unknown	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

80

Initiator	*Triggering Action*	*Effect*	*Recipient*
Luigi	Presses start	Luigi takes movement control	All

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

81

Initiator	*Triggering Action*	*Effect*	*Recipient*
Lead player	Navigates menu	Can use items? Players observe	All

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Unknown	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

82

Initiator	*Triggering Action*	*Effect*	*Recipient*
Protos player	Builds building	Extra building added to environment	(Discovering) Opposing player

Comment: Hasn't been observed (yet) by a player. Not interaction?

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Potentially	Mechanical	Sync	Possible	Unknown	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Unknown	Unknown	Unknown

Reason for not being valid:

83

Initiator	*Triggering Action*	*Effect*	*Recipient*
Protos player	Builds units	Extra units in environment	(Discovering) Opposing player

Comment: Hasn't been observed (yet) by a player. Not interaction?

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Potentially	Mechanical	Sync	Possible	Unknown	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Unknown	Unknown	Unknown

Reason for not being valid:

84

Initiator	*Triggering Action*	*Effect*	*Recipient*
Protos player	Units collect resources	Resources removed from environment	(Discovering) Opposing player

Comment: Hasn't been observed (yet) by a player. Not interaction?

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Potentially	Mechanical	Sync	Possible	Unknown	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Unknown	Unknown	Unknown

Reason for not being valid:

85

Initiator	*Triggering Action*	*Effect*	*Recipient*
Protos player	Orders unit to explore	Discovers location of enemy player	(Discovering) Opposing player

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Potentially	Mechanical	Sync	Possible	Unknown	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Yes	Unknown	Yes

Reason for not being valid: None

86

Initiator	*Triggering Action*	*Effect*	*Recipient*
Player 1 (P1) (top screen)	Moves	Change location	Player 2

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

87

Initiator	*Triggering Action*	*Effect*	*Recipient*
Player 2	open gate	Remove barrier	all

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

88

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Shoots	aggros npc	all

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

89

Initiator	*Triggering Action*	*Effect*	*Recipient*
P2	Shoots	damages NPC	NPC

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

90

Initiator	*Triggering Action*	*Effect*	*Recipient*
NPC	Shoots P1	misses P1 roll dodges	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

91

Initiator	*Triggering Action*	*Effect*	*Recipient*
NPC	Shoots P1	damage to P1	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

92

Initiator	*Triggering Action*	*Effect*	*Recipient*
P2	Shoots	kills NPC	NPC

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

93

Initiator	*Triggering Action*	*Effect*	*Recipient*
P2	Pick up ammo	ammo	P2

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

94

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Hits NPC	damage	NPC

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

95

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Kicks NPC	damage	NPC

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

96

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Hides behind crate	protected	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

97

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Change weapon	new weapon	P1

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Informational	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

98

Initiator	*Triggering Action*	*Effect*	*Recipient*
NPC	Shoots	P2 hides	P2

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

99

Initiator	*Triggering Action*	*Effect*	*Recipient*
Self	Collision	Collision	Car behind

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

100

Initiator	*Triggering Action*	*Effect*	*Recipient*
Blue Chevrolet	Change position	Change Position	Self

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Possible

Reason for not being valid:

101

Initiator	*Triggering Action*	*Effect*	*Recipient*
a player	Joins grid	1 more player	All players

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	No	Unknown

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Yes	Yes	Unknown	Unknown

Reason for not being valid:

102

Initiator	*Triggering Action*	*Effect*	*Recipient*
garage1647 (self)	Starts moving	accelerates	all

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

103

Initiator	*Triggering Action*	*Effect*	*Recipient*
self	Overtakes	passes	P Dreootbav

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

104

Initiator	*Triggering Action*	*Effect*	*Recipient*
red	select char		blue

Comment: Also 00:07:59 and 00:08:11

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

105

Initiator	*Triggering Action*	*Effect*	*Recipient*
Man 1	picking characters	Socializing	Man 2

Comment: Banter + negotiation + character technicalities discussion

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

106

Initiator	*Triggering Action*	*Effect*	*Recipient*
Man 1	picking characters	raport building?	Man 2

Comment: talk about previous game experiences

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

107

Initiator	*Triggering Action*	*Effect*	*Recipient*
Man 1	narrative character selection	building conversation/relationship around chatacters + player	Man 2

Comment: “hey my boy Ross”

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

108

Initiator	*Triggering Action*	*Effect*	*Recipient*
Man 1	team naming		Man 2

Comment: "Are we using like max"

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

109

Initiator	*Triggering Action*	*Effect*	*Recipient*
Man 1	no clue what this part is : kitting out characters?	game negotiation	Man 2

Comment: "are we using like max-level characters?" "You make it like even playing ground"

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

110

Initiator	*Triggering Action*	*Effect*	*Recipient*
Man 1	Question + instruction	game teaching	Man 2

Comment: "are lvl ups random?"

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

111

Initiator	*Triggering Action*	*Effect*	*Recipient*
Man 1	changing exp	explaining action	Man 2

Comment: "they're not random"

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

112

Initiator	*Triggering Action*	*Effect*	*Recipient*
blue	selects a char		red

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Informational	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

113

Initiator	*Triggering Action*	*Effect*	*Recipient*
red	cursor moves		blue

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Informational	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

114

Initiator	*Triggering Action*	*Effect*	*Recipient*
blue	selects a char		

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Informational	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

115

Initiator	*Triggering Action*	*Effect*	*Recipient*
red			blue

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

116

Initiator	*Triggering Action*	*Effect*	*Recipient*
blue	moves cursor	sees red+blue tiles	red

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Informational	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

117

Initiator	*Triggering Action*	*Effect*	*Recipient*
blue	moves pegasus		red

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

118

Initiator	*Triggering Action*	*Effect*	*Recipient*
blue	moves chars		red

Comment: Also 7:08 and 7:18

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

119

Initiator	*Triggering Action*	*Effect*	*Recipient*
right	tank firing		left

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

120

Initiator	*Triggering Action*	*Effect*	*Recipient*
left	plane taking off		right

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

121

Initiator	*Triggering Action*	*Effect*	*Recipient*
left	plane flying		right

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

122

Initiator	*Triggering Action*	*Effect*	*Recipient*
right	tank firing		left

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

123

Initiator	*Triggering Action*	*Effect*	*Recipient*
left	plane has target in crosshairs		right

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

124

Initiator	*Triggering Action*	*Effect*	*Recipient*
right	shooting down thing		left

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

125

Initiator	*Triggering Action*	*Effect*	*Recipient*
right	shooting down things that are in close range		left

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

126

Initiator	*Triggering Action*	*Effect*	*Recipient*
left	pursues red plane		right

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

127

Initiator	*Triggering Action*	*Effect*	*Recipient*
right	red plane takes off		left

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

128

Initiator	*Triggering Action*	*Effect*	*Recipient*
left	plane explodes		right

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

129

Initiator	*Triggering Action*	*Effect*	*Recipient*
right	plane explodes		left

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

130

Initiator	*Triggering Action*	*Effect*	*Recipient*
Team 1 'Dan?'	reinforces infantry base	has stronger base levels	All

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

131

Initiator	*Triggering Action*	*Effect*	*Recipient*
Team 1 'Dan?'	Ends move	Turns over game to team 2	All

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

132

Initiator	*Triggering Action*	*Effect*	*Recipient*
White phoenix	Adds tanks	has more tanks	All

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

133

Initiator	*Triggering Action*	*Effect*	*Recipient*
White phoenix	Ends move	miles' turn now	All

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

134

Initiator	*Triggering Action*	*Effect*	*Recipient*
Miles	Adds tanks	has more tanks	All

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

135

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Moved pieces	advanced forward	P2

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Potentially	Mechanical	Sync	Possible	Possible	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Possible	No	Possible

Reason for not being valid: None

136

Initiator	*Triggering Action*	*Effect*	*Recipient*
P2	Moves pieces	advanced players forward	P1

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Potentially	Mechanical	Sync	Possible	Possible	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Possible	No	Possible

Reason for not being valid: None

137

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	ends turn	P2's turn	All

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Possible	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Possible	No	Possible

Reason for not being valid: None

138

Initiator	*Triggering Action*	*Effect*	*Recipient*
P2	ends turn	P1's turn	All

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

139

Initiator	*Triggering Action*	*Effect*	*Recipient*
Player 2 (Mails 33)	shoots gun	hits P1, eliminates him	P1 yellow team

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Yes	Yes	No	Possible

Reason for not being valid:

140

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	moves between team options on menu	changes team then changes back	Blue team / yellow team

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No	No					

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid:

141

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	shoots gun	hits fence/wall	P2

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Potentially	Mechanical	Sync	Possible	Unknown	No

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Unknown	No	No

Reason for not being valid:

142

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	shoots gun	hits p2	P2

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Yes	Yes	Yes	Yes

Reason for not being valid:

143

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	creates game	match created with p2	All

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Possible	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid:

144

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Shoots gun	eliminates player ‘mr coke’	’Mr coke’ player

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

145

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Shoots gun	hits wall	P1 + team mate

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Potentially	Unknown	Sync	Possible	Possible	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Possible	No	Possible

Reason for not being valid: None

146

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1 + team mate	Shoots gun	eliminates player 'pannta'	P1, team mate, + 'Pannta'

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Possible	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

147

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Reload	reload gun quickly to shoot	P1, teammate + other player

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Informational	Sync	Possible	Unknown	

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Unknown	No	

Reason for not being valid:

148

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Spins around on countdown	distracts other players / amuses them	P1 team

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
No						

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*

Reason for not being valid: None

149

Initiator	*Triggering Action*	*Effect*	*Recipient*
P1	Shoots	Hits team mate	Teammate 'Gg'

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Unknown	Sync	Guaranteed	Unknown	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Unknown	Unknown	Yes	Yes

Reason for not being valid:

150

Initiator	*Triggering Action*	*Effect*	*Recipient*
'Pi zza'	dropped out of game	Yellow team loses player	All

Comment: Any player can do

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Possible

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
Yes	Yes	No	Yes

Reason for not being valid:

151

Initiator	*Triggering Action*	*Effect*	*Recipient*
(Any) wrestler	Moves	Wrestler move, other player observes	Everyone

Comment: All players observe all interactions as whole playerspace is always viewable. Man, this one was a mess. So many interactions! Not sure how to break them down or what counts as a duplicate

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

152

Initiator	*Triggering Action*	*Effect*	*Recipient*
(Any) wrestler	Lunges at another player (miss)	Wrestler move, other player observes	Everyone

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

153

Initiator	*Triggering Action*	*Effect*	*Recipient*
Undertaker	Wrestler attacks ref	Wrestler move, other player observes	Everyone

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

154

Initiator	*Triggering Action*	*Effect*	*Recipient*
Rhyno	Attacks HBIC (or other)	Other player loses control / takes damage	Everyone

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

155

Initiator	*Triggering Action*	*Effect*	*Recipient*
Unsure. The opponent. Or 'the system'	Quick time event	Player prompted to press button to get up?	Everyone

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

156

Initiator	*Triggering Action*	*Effect*	*Recipient*
Undertaker	Dragging Rhyno	Both players move	Everyone

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

157

Initiator	*Triggering Action*	*Effect*	*Recipient*
Undertaker	Interrupts other player attack	Other player freed from grapple	Everyone

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

158

Initiator	*Triggering Action*	*Effect*	*Recipient*
Rhyno	Picks up object	Rhyno receives/wields chair	Everyone

Comment: None

Is Valid	*Is Interaction*	*Interaction Type*	*Synchronicity*	*Inferred Likelihood*	*Initiator Identity*	*Identify Recipient*
Yes	Yes	Mechanical	Sync	Guaranteed	Yes	Yes

Explicit Awareness	*Deductive Awareness*	*Explicit Feedback*	*Deductive Feedback*
No	Yes	No	Yes

Reason for not being valid: None

Appendix C

Games Excluded from Interaction Analysis

Title	Genre	Reason
The Orange Box	action	Collection of games – No clear game that has that score
Ace Combat 04	flight	"Insufficient info: One sentence wiki; one youtube video; no PS4 port"
MX Unleashed	racing	"Insufficient info: one youtube video; no details on multiplayer beyond freeroam"
Midnight Club 3: Dub Edition	racing	"Ignored Gamemodes: Paint; Tag; Detonator; Race editor – Not enough info"
Golden Sun: The lost age	Role-playing	No multiplayer footage or information readily available
Infinite Space	Simulation	Insufficient info on multiplayer mode
Mega Man Battle Network 3	Role-playing	No multiplayer footage or information readily available
Phantasy Star Online Episode I and II	Role-playing	Massively multiplayer

Appendix D

Example Interview Transcript

The following is an example of an interview transcript that was produced during the study in Chapter 6. They have been published under DOI 10.5258/SOTON/D1971 [84].

Researcher: When you were playing through the story, when did you guys first notice or ssupect the other player might have something to do with your story?
Participant 1: Around act 2 I think, somewhere... firstly, i was given two choices to tell Sarah something or to help her in the plan, and er, check for people and when she doing a safe or try to look for money or something, and I chose to stick to the plan and at that point I somehow, like, it clicked that I might be, err, influencing the other player. Somehow. Later, there was blue text "The other player chose this" and from then on i was pretty sure that he had the same thing done... the same thing that I did to him, he did to me, like, he had a choice
Researcher: okay. Interesting, what about you [p2]?
Participant 2: probably wasn't until i saw the text at the top that saiad "the other player made this choice", or whatever it was it said.
Researcher: interseting, so that was the first thing that tipped you off?
Participant 2: yeah, until then, it didn't seem like there was anything else affecting it, that i couldtell
Researcher: okay, fair enough! So, so when you first saw that blue text that said the other player had made a decision, how did that affect... how did that make you feel, what did it make you think about?
Participant 2: it made me wonder what other choices they had...
Participant 1: definitely, i... thats one part, and what else.... i was just happy that he chose that! it sounded like the better otion, but maybe he chose the worst path, i don't know...
Participant 2: that was.. that was the other thing, because obviously each of the choices has like a name at the top of the block of text, and i was wodnering whether we saw the same name for those decisions made, or not. and whether or not that might affect their future decision making.

Researcher: interesting, was this something you were thinking about at the time?
Participant 2: err
Researcher: or is it something you just thought about, sort of now
Participant 2: yeah, it was at the time when i saw that, i thought, i wonder if they're aware of which choices i've made? and this might make them, this might affect their judgement..
Participant 1: yeah, exactly, yeah
Participant 2: but.. i get the feeling we were given different like, header text for the decisions. Based on what ended up happening, but im not certain.
Researcher: interesting, so did you find that that affected your decision making?
Participant 2: not really.
Researcher: interesting, so what were you mainly thinking about when you were making a choice?
Participant 2: mostly minimising risk!
Researcher: what risk?
Participant 2: well, based on the context, it seemed this is... it seemed like the kind of situation where it would be quite easy tog et your character killed by making bad choies
Participant 1: yeah, exactly
Participant 2: so it was... mostly trying to avoid that
Participant 1: yeah, i was completely the same, i tried to go for the good edning, and mostly do the right decisions, even though there was death and... you know, not really the good things, but i tried to do the right thing.
Researcher: Why did you try to do the right thing?
Participant 1: i just... didn't want to see the characters ina bad position, like, i just like a story... i want them to have a happy ending. And i tried to help them. Or I tried to help the other person help me to come up with a good ending together. Something <ideal>?
Researcher: interesting.
Participant 1: yeah, like, i noticed i could have given him.. it coould have gone a competely different way, if i had chosen at the beginning something else. or at least, i think it would have gone a different way. i can see how if i... wasn't inquisitive enough, i wouldn't have known a lot of the story or, because i wanted to know what happened with the other person, what their story is. Thats why i kept on trying to pull the information from them.
Researcher: so, were you trying to see the story from a different perspective?
Participant 1: hrm.. something that.. so, my character, i just wanted to know the story of why the other person did the things that i saw, and felt the consequences of.
Researcher: So when you.. were there any decisions that you made or decisions that the other person made that particularly made you... that particularly stood out to you as impactful or interesting, or that generally sticks out in your mind?

Participant 2: i thought it was interesting that you chose to tell me about this data that you found

Participant 1: oh yeah

Participant 2: and that, i think, made me somewhat assume you were going to be taking the friendlier options, shall we say, in the future, which probably did affect some of the decisions that I made later on. I dont know how much.

Participant 1: yeah at the end, i feel like the decision, like, where we were going back and forth talking... i feel that the decision to either do something really bad or just give you the keys, but i wanted to understand why you were doing this, so i kept on asking, then after a while i got an option to go with you. And, i clicked on that, and the first few sentences were like, i draw the gun. and i was like, "wait, i didnt click the wrong one?", and you know, everything turned out fine. and thats the... yeah, so, i could have killed you

Participant 2: yeah

Participant 1: probably, and i dont know if you had the same option for me.

Participant 2: i did

Participant 1: yeah

Participant 2: i was actually planning to

Participant 1: yeah, i was.. i had a small suspicion that you probably had the same option, and that you probably could kill me, but i didnt really care, because i wanted to.. understand, the story, from your perspetive, and understand your actions.

<thoughts on that above

Participant 2: see, i was, as soon as that option appeared, i was planning to go for that eventually, but i was mostly trying to see if i could find a way to get away without killing you, but also without you following. and it turns out, i held out a little bit too long.

Researcher: Would you, if you did it again, would you choose differently?

Participant 2: i would have chosen to shoot him, yeah.

Researcher: why would you have chosen that?

Participant 2: because, from my perspective, or trying to look at it from my characters perspective, being hunted by this shadowy group that we're both part of... he could be a double agent, i cant trust him, i just want to get away. i dont want to kill him, ut if its a choice between killing him and someone knowing where i am, i would absolutely have shot him

Researcher: so during the final scene, did you suspect the other person had choices they could make?

Participant 2: <uncertain sounding> yes, i also had a feeling that they... that you probably had the option to shoot me.

Participant 1: by the final scene you mean the..?

Researcher: the last dialog.

Participant 1: uh-huh, yeah.

Researcher: so, how did it affect you, knowing, or even suspecting, sorry, that rhe other person might have the option to shoot you?
Participant 2: it made me slightly more hesitant to go for the shooting option, because if the other person also has that choice, it isnt guaranteed that that is going to work out great for me, or my character, if it was.. it it was the same situation but only one of the characters had a gun, say only my character had a gun, i absoolutey would have shot you immediately. but because i wasnt sure say, if we both chose to shoot at the same time, i dont know whether that would have actually worked out great for me. so i was seeing if we could get through it without any depth. that was mainly out of concern for my own character, rahter than any altruistic intentions.
Researcher: Okay, so, during the earlier parts of the story, when you were exploring the memories, how did you think you were affecting the other person? did you think you were affecting the oother person?
Participant 2: so at the very start, i didnt think i was, the first point where i thought it might be affecting, well, i would be affecting the other person was during the confrontation with the boss where todd gets berated, but until then, i had the feeling that what was hapepning was that there wasn't much else that could have happened. although apparently that wass wrong, because you had some options before then?
Participant 1: yeah exactly, i had either erm, stick to a plan or do my own thing. and i chose to stick to the plan. and thats this moment where i thought, this probably affected the other player somehow.
Researcher: mhm
Participant 1: when i was given a choice.
Researcher: So, when you thought it might affect the othe rplayer, did that affect you in any way?
Participant 2: yeah, it changed... so, if i didn't think it would affect te other player, this is the option to either stand up for todd or be quiet, i probably would have chosen to stay quiet, but I chose to stand up for him, because i thought that might make you more grateful, and more likely to do other things that might benefit me in the future
Participant 1: ah, yeah. he, we <unintelligible 2 words>
Participant 2: strong theme running through all my responses
Researcher: were you trying to play the other player then?
Participant 2: absolutely
Participant 1: so, you might say you did succeed, but i mean, i was half and half thinking about you as the, as sarah, who is making the choices, the other half thinking about todd and sarah as seperate... just as a story, and like, the fact that you made choices tha taffect my point of view and my story, was a bit disconnected from the fact that i knew you were doing that, if that makes sense?
Participant 2: yeah
Participant 1: like, theres a story, then theres you who changes the story, but i read the story anyway, so its like.. its a bit disconnected

Participant 2: see, for me, it was the opposite of that, i was very much thinking of you as being todd
Participant 1: yeah, exactly
Participant 2: making decisions like, trying to think about what the character would do, as opposed to what i would do, which.. wasn't always the easiest, given that i still dont know why the organisation was so interested in sarah, or what all of that data was, but i can only assume it was bad
Participant 2: yeah.. i don't.. i have no idea
Researcher: so, you were very much thinking about... it sounds like you were thinking about todd and the other player as being synonymous
Participant 2: yeah... mostly.. < <- sounds uncertain/hestitant>, at least, i think i was, consciously, i dont know about subconsciously, obviously
Researcher: so you said there was a disconnect between the idea of the other player and sarah?
Participant 1: yeah, exactly
Researcher: so, how did those.. how did that affect your experience, thinking about it in those terms?
Participant 1: well, it <did/didn't?> get me emotionally invested in the characters, and like, i could, they were.. a couple, i don't know, they were together doing heists and all that, and i thought that they had a connection, so i tried to keep that, and work through that. and the other player was just... mm, was like, it added, he added to the experience, if i can say it like that. like, the fact that sarah wasn't exactly my partner, and that she could do something that isn't expected, because the other player can control that, made me a bit more... even more engaged, because something might happen that completely turns everything around and the story changes, and that's.. yeah, it made me more engaged.
Researcher: so, would you say the story was more... unpredictable? Or..
Participant 1: yeah, so, there were a few parts... yeah, like, a lot of the story, how it falls out, you learn on the go, while its happening, and thats part of the unpredictable things <vote??>, yeah, the fact the other player also could do something unpredictable added to that so, yeah, i would say that... the fact that the game, the story, was not predictable, added to the experience.
Researcher: okay, so..
Participant 1: yeah, especially for the end, i was expecting him to shoot me or do something other than that and.. i was just stalling for time and trying to.. yeah
Researcher: okay, so how did the flashbacks, the memory part of the story, and that final confrontation... how did they differ for you guys?
Participant 2: well, i guess to some extent with the memories, you know there's a maximum amount you can affect the story, because it has to have gone one way for that to have happened in the past to lead to the adventure you're currently in, so, i know im not going to get the option to kill Todd in one of the memories, unless it

turns out to be a game about time travel, which seems unlikely. Erm... outside of that, i don't know? I think, for me, at least they seemed like it was just... still part of the same general story, so it.. i didnt feel like there was any big difference other than the obvious, err, lack of murder potential.

Participant 1: yeah, im mostly the same, i didn't really think about the memories, and err, acts as different things, like i felt them as part of one, complete story, with... just retrospections, but yeha, exactly, i didn't.. i knew that i wouldnt kill you, because in the future i would... yeah, time travel.

Researcher: what about your perception of the other player? did that change between your confrontation and the memories?

Participant 1: for me, i would say yeah, so, in the memories, the choices the other player made weren't that obvious, like i could see the blue text or understand what he might have done, but it wasn't as in my face as wen i was waiting for an answer from them and we were actually talking back and forth, so that's the big difference for me, between the memories and the other story

Participant 2: id pretty much agree with that, bebcause obviously in the confrontation, its... the switching betweeen who's making the decision is a lot more rapid fire.

Researcher: what did you think to that?

Participant 2: it did make me wonder, when i was waiting for you to make a decision, and i still had two of the options and i think they were either 'shoot you' or 'agree to say', what would happen if i'd chosen to shoot. whether it would wait for you to make a decision before resolving or whether that would happen instantly, but that's less to do with the narrative and more to do with just the implementation

Researcher: okay

Participant 1: that's actually a good point, i didn't realise that i was thinking if i shoot him now, he wouldn't be able to explain to me, maybe. yeah, so suddenly i had, if i shoot him now, does his screen just immediately turn off, or does he still have one option, maybe to dodge the bullet, i don't know, or something. so yeah.

Participant 2: i think, it also actually did make me think a lot more about the decisions, because in most of the previous sections where the decisions were somewhat infrequent, I usually made them very quickly, but when it got to that point where there's a lot more happening, i spent a lot more time thinking about how to get the information i wanted out of you, as fast as possible so i could decide to shoot you.

Participant 1: yeah, but im not sure in the end, when i decided i had enough information, i immediately clicked on the 'go with you', and i'm not sure if.. so, i don't think you had any choice when i cicked that.

Participant 2: yeah, so what i would have done if it had been like, you'd offered to go with me, is just shoot you. but instead....

Participant 1: it didn't give you a choice

Participant 2: that happened and like, okay, what now, he's offered to go with you, so, you take him with you, which isn't what i would have done, but obviously you know,

to some extent there are restrictions on how many options you can provide to someone.
Researcher: okay, so lets move on a little bit, so for a bit of bookkeeping, before how this whole scenario began, how well did you know the other player?
Participant 2: not at all.
Researcher: not at all?
Participant 1: nope
Researcher: cool, that's just for my reference, more than anything else. So, in general, when you were playing, how often did you think about the other player? Not at all? All the time? Any other description you want to put forward?
Participant 1: occasionally, for me. any.. at the end, way more. so we started on almost, where is the other player, and it was like... er, just a curve. and at the end, i was literally talking with the other player, so it was...like that
Participant 2: i mean, during the first half, i was kind, idley wondering about what kind of choices they were seeing, and, what like, whether they were seeing the same parts of the story as me or whether they were seeing something completely different, but generally, when think, like, i was only thinking about the character, rather than the other player making decisions.
Researcher: interesting, so, when you were thinking about the other player, when you were considering any aspect of that sort of experience, did you think much about who the other player was, or just that there was another player?
Participant 2: i don't think so. i think maybe, if, we'd known each other before, and i might have some information about how they might react in a situation, i might have thought a lot more about the other player. but given that, we basically dont know each other, like, i recognise you from around campus but thats it, i have no way of telling, what decisions you're more or less likely to make, so, it doesn't really... its not even helpful to think more about the other player as opposed to the character thats presented.
Participant 1: yeah, pretty much the same for me. yeah.
Researcher: okay, so. you mentioned earlier, that, i've notcied that you've interchangably been using the words game and story, is it the case that it was something you were trying to win? or... was it, what are your thoughts on that basically?
Participant 2: so for me, it became pretty obvious early on that sarah as a character pretty much had the goal of get away from everything and... not be found, and have a quiet life, probably. So, like, for me i think i kind of internalised that escaping from everything is kind of the objective of both the game and the story, and any other outcome would feel like... erm, feel like i had soomehow failed the character.
Researcher: interseting, that you'd let the character down?
Participant 2: yeah, kind of. Because i feel like er, for instance, if i'd chosen to stay with the organisation at the end, that to me felt like it would be entirely contrary to everything i'd learned about the characters, both their experience and like, what their actual goals were. and, that, would just seem wrong.

Researcher: okay
Participant 1: well, from my point of view, todd was pretty much clueless abou what's happened, i mean, i might just not have understood a lotp
Participant 2: well that's the impression i got as well
Participant 1: yeah, then, and, that's why, i didn't have like an objective, i just wanted to finish the story, the objective could have been to finish it with a good ending, or sometihng thats resembling a good story, but other than that... yeah, for me, it was yeah, more like story, with inputs from other players. rather than a game that i'm trying to win for myself. like im trying to win for the whole characters... setup. the other player too, so yeah, something like that
Participant 2: yeah, i think i'd agree with that
Researcher: so you were trying to guide the story?
Participant 1: yeah
Researcher: mm.
Participant 1: yeah, guide the story.
Participant 2: i think if, at the beginning, say, you'd told.. you'd told me this is the specific, this is thew inning state for the game, and if that had differed from my opinion about what the characters would have wanted to do, i probably would have intentionally lost the game, because it would feel wrong.
Participant 1: mm, yeah. yeah, exactly
Participant 2: it felt a lot more like a story, than, something like... a standard RPG, where you just... this is the goal, go do it, who cares whether its right
Participant 1: probably mostly because it was actually like a book, you read it, and we have the... we know that books don't change when you read them, so that might be something engrained that we subconsciously think about, that the story is already written and we just try to read it and make the choices that would fit in with the story
Participant 2: maybe, i hadn't thought about that. id be interseted to see if it was presente din a different format, whether that would significantly change the experience.
Participant 1: i mean, if it was an rpg in like, 3d space and all that, it would probably be... different, in the feel, for me at least.
Participant 2: i don't know, it might be.
Researcher: fair enough! Thinking about the experience as a whole, how do you think having the other player there affected your experience?
Participant 1: for me it, was more engagement, so, i actually felt more engaged with the story and with the characters, and if it was just im reading through a story making choices for myself without any other input, then it would have been a bit more boring. because yeah, it's still a nice story, its still an itneresting story, but the fact that another player could change what im seeing and how the story unfolds actually made it more fun and interesting for me.
Researcher: interesting, is there anything else to elaborate on that?
Participant 1: not... that's generally so, it made the game more fun. it made the

story, game, more fun to play. yeah.

Researcher: what about you [p2]?

Participant 2: for me, it definitely affected how i interacted with todd as a character, becayse knowing there was an actual player making decisions, i felt like the actions i made were more likely to have significant, or a useful affected later on when they're making decisions, whereas if i knew it was just a standard text adventure, then what todd does in each situation is pre-programmed, so its a lot harder to tell whether or not they're actually going to respond like a person when you make certan decisions. for example, when i chose during the boss scene to stand up for todd, i feel like knowing there was a person that would see the result of that made me more likely to pick that option, because i know that a person is going to see that as like a nice thing that someone's done, and be grateful, whereas a character that's been written months ago might not necessarily react that way, in the end. it might be that because of the way that its been set up that that decision doesn't ultimately affect something they do later on, whereas when there's an actual person seeing the result of all the choice you know that to some extent, it will always affect what they do later

Researcher: okay, hrm. Okay, so last bit of bookkeeping is just: have you got much experience with interactive narratives, or thiings like telltale games, or...?

Participant 1: what do you mean by much experience?

Researcher: have you played many, or read many before?

Participant 1: ive looked at them, studied them as in how they make the choices within the story, for the game course, ive looked into the choice trees and.. whatever it was, i dont remember, but thats mostly... i dont really normally play games like that.

Researcher: okay

Participant 2: ive played a fair few text adventures and other similar type.. ostensibly interactive narrative games, and ive also played a fair amount of DnD from both the DM and player side. and a lot of avalon and resistance... which, given its entirely about not knowing exactly what decisions other players and making and is very backstsabby, i feel like it was quite influential in the decisions i made in this specific story.

Researcher: mm

Participant 2: erm, so i lied to your character than i necessarily would have done, if i hadn't spent quite a long time lying to and trying to find lies in groups of friends, through games.

Researcher: gotcha, okay, so... last question i think, for now, is... how do you think.. you know, we've now spent about half an hour talking about the story and the experiences you guys had. do you thnink that's changed your perception on that at all, or what have you thought since just discussing it?

Participant 1: well, i realised the scope of it is much greater than i initially imagined. so, at the beginning, i wasn't... like, i'm coming in without an idea whats going to happen, and slowly my brain fills the whole story up, and at the beginning i didn't really make the connection that the other player also created the story with me and

plays the story, but by the end of the game and by the end of this interview here, it's like dawned on me that its much.. more connected with the other player, somehow. like, at the beginning, i was telling you how the other player and the story were seperate, but now i can see how... it's so, it all comes together.

Researcher: okay, what do you think of it now that you've put it all together in your head?

Participant 1: well, i would definitely play stuff like that if given the chance, because it was fun for me to experience, and the fact that i normally don't really read books at all, or... i think actually shows that this, which is a story, like a book almost, actually makes me want to read more stories like this.

Researcher: huh, interesting. what about you [p2]?

Participant 2: erm, so for me, when iw as going through it, i ofteen felt a little bit lost during the story or while making decisions, because i felt that to some extent there was a lack of context or backstory as to what was going on, and occasionally while reading through the actual prose found certain uses of phrase or things that, er, I found a little bit off. but looking back on it, i think that that stuff wasn't really as important as it felt at the time, because it doesn't really matter if I havea ny idea what this organisation did or why they were so interested in sarah, because the important parts of it were the interaction between the characters. and so, you don't need to establish the setting so much, because the character, if the characters are reasonably well defined, you can put them in pretty much any setting and expect them to behave in consistent ways. which has made me think that.. potentially a lot of the like, descriptive prose stuff is more... unnecessary, than i thought before. so like, a this point, i really don't mind that i have no idea what,, for instance, was in those files that you found. whereas at the time, i was, i found it quite frustrating like, what is this information about her? why is she so desperate to get rid of it?

Participant 1: yeah, i was pretty much the same with extracting the information from you, understanding why you were doing all that.

Researcher: mm, huh, well alright, we should probably round it out there guys. i believe you had somewhere to be at 1, right?

Participant 1: yeah, it's <X> so it's just... 2 minutes walk.

Researcher: cool, alright, so we should definitely call it a day at that. i'll leave the recording going for a few more minutes just in case anything interesting is said. But yeah, did you guys enjoy the story?

Participant 1: yeah

Participant 2: yeah, it was good

Researcher: so you guys are the only two i've seen, where todd has left with sarah

Participant 2: oh really?

Researcher: yeah

Participant 2: to be fair, i was trying to stop that happening

<laughter>

Researcher: so this is...
Participant 1: ..who normally dies?
Researcher: ..so when you couldn't stop that... hrm?
Participant 1: who normally dies?
Researcher: todd i think dies more often.. have we had a... nobody has stayed, a handful of todds have let sarah leave.
Participant 1: yeah, i was going to do that if i wasn't given the option to <??>
Researcher: so that was probably, i'd probably say it was a 50/50 split between ;someone getting shot and letting sarah leave. in no situation did sarah stay...
Participant 1: yeah, makes sense.
Researcher: ...at all. and this is the only t ime when todd has left with sarah.
Participant 1: wow, okay
Researcher: so why did you actually choose to leave with sarah in the end?
Participant 1: i felt like they had a story to complete, something er, like, i could see they'd done a lot in the past together, at least that's what I made up and all the mainr easons that... i don't know, in my mind, they were together. something like that.
Researcher: fair enough! just wondering why you were the only person to make that choice. but we have had a couple of accidental shootings happen too.
Participant 2: i can see that happening in that situation though.
Participant 1: yeah
Researcher: we've had the situation once where they've been going to click and the nodes have changed and they've accidentallly hit... shoot instead
Participant 2: oh, yeah
Researcher: well, thank you both for doing the experiment! glad it was interseting at least.
Participant 2: it was, i think... erm, about specifically to do with the actual browser page, when there aren't any more nodesto choose because you're waiting for the other player to make a decision and it just says like "There are no options left" or whatever it is. I think, if you weren't already consciously aware of the fact that there was someone else making decisions that will affect what happens, err, that would have... if i didn't know that, that would have caused me just to leave, very early on. Because.. yeah, i guess i'm done, that was weird, it didn't go anywhere!
Researcher: thats why i had to very explicitly say at the start, and i couldn't tell you you were waiting on the other person, because part of what i was looking at with the study was how you developed awareness of the other person's actions
Participant 2: right, that makes sense
Researcher: and how you understood how you'd affected the other person, and then how all that affected your experience of the whole narrative
Participant 1: mmhm
Researcher: so i was particularly looking a t how certain aspects of the story, that were designed in very sepcific ways, changed your experience. as well as in general, what

doing the whole multiplauer story thing did to the experience of doing an interactive narrative.

Participant 1: really interesting.

Researcher: yeah, ive got to got write up 11 runthroughs of this now, 11 interviews, and see if i can actually come to some conclusions!

Participant 2: well, at least you dont have to transcribe it by hand.

Researcher: yeah, i do..

Participant 2: do you?!

Researcher: yeah, i've got to transcribe all of them.

Participant 2: oh, dont you..

Researcher: yeah, i've got the recordings, but i've got to delete the recordings because it's identifiable...

Participant 2: but on the information sheet, it said that the transcription was going to be done by software?

Researcher: yeah, turns out all the software that can do it is crap.

Participant 2: ah, im not surprised by that. sorry to have been talking for so long then!

Researcher: it's fine, i'd rather have the data and spend more time typing it up than...

<end of interview>

Appendix E

Interactions Identified Per Game

E.1 Advance Wars 2

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Unit attacks unit	M	S	G	N	A	N	A	A	A
Capturing a base	M	S	P	N	A	N	P	A	A

E.2 Counter-Strike

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Dropping a weapon on the ground	M	S	P	N	A	N	P	P	P
Shooting at a player (and hitting)	M	S	G	N	A	N	P	P	A
Killing a player (w/ Notification)	M	S	G	A	A	A	P	A	A
Throwing grenades and hitting	M	S	G	N	A	N	P	P	P
Throwing grenades and missing	M	S	P	N	A	N	P	P	P
Dropping the bomb (deliberately)	M	S	P	N	A	N	P	P	P
Planting the bomb	M	S	G	N	A	N	A	P	A

E.3 Dark Souls

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Leaving a message	I	A	P	N	A	N	N	N	N
Rating a message	I	A	P	N	A	N	N	N	N
Leave a summon sign (W/G/R/D)	M	S	P	P	P	N	N	A	N
Leave a Gravelord summon sign	M	A	P	N	A	N	N	N	N
Summoning another player	M	S	G	N	A	N	A	A	A
Injuring another player	M	S	G	P	P	N	P	P	A
Moving while in CooP/PvP	M	S	P	P	P	N	P	A	P
Healing/buffing another player	M	S	G	P	A	N	P	P	A
Killing a player	M	S	G	P	P	N	A	A	A
Dropping an item (Vagrants)	M	A	P	N	A	N	N	N	N
Kindling Bonfire	M	S	G	N	A	N	N	N	N
Creating a miracle synergy	M	A	P	N	A	N	N	N	N
Ringing the undead parish bell	I	S	G	N	A	N	N	N	N
Dying and leaving a bloodstain	I	A	P	N	A	N	N	A	N

E.4 Dead by Daylight

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Moving around	M	S	P	N	A	N	P	A	A
Moving around and being seen	I	S	P	N	A	N	P	A	A
Colliding with another player	M	S	P	N	A	N	P	A	A
Contributing to Repairing Generators	M	S	P	N	A	N	P	P	P
Finishing Generator Repair	M	S	G	N	A	N	A	P	A
Failing a skill check (loud noise)	M	S	P	N	A	N	P	P	A
Failing a skill check (As seen by Killer)	M	S	G	N	A	N	A	P	A
Looting a box	M	S	P	N	A	N	P	P	A
Stunning a killer with a flashlight	M	S	G	N	A	N	A	A	A
Unhooking an ally	M	S	G	N	A	N	A	A	A
Healing an ally	M	S	G	N	A	N	A	A	A
Attacking a survivor	M	S	G	N	A	N	A	A	A
Vaulting over an obstacle	M	S	P	N	A	N	P	P	A
Vaulting over an obstacle (As seen by Killer)	M	S	G	N	A	N	A	P	A

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Dropping a pallette (on the killer)	M	S	G	N	A	N		P	A
Sabotaging a hook	M	S	P	N	A	N	P	P	A
Local team bonus perk	M	S	P	N	A	N	A	P	A
Global team bonus perk	M	S	G	N	A	N	A		A
Killer moving terror radius into range	I	S	G	N	A	N	P	A	P

E.5 Dragon Ball Z: Budokai Tenkaichi 3

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Injuring a named player	M	S	G	A	A	A	A	A	A
Charging a publicly visible energy bar	I	S	G	A	A	N	A	A	A

E.6 Fire Emblem

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Moving a unit	M	S	G	N	A	N	A	A	A
Attacking Enemy Units	M	S	G	N	A	N	A	A	A

E.7 Greg Hasting's Tournament Paintball

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Shooting Unnamed player + Hit/Kill	M	S	G	A	A	A	A	A	A
Moving own avatar	M	S	P	N	A	N	P	A	P

E.8 IL-2 Sturmovik

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Shooting at named player and hitting	M	S	G	N	A	N	A	P	A
Killing a player (w/ Notification)	M	S	G	A	A	A	A	A	A
Move Another Player (In Vehicle)	M	S	G	N	A	N	A	A	A

E.9 James Bond 007: Everything or Nothing

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Simultaneous Button Press Progress	M	S	P	N	A	N	A	A	A
Picking up items	M	S	P	N	A	N	P	A	A
Clear a path and seeing no enemies	M	S	P	N	P	N	A	A	A

E.10 Journey

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Moving around and not colliding	I	S	P	N	A	N	P	A	
Small ping (No regen)	I	S	P	N	A	N	P	A	A
Energy regen ping	M	S	G	N	A	N	A	A	A
Moving within regen range	M	S	G	N		N		A	A
Pinging and triggering unlock pillar	M	S		N	A	N		A	A
Colliding with another player	M	S	P	N	A	N	P	A	A

E.11 The Last of Us

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Shooting at a player (and hitting)	M	S	G	P	A	A	A	P	A
Shooting at a player (and missing)	M	S	P	P	A	P	P	P	P
Killing a player	M	S	G	A	A	A	A	P	P
Throwing grenades (and hitting)	M	S	G	P	A	P	P	P	P
Throwing grenades (and missing)	M	S	P	P	A	N	P	P	P
Emptying a box of items	M	S	P	P	A	P	P	P	P
Healing an ally	M	S	G	A	A	A	A	A	A
Dropping Mines (and hitting)	M	S	G	P	A	P	P	P	P
Dropping Mines	M	S	P	P	A	P	P	P	P

E.12 Mario and Luigi: Superstar Saga

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Any Button Press	M	S	G	N	A	N	A	A	A

E.13 Midnight Club 3: DUB Edition

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Colliding with another car	M	S	G	N	A	N	A	A	A
Stealing/Taking the flag	M	S	G	A	A	N	A	A	A
Moving	M	S	G	N	A	N	A	A	A

E.14 RACE 07: Official WTCC Game

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Blocking off area (movement)	M	S	P	N	A	N	A	P	P
Colliding with another car	M	S	G	N	A	N	A	A	A

E.15 Ratchet and Clank: Up Your Arsenal

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Shooting a named player (and hitting)	M	S	G	P	P	P	P	P	A
Shooting a named player (and missing)	I	S	P	N	P	P	P	P	P
Killing a player (w/ Notification)	M	S	G	A	P	A	P	A	A
Capture Territory	M	S	G	P	A	P	A	P	A

E.16 Starcraft

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Mining/Mined Minerals – Other player aware	M	S	P	N	A	N	A	P	A
Moving Units	M	S	P	N	A	N	A	A	A
Placing Buildings	M	S	P	N	A	N	A	A	A
Attacking Enemy Units	M	S	G	N	A	N	A	A	A

E.17 Super Mario Advance 4

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Passing the turn (via Death or Win)	M	S	G	N	A	N	A	A	A

E.18 Toy Soldiers

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Building Emplacements and seeing them	M	S	P	N	A	N	P	A	A
Launching Units/Queueing Units	M	S	G	A	A	N	A	A	A
Taking control of a unit	I	S	P	P	P	N	P	A	A
Moving a unit that can be seen	M	S	P	P	P	N	P	A	A
Shooting a unit	M	S	P	P	P	N	P	A	A

E.19 World of Goo

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Moving Cursor	I	S	G	N	A	N	A	A	A
Placing goo	M	S	G	N	A	N	A	A	A
Dragging goo	M	S	G	N	A	N	A	A	A
Moving the shared view	M	S	G	N	A	N	A	A	A

E.20 WWE: Day of Reckoning

Interaction Name	Interaction Type	Synchronicity	Likelihood	Explicit Awareness	Deductive Awareness	Explicit Feedback	Deductive Feedback	Initiator Identifiability	Recipient Identifiability
Attack an enemy	M	S	G	N	A	N	A	A	A
Moving a perceivable avatar	M	S	G	N	A	N	A	A	A

Appendix F

Honour Between Thieves - Experimental Story

F.1 Introduction

Honour between thieves is the experimental story described in Chapter 5. Written by a team of 3, the story has 30 flashback nodes (10 preparatory nodes, 20 choice nodes), 286 conversation nodes, 13 introduction nodes and 10 epilogue nodes. There were additional supporting nodes necessary for the experiment or to maintain the flow of the narrative, such as the nodes during the finale stating ""Sarah is waiting for Todd to speak", or to implement character selection at the start. In terms of prose, the story was approximately 7000 words long, and typically takes 40-60 minutes to read.

It has been included below in multiple forms, as part of a research through design approach. The artefact itself contains design decisions and implicit knowledge that may be useful to future researchers. It has been published under DOI 10.5258/SOTON/D1972 [87].

F.2 Artefact Source

This is the full source code in typescript to generate the JSON for StoryMine. The code has been turned into a "tar" archive, then compressed using "gzip", and encoded in "base64". It can be retrieved by copying out the text, decoding it from "base64" into a file, decompressing that file using "gzip', then extracting the files from the archive using "tar".

H4sIAAAAAAAAA+19a3fbOJLofG3/CrZ2zkbOKJKf8Ywz6azz6Il3kzg39nSfvRnfblqCLLYpUktSdnuSnDN/Y8
+598/tL7n1AEAABPWyrSTT4u50ZBKPQqGqUFUoFPKs2/ndHT8b8Ozt7uK/m3u7m+a/6vnd5s7m5t7O7s7u

9sPfbWxubu3u/S7YvWvA8BnnRZgFwe/yUdrvX9eXm/b9K31ymP/uYJxctIv8rvrACX64s1M3/zt7e3t6/ndg4jc
2t/Yebvwu2LgrgMznNz7/0XCUZkXw4bhIs+vvx0m3iNKkFVh/HoviU9DP0mHQyPH9KA67Ig/HxSDNouQ8js4
6+L9h2hNx3rGqNh6tWT08S5NeZHSh/36WDkdhFuVpMm9Xugmjrx+gqfAsFu9EX2Qi6Yo5Gq3UNdp9G57P0
xQW90B13E1HMzWTdwdiGOad4TguIihzLbKO1UhutF5i8GgksjDptYLy1cn14j1qBB/TR+hyTfxKfUZJIbI+N
BQ8QxESfFgL4LmUEO4HFVS2qECU/zWJ0+6F6Omm9x1yUAVfzVJsTK0pktu3iZeLTCiw9qluPEcj/J7LYY1
gMvMn+wFO6vtTbjbHSXhSDpQmhT8l4RC/5AWiV5YGSVPIIcGnszSNRSgBLAZR/gaq5CPo3vxYQteXAAf
dTISFIBCbKcO4b0G8vm9NSCwKhj54HMjybf7748fg/ekjXYiGYxTiv6GQNb52Pggz0Sur4VCNWvQnVGrQutI
I/hAk4teCADrsNdeN7gx8mL2ar6Gdfhjnoqxl YcqoZr8v61lgqko2uoMG/t0I9iXMyFa6miJnqJWIqypNNwlLrbJ5/
mmMk9qE6jwbNouoXy39zcsdFunookRnAFOdKG02opzwrloMHgQ0HwCfKR2kwGi/+F9/PXjVKmEKGmNZs
eEKk/YPupDz4Zgofj3YvzMw3xyd/FQFdVFATcxXxM0N8f5q8eEsF/MzAXoXOHdlt4bWUD6aEhks00wYffgy
Gp+l6akNq2ap1U9SMPTTrKnEapD2WbyuGxyOL9pdhXGQt+N80GRF28PgUlh84sYzUYyzhMXGI1wAtBA5
RDm58aiyIlgCVkKhKvzhcbD5qNLuYY9aJv2fNYifiqsoEXdhBkzR/7c39jYc/X9nGz6v9P8lPFJ7vB+EedDPpY
bYz71K3skV8rEkL5KMb0DPVToO01gCb0AbeR2O/ixVH1kNi373yKtslQVk21HPaRR40n4DnFWIpLBfFuF5rt
5otSaC5dx8WQLQE/0Q1NySixgX3wMKGKLmKCwGJyn/odoA3crCA/JmP4rFM4YIdax+3gYNrfc9vD2+Trp
WM63gAygNaQ9a2g/ujYv+H+99Wje0jYLbfhz8+/HRG9DSslw0zebNsoRrqZbUILypynO70GCeo6hqgwB7EXY
HzaLE/ePvSvlFTbdzEJBlgfeNUdRrnLYMKSfnqizThiIt8zNPnVGA5KtZQk+lUagAeWYV4qk1S8ALVl+tcnK6
jYL0JnhSedUehqMm/sJx478IOqyd0KJq8JMSyybSMzFML8UhCO5MdItX1PrjwEVjuQRBlTTuVcsxFI/Kkp3O
/xZZGqRjVHEFgQT/yYtWUKTBKBOXgCRgmn6URAV8TtNRHlwNRAIQdcdZDjPf1m1Vxv+Y9HwLKnsA
Ckag3N4YlFpCTd4KoGnQcqnYukUhuh0sKHo8dEk350A3ZsVHVqWo3/y2rATLlVqYGCOwCjqly8I07e0o6Ylfj
/rNxvdpdhVmyEuN9eDPwYbbFi7A3dCGRS2y6vGV98yxAcT6uoHJTy3ArPnCg3qjmRITst/KN6VhMCansKm
PGo2yLv3KPsvqhhCXAoLeYN8lW0mRTv8oED997nVr9dzOY+h/UhDfvgY4Wf/b3Nreruh/D/d2VvrfMh7lPR
yB1hPlIpdOwnv9/F7pWvw+DvPBWdi9aAX6J0oN5VFsd/rq9U9cx/BLvkvjeXymWNyo/eJXoMme6JHhVvYn
5Gtq8NYctPjnS9BL52wBqxgKcxdwkQfvwitE0fOwCKXA1ThSqiQsDY1GqTajgez51B2EWdgFXdlXzVCMjdeD
qFSNzZZspVl+gfVQa8CkbyLYUt1sOlVA+TXG9f7U0IFhsSNlVEmRfBRHRbPzt+zJ35KO4QxLFFIMlYTsW1
6jVdtWR6hYjONYlYaeXoH6s29Z4vgWLXGCw7TE1cdjBOgoeS7iaAgaVAaN4msJaGO/YagpWOdCXMsibs33
G6dtQMewaa77+VVUwEINtdYdJakb5iJoPDt6/frFm5OG7ZxR0xIlY/HIU6vTefHmeafjqaXwKD0LNvYcjYvas
0tIs8FActNT6QzsmAuNcB+Amqg9IILq5sLloGbRwXy6+fAYfMV3DvT8UXOe9yvynvcDcp9vmm0I3wOlnNYQ
WDuPI9DBN9fbv6RRQrSpCc5tlqbINzTJiHcDySvRL2aERprZU8FoS4BRhtR8+UPQ+FuCTjoEtezlk8d5pijqk
W8D5TxLxyNsPX96rRe0ptRzLQG3brsyrG/fGdKPWmTzwLDIFYZARgVNJfxQSFFXrpCiNqCy2RaZUli6rRlt
3dy1wYfKM+ckpdKvv6iW8kpLLS6gnY8G+syahEK9qGl8GSvbpCUKLNcRWxg+gc61U6CxNx7syzXCXKEy/
n6SWopIU7626iv8or0pv69bphMTiobDQgDOoN1FWZHbcjwZ6i1yf/WtpGB6v+4jSaIIY1R+ajR9Tho43n2j8rgy
6Q+PqmWfqYkyK+jZk6sZ4outT3EpsmuCBK1Om3iCx49tGNZN5BaDLL0Kfv79B6vIp/3gJLtG+ihSuYtZtkGe
D8UbAaymAzCO+7TJZoyAt9l+tvzlEwHulkN+7EHEnUKt+3YApp0DyRe59pr0oxiK2tCr9aldpK/SK5E9A9H
eXMehNLABpbMABnR77Vgk5wDGt4+DzdkGl6ZBH8gdhFQBP4dhck3QyTFFSTna+mHAKDQEQFTm5qfm
7kVHyk00HC+GxaEld1qja1Vf65mvMKkrU9R4jA0lYzDkP/TXRAdRDYufpGgwHCZkzhACLBZvBWRy7AeW
2bPOQQdyLuXwqWD7jbjCT81ymtkkSKoCio0CxJqyWXg5wPfmEJXGnxhyy/ost7T2g/cMQwYWG85p0mviT
5xR/Lcd9XD2bCZcxwXtMEcjT29+NdcNHy76MWPxQ5RH6BHOxkJ7sMxVIClNFAP3+VShmRnrF5RDSn8c
fHA39Sau0oYAtJt7b8vHU1ympQ5qrZmW1YCiS1cx0OToyZ4igYtaUx9yrRKLw/z2CYmTqpJW9mxwOrZ0M9
3PHFDJUj4dxhjMZHQb0r0ipfQX5Qk3p9teSaPE7sedf/NjhQSspgwVrexfjtGSXTUia/JjdlwSwRy1a9So7ysTvr4g
SLOJSu/Wd4kv4BWPKNV+iuci72YRRQBxaMFhUpgCoeq/0B+198KwGHwypc4nUiPlJ4P2F9SrfWBNtTJM
xbxiukyBMcyvk24J4jAEU84Ui6XlFV6FES7q7AzU25jNRrszEFFuOIl/LRo1e5kGp6hlvxY+j46q1ATfXKgm17V

DK8eVJk7PSybKacyf26/6tTzo/3edt7e9AzAl/uPh3obr/9/d3Fn5/5fy3I7jXOtyOiryKHsuaKvaE+t9GxHeViCXt
9dbCFnHUZ5kYZLP3KAvftpu5da2G1QrIdpSSVhElwK/5i0ZU5eXuyX4J26S33RTphq683QMplypD32o7EpoF0
+Kmv0z11FU+ogQ9k02dEy3EA1pU0Vd28W3aopvlcU9CzTGVNhgU6VyAdl3RrWumrNX4ve2akzwt4Lqy61W
0G6XimrbHFf9py0LePa+uXjG5Q9MpC7MX2n/jsZncdS15qDlfqydjkpJHMS+7QjztQZQ504xGUYDaoZU7Tod
RGsvCINcGC4T9I2KsDsonSUtjH9BLSUZh3F8HYS9HkXESLIOzkRxJaAAvBtyyMsZNsyzWLpcwAwEqiUXrp
dKtfLjIgMd0LoVtmupWYp/wR/SssWY8XaltrOLlAKU2XxNfzuhaattRWFYYFMGtRPZtTVCmh8sg73SpN8c
/+QMwqBLqy8586Tfs90G47CMBTLSbgqNbnHdxQDIPgsqVxY2XciNgUlyar630HjashvlgxLr9YjfmgnxNhkshP
WtW8L6TKD4UV6LMuvF1uk0LG9BFXd0Zj9mdDVPLYiLylTabgwsPwyL7gAIypwbtx/JdarpLWI9/RcfXnn8
uOy6bRzmqIzJREGl89MaL4YbhEUzxmGSOL2VAEmfuPYLCLuasapa81Vp3FhmXST7W9yyW9yqbXGr0uJW
ZdfOFxFsLc3mMSy1iuNBrOkqIAeHltQPlSZrqlxhZCls8shX+QKLGG7K8rBW/YJNfrMbLtpmUEd1DbYdCs7S
W4qCvgex+350o2PU9jwb1KvcyE0fGTdeiyFMjTxQUUPUHnc0lXTc0RJlMkKYqN51SeOj6WI/8A2xrb9XWta
C0VuvLOBwgkURNZVHFbIpH8vP7a1tlEBXsvaFE9esK+a5qf1H9n+UhPGdnPzgZ7L9v721ubfl2P/bG6v4v+U
8N4izu7nperPQQDrwVILKp03Lz69LE/wZ2BHpeRaOBlGXjBCRlfXwYyQ/3lYkoXuSRHdmHrWqPRv/dZyFv
9vT7Nbifph0MzFEoX8XiQmWeHBedTndQ+M5kKUqV/aRWzNtOnxyiVAFiJUt87YYrQZQL0ulC/4Y1MtBq
+bjSdqTJ35ABboUP0bFgMo/M5fpHN8cg7pa5Fh+0rfq9yK8xlYrHwp48Rew9HLq7z/EdV75zM1W4XG+mQX
WjKBmGuxP5KcwvF/akxT2et9TkZOU9/N9m/ctiTOSVvJcvrUlnaYXkUDRxg4L0Ltm2VZvvKN6DWMHBRk
kzeZv6TXV0+EVZZScIDv46TVuSzZN3bRWLeT+RnzCDPuj87HSwNK2lWFRmXu0jEp1/q1yGE9PSJuPqph
D5w9qt8lsiXa9c7fksTr3khvH8hubjf2JBA5Ftv740FuIKIhHZMQ0W1tmnoOBi+yq4XiYoc19tUmbjVYXOMvsjrt
fE0Eidfjji2iEAU9M4Q2tvWplvFG+8+jyDeMctqGcvzeYoW2f/T5VkR73O0Z4EUm5nvjVc8yRnbLlEUeFnWcY
ogUNYsNQjVwkh/pEqXOKDSuJXwFB0nIPHpd96uDLw55hykf9plnBOHNmvn5kmvwKssOkn2r6tOM7qQu7A
szDW5ExN6jazgE4pM3GevBd8GDzScB/YRILosbGo0pzR+j6Kds0Onisaj9RtbEdeuWAVVpEweOK7ec2Z6dMw
Od9Ke/8rqfAE+put8zwVZum5kshOHPzVM89HYl8epTEpUY1Zbh1QN3CeGsweavDjXItEhW19SjyzxGXTjW
MJJBcM9EjYDT/pKRlWg/2g5+Pw2uUNL//4NDop59r/ABWcy6I7xl6GLrd01T3g9Vqo+HWrzoltOugzkvgD2b
D55PL7YreFDbL4y74YJiYAZ4bweVW9k9FOR0/M6olloN8JMKL3EG2hXC3Qnid43SZ6HEnqwbJk1DqorXKg9
Xy9ShWaNa/S3SWEj7X4pc8uEzNLQuhphtXbf3VlLRP8EppeQlIo/XoJZgSGZ5sV2vZRANVLnPfNRu8Aj8zWt
K6mrd5PsN7UDTb7fbR2S+iW7QvQDluuoyiXfvmejTtwDFQonMKv1yNpC704J24jMQV5kyxD2Vba2LlPL7qG
f/CPCfuWXPo2V04uei671SRHzPwNgF8mEOIYOZlO3bs4ieDWZVqYism8ribpx9yuBrz23T1EtXUyErGYGnLb
vIYU3PypZBRTZo6OFUEMuBNrEdK8wsOej2AfIz+dt6BTcbDM5HhNgt3IzdnL5GvRC8wVTIuQA79H/jzM25
J2fK1ibJ8WcRaYNxKDTNo0H4KN9YwkV3tUnsEZGd+d0GzoX9+XzbxDli20Zo+jhZaBDNMlFZvzXnyArtuT
MFrtb09CJNejLvb0X+NGe/BmRiEl1E6zjTiO52TAb6P0ytY/YIQanUvcNGEggL+bPxnOg4AnwHG7+FRBZx
U3DSn3b6AqbDBG4OywUNc9eENbWcWBRiqAEiQgiwLrtLsIgeIQAxRI2Gej4dkXMCfIeenMAkfBK8QevMV6
IYtTg15WNzDbftuOM4BQsFAJykASwt/dyBgMFfYMpMdDkSeAcP9/8swiomwwhwtHgoeCBlTmknaVsI2oLm
3NOQfJToWJklzmCfpOaw1pt0Jywdbz3Y/1SxTbsFGywdmyzTGjT7Y1p+hD6tgbR9V10GU1w6jJmuYO5pJ2c
Lqhzl34jAT5Fqs1IDsImdOkCXWFgBZ8gFMUsDj1lwqeYkWbKRq/EM6ObTUKU1RFEd0wssWOC5tTVrWk8
qCbi5mVcsXlkf7uAKb0zK1yb/+a1D+pc4dfRds4IdvVX2fGVFZsmFxT6oKhWHe+tZ4AtuPEGuu3YU9EDHII
T0Wu0825Bbq1J0FW5twFVFLnRiaVaUaP/mEDyEHJXgBWvYFEdMZnkUjMQpCFXT0dumhMdw2M9QLq
MxVFMcgtQMSvfgFzQRYILoiICSBGM/hZXohErMnnzPobvq0Ty2VES5TjGLLI+tTpVquPKw7n0QZRquTm
ZnEN9tk8uAWmM1ZKt76dN5Rp3XzOcWFMtN8WgJhjvnsdII3aSK02vYiQcdsANZa1EXtjMuAcgYSBdWWXj
qGofa0tiOFOpqJD0i34hOQpbLCKuIuB8goiKeuZrumfuldy/7y7sXByYt3Px29U8lFZ1J4N+ZY4A6h8rmOeDRG
s7kx53Bkhdsfz9Zi49EDcjaKiKanMvN3oNxfoFbeE10AjDJOYxtM8j42nrRXNVGmgooBKzcwVi8Lr6BYHpyPE1
Lk87LHu+QsP/0aDFbn/Pe6/msRz8JiKuYPcPgwcpDBwKU5Hs72is0J+38zIJ1k1mA6dqc5Z2c59Uo/dMChhxw

x9NA3nFMTm84e6w1ImFQyD0Yn7fBOXkYcEgaT0yZhbO4u1/q7omDPvvbtEfC0TfPJKNcEPBm307Yu5qdfB
2ykXc9ITiv1vHaQp3bLJ7BP1yc2hlu6czbnTPIrDHxYnLEwhkFqQ6gqYCBDncyaEO4wUWJhZz3mMoSaO6N4
jVZwHl2iRjOQvh50FWM58vGE2de4dhiTMuO6IcU6Bm0YM4GoqF0+Fp2Kc6yHNjFKOHT7X+Wqy5SnZJkL
ikO/mgcM7FkLCRPSKyvSZyGipyY4X0qtVjQhoGg2akdzhOrey0Geng+K4AFObJSBep5TehY0RKJco176QDF
/C708TxlEYI4lMIKrNt+cE3zTNQ9LhOeZAJYwMCFVntuZrecRENuQpA9rrq3A6RazjnGfLUx2jFmQM1i60M
+dw6yEwLDLZBcfPpFnavHs0cIK3DxdSAGDmjwJtUpYXahc3QQwLRirQ271QdxABzJQHPbC5Bz5YpTmaO
Be8/5Cdh4mkdoGSAHPE3nlS1fXcHJmW8gZdSWl4kYKscAtTsw5ysgoYanEs9SrztLyFTjEUqkuKZxZtC5GUZ
yej8W7MglEGbnGitcLWcTciIAP6rV0nNFe2xsz+LDqv5ZpIaC0262MelTfv7OSt6lzXm/sE15Rv+lJF4ePkSnET
uQky8v0TWbQAfuanYQ7Mm3FVZglzcZfE+UcQ1j1CHh/Cw/QeEAs96arWexMmoapkdTsILbZeDrOMVNqjp
tq43wcxm1r0wlqqoWiUvUAbbM0iApYRs+jBJo4D6PEqn+WFqxD1HX/MiI/Gkh33Avx160FgDZz4+tWMEiH
wqobT+oTt1CHQqAHsFqptjOsJUgrYE9eGvas2tJEKEwHkbeRsF+IbBgWg/rqtUAcJdz52EazslcKw8Ks1H2VX
odxcV1fsR7PKNzS4ZOGjhqtEwSKXFSwjKec1i8lUVatvLrV1SKmSg/1a69Z1V6NZ3SolHNa6dXrcnFr1nQ6wQo
u56MGk7ah7Nb049Wj5Me16Kyo/6p0OZg1Q/CUkq3LAe7GkmucUsTFep//YSm1ukHgy3jw/J95Amr59z9t7mx
sb7v5/7c2V+f/lvLcTv6fOziV9XUeWyPh5rujtG7vy/f1FW4uhvHabZz++wyH2yT4sr952jfKLHZ4TqapNgWaC
qc90dcyjbK0EF0Ma5TpQoFg8bPcpKQ/VObusmw6Ls7ScdJ70TtXF5ydtE4wP195MuWkFZzIEyl25SihumSS7B
slZ6rbc5MlqS/69h6A50SH9JsJBiLj2IuZCTjK6fAXtG0dw5LJBIz4YaeLSiu5eZAqN44J1JSqBCJxdgD6FPZ6nM
5k3QeUCt3FEpsATItmbwt+VYCymzNzvng+W4lHKGOPnGiVbsWaeB0YtVlJw+4prKLLN1u6VXXFFHft9i3
pRHVtko3uecvfs1VWdbzVUk2a/W66GNYUxZFvzXXP1c3+HBCzRlT+3DVY8vcfJAV++hnv1wzzQm38u3BF
l5hsG2H+McxflQWfGV4OyTy2BHQ4y/momUym3ahvX6ZoPll3b552k0gZoQ6ayOpg1lNpOx10G8aRMv3ukRF
AZnY2Ma7C8jrI5+dBqMIl+ARHu0g5UrG57jvDAU9doKSvLA1ekZG3hNPnlB7tiI0Zyh6XCVDw8TF/7bwotm
mVKK4e/iinxCOlKPC/OQxHI8zSo6kHJR0dFnRSyeFD5GNwxw+EPEVHCpWGoJBwHGRZeN3GNbBZirV1
ygpVjfIMykBPaJnhUyToFgIsSNTUhRr/DEV+/4GC34GJZWHg5eowWu5022GRvvj5snsPbKaUmyglK0JSYSA
TGFmfY2mPMLFZSd9AYTSiclMZvaJryATCEzY6sVse9zTybBpdOGi0rzTsdPBAkiKTkKaQJj4CMDESP8N8
e+R0fBBEbaD2qKCQAONo59E7LlpGJ5dHB3Q3z/guhLCsKDdpsCfMrS5dZj0xwvPwiQo0pvD/M0zhJ535LTw
U0A3l3zSrQZrY3WG47mQslvHHnglgLkuo1rPyepnJIWpSk23+rGqWRA/Ubuu57aN3rcnTXL0ux3vOZxKUDk
fgI6cZm5pAE4g9VxVTIc/MLjXxzrM1X/FCU5F1ddED4GGI8ujbb/GXXuTddFlTDsSBis7paCYo+IRVQxSbZ
7BqpTLliLy5XOZjnDnmu1et2dJDCtc3KTHJDDLWLlkjYBsNE4iaVaE+/j+wjwBMXhrUZqRxUr687cNCg3Ug
lcttni6+1pgdL7LmuP2CuDsyVXXo/dtvJ6j7ThPITuYYPYxj+acV6OhMrTtbKp9O52XYvbgO+tGvdIirlL4czx
BDdTy2RZTRrtZ+I0SPtnLPBItTEvS4WYgR2mG/D5o+3WVDUcm5PnYy0IcX3TZBNXXRVXOPG/eOnbM
gR++7phnaxMTB8xkzKIRX1wZ4dMvTlDXhVQ3B5owqFvExET1RyXDqWZfLeTfw5kLKlJHMCMbaShVaqU
Ka9r4IVciVybeiElmN3o5qxGsyt2A2bx/en0RGN9Webg5BjYJVtQplV7MqXvKCHp9C9ehzb02sniU8Zf5PznO2/
P2/rc3dvZ3K/t/exmr/bxmPlANllgU39RmsBj+vYfjKL+kZLFe94ByWoyDsdtOsJ+9EBPsqaQeNp6IoKIgcVi98
ldBJLj6mNKDzwpivIBrmIu4HFL4ZZLiK89IqQIWSq+QamW506ppDPIMzznZwFWayNIgrcS1XWPj7+l4PMw
NcCL4p4BLhQZjzsM+houLXsIu5BHSNKAM9BRSYYZgUazisPMSjykVwlY5jPL7HDcBnkMwZtTFMqSqMbg
BGEmmwAxGP6B6CQAxHBUdEYp8tDvYBfSCOigK0C7xRaUR6t4ybPAthCYuDNRixilA+Hyuooxg1hDAOs
yGiPLlX4CkZMMxAPRARRVgGB3mQp6hVq/Dx8xQTzmUyqNpV74cwa9cthaszsUa5HBANQ5Fl15iKoR2s/fk
s63xH/1l7KYJ+JsTfMR0Dn1IHmDIKmJanA2gO2sFxOhRIEqCo9NIrajVD7OkrM/kS6SiR1XByzI4aT2ly8eT7
GH6EAEkL76I8vBfHfATo2wYSAv4eFxQ6z2geCgwAwwx4wSXmGMcy45ztD+gtGkY91Mmk3tbvl6ftUwTwZZ
RTyD+hCZUsnpdxoXGG55CgN1TBRhiGWlhwn9BZ/fNxRi2OkD7wIAUwwiGqi2TkDMW3DVAJh4hEhJ/2K
eF9PxxGcQRyhwCHScUs6UgciAqFRSR4QbfpXgGqcwUVo33t5zIhpZ95VVTXjbhXHYbQ7Csyxb55Lf8Gin/nY
cLg8zEhQC2PnU3lv3bwOs1Vft+Q0pOgYX0+aCE+gLOGIK8oMlLmZ5EUD2PpI+QUrxsco70d9krGtF9p8YV

bY5TxJFcw4sxQuT6SQcJcRTvmNvfqCMmcUrUgNocYT45tiLwbjgTvnrsh3C0+m01x38CD0AZBgjIjodh7ilEd4
CUtGPDMM6ni8c+Rhi0eOaaYxeGQbB3JuMxKekS/hPinzleDZ25ayIXUE+WnGdCMjVXaGRyKKEJ72tYa34
PwaPB4h+MhWHQmvbY0wYowjlBG8GzlV+ju6pkR7wVjfRgl4wKlBBbrZdGlSGwMv0PLkUNYuZ+gN+73Y
ySqcwZjNCaulYAXaRrnslslpRzJSIIJM+Ug7WRpOuTAbxlki0l5lOMGXUvt4KlsOqc9Y0qKYwsWFpmUDkhNt
hHJymsokkVO8LO4n1s2u/Odx+kVsgVYIzQFdH6AT9PBANNeuZzYkLSDF4BkhhTJStIu0HsuBOoNQYFHeK
Dpc+RFHFUOkrWQk1Anph1prFqFqWmV4h+bcBYARVquoPUf1WY5iwREHgWidtJ2FEw0k1dgYOX0knoO
SXwydYhfAWFAFTg2Y/1BAgwiCT/xFx3GwTCFhKa3aK2Fso18EBKBIPCYIwqEV5Sj7NL1UFICFePaXtC0
4/ESMSI6LAZMbXwcF5mbqBIEv07ugA0gMDTxJN4PWMDGcYuXfRSxZ+EZwMo9hwnnn8JET9AGLeMVX
bC99oJ0Gvx4ESHPkHxRCazMAya8LmAhrNymkdhsps4O96NM3ceNq8a4O8DcE4DgkCegyAQICUpdAXhCKh
uCJYCKFa0AMKdQAzB5BmRcYKuj9ArTYRGt4AbzgJJnYXBNnJdKWBek3UjKHmKbOE0zRDnJpxaxEf+
3zUpNdwwCSuXawjZ5LqR+fJ7CtxTlrmzvLO1d89noBK+bwZojdixp4YNQ86JC6FG3ZlEhAEYRFy5K2FA3Dj
H1GxIsj13g+ITkX+qb+hvxgWQi6zjqk2hkwYiiHCSscjHHeOhE6jIV7vEfEyfuYQQS++SlUK1yD+JpZu45HizE
PjjoevbBRhfjn/zGDJTbHMTLm+agvGShaEgshEuzwTRI4LSkkeOxh1ggJQRPJfCHiyS90gAGA6l2EWWWZy
bbjIQFWA9J+Sasl69hEybjkdSdj+/yCuPB/0rGy+fiPGQkOjTNKxdOb4G4vmLtMelJZN0dI2Lrc3Ni7RlmZkZa
xKX1jokZcj3FepjMmq1yOUa1lxXr4fjvf48Bsh/BzIBZyemsDgKJdlJUVGbpxzBm3Uaa+LQAyNM6TDTn4d8F6
4VAMPd4h5G1FtJ9jwnlhVLe0RgMGUusYEQZzELjJXLYdTqG2W2pY8eczJbG2S+PFcU9pWqZ5+FxqhCxUt
ugyQ0aL5Jf0mtsllWoXjps4JTLM/YFM4iUFHmEpgILH+S2bizCDLidtgBUt7TtB6oNKDxDNIHCCwsYPQED
CudFapUnllFJAjsTVEDk0MYJFLhAwFrS7jgEWYDIgw5QBqJLG0H9UW0OKmEDs8btmjRb0mk0PMtLrZUo
DzrPgX1qCFfe6NiVjMOiAbNZMqP3x2AgwxwK9PfnoH/TJZCIoJzs1eoqUj1OaVGtPNbqIVu9osxMtmw14FZlL
kUlkCIOD3HBscrYApIEJlAtyi5I/GBeziskOzp/3pJHdy0lVGhtXQg+DJ1iWgCURNAwugZE6VphXZm8NazZn
rHdHvVhdhEvNKEhCEfFvVLBB3rBRcRux/KpkdkJIL8S2O4vIJPJ/UbiQ4KMvIK3jRR6CzmPesKQZADVCQ
nLPNe5v0Auh7kysgom3HHcbtQRHkHtUF5bzmlpreBglArAhDgK81zgEWUGSi0NA5I5fmp1SK4oibeLRr0hZeX
ijqvvVSoHPGTTTHoy0ENg4ROl3QPgTKQNKZUqlOw9NH+HEnhGSkaVyaXkg5hTKMjT+ChGr6JEarGSlK
GeTcq9KEc3CdMyUFU3zEA/0qfHJxE3mpgq6wB0VjoacX8WZuUC5SlCgRSEE5JR6rUGKaYkEKEfWKNDX
okBR4nUqslH42cILbhBhRkRaUhhRdWlagg1EECYCzw/S+OSSwdJbNzBRfGK1rIyvHGyyEtjMFKt5PUxQEt
5kIpBll4hap08JThqm9WncYe0WJTakd4Zi4SKRahlOsAOU8m+o36YWYiioJbJJneFVQ4CJ2MSrkI8qYDQuMf
K3FlMapDl4s4w93BOiZCROoBrMBIphEUHExgOwuJ//vHfPAWg1Oa0YqLbYYAx6QVdwlp2lQ9FTE4pUAL
yAXSHlozy4PSgDqoCFMKTjc8AYRdIBUlvFI5Qs8MT1CRwYX4uUAN8KnpPSLNLRyJhkSeu8XZvVpzGQAt
5FzFQjEHGxsSadIsl0SHq1z2pwLcMTKBzRlozQNOYXxmgGEXSUtKpuDD0YDxqBdF5Qgd1JAVFiVrnGG00
GmTHLMoRC9hoD2wCPCSdMcMSxqDNMfznXOZzNsYKnAkoBEVBAoUqq+QQQfYVjq6F7WuopYnbza5z9
AKSBoUIiWB045zCK3pocl2yaXOGTtv/+cf/PRq0CF6aUZJk//OP/1fnL6Qah2T5IGlBSURQ1C9tIsHLOVUn9
7SBN5pzHIlpo6I/D2Y1HiMiccrBACkQEaSpIj+CXjUCgXkJ7JlZt1zDkK+1+59PVMCqBtOG48f1hsAF+Iq2Hl
PFRmxRmZTtMeVtRXcyDc5kC2CntI8xmRG6/Ni2Y/FkHYNX7kkS+LlaCjHFJ677UVL6HLspCP0eaPrcyxoC
EqGGF2XfEsC8Q0KSjlYPcmWCaMetj3SIwk9VQXnfRZj/G5MPSGoU2ErZ9iF8BQhIgcHUo9KX2wJRj4eiEEd
Gj5kYobWdMCGxiXGewaqMbMTg4Kwr/SVE3MHk4z3ycSHphLpKZOgbeivRTgBu6wM/oYlAEuuJDWQQD
tvtNgZgINcKiohLuRZNTpQTamo2YBQqkWvPUbCgPUS7IWG3mOZ1cdXmheUniM1F5OfSxOdLLT0BwIWk
J3pRZpGeL2cWnhpnNxSe7OH1CM87kJ0Hg5beBBAZ0aUjNqUnl+UQe9bAeHfkJuolUm5+iWKzVmpqiybKS2
cg+dPkEFfSc5nS84A6S3BKccMIRsjp9IJoOAy7Y1RUgxEyCVhFMPHjqJAAk6aKV9OUyD0Tg0hS2hnSmJwfR
WQK540fUUwB+u5lZS5rtKQaLWlK4d2HePVFK2gU2gAmxyuJqpBUe23MNEhEf+7YH3ww/kuen76zC6Anx3
9t7G1uuvkftrcebq7iv5bx3E7+h7tK1mCdBrmTy39nTdiAV9R83kwOS0hcUU0W4bzGE7b8zo70nmmA82WR4A
xCoKpgYH3NVd9ra+RDA/FFmd/31TVWj4MN+KgvssVQezoXZdyS2pQpifT5L06TIBEhg6kb71X+tZzO1VrX

PkW99Tamp2ziNUHrUK5xCiB9ql4TzOeApJB9a3bb4rZP0lfw0YCFhqvuCFajC/7wONh0byDjqlz+sYksI2Ghm
XyJyxt5/5AOytP+5qH9NSvE3AS/cg2W3Zd7yMUF1MrEqGLSVT/GeUOzDiEWR81uMd90u2hXB7D431rUc4
rJGuQbvdWgn6vPMwFcY6YpMArhwYP8FSXDrE/QeLMJMobiXM07eZKMeib96/sgAKqD5Pqv0p/5WE1MO
WURXtpAYUIH8gqx6JLvdVAnOq2Zo1dGlk9LtKvv3QknmXxMGjo92/KB7oSi6XniSY3RopygT4zbsWvG0em
AEc6RjfK+N3rNuSj5n48fJ4grOQ8KFqijf0K9uW44c8fbaJnXcuPcuSXwpmyJFESImWb1tGXnHT39ZN7TBQv
1lJtAcHFtNhTSREAnyZ6BrYbxYGlGWTDpClc93snX8pXk7g7CvBdxZJ+5UUsJXUCbK3qqvW0Ncxcj4g/AW
MJAPLVScGZRWA1qIG/p1cPuGt/+GOZv0oIHPvPlKdaZo8Zh7oEELFnO72KBZFWs5vh4c3TykyfPx6U3F4c
cU12bE7J4TLw0jZmGyCHCWI3yKsCoH1TphYLAQ7D5u3R7YA/vIeO9FySMq5BCarpMVw8ohSle7geLCnlI3h
y8ed625iTKD1SHs52Oq5+LqEczUQ6Aw2vVCHSy1+rMOGfqEEq7wHubxVr1pHRqpkVZq2cSZ32ocoVBu5XK
7qE9HxLN+fWtSBN79GZNqOkFy7vLlguxV2nTK1cc/3UhRUKpb/LqdXS0/iDbDDiNREXG2x2sf9J7gDXlrY7
XP/1s3juMq3G52GrFALVY6xWIS41YfWTdKuGOcN1BJ3f1aJXQ86t80P/DWTVET4n2TCkPt+QRmuL/2d7
Y2nT8P3sbm1sr/88ynqV6cO7MZcPumd9Ckk1pBKPtIG+7s81fzqTzQnJ0NYufyqBTl98PvdhRN/gewK3aEiAY
POaPee7dSA1YCwM20yarF8+/90lNzUdhV/5pqPi0evNiU2ZzcVw1Rq98RB8bRl3rwXeoT3EqCdWD8151ZfXE
NjyQqiK95mUYj4Vh3bk07R9/xWSwlUN4o+BAqE5S/It6gn+tCf7DH2x9D6u4OnksTUnS7aqjKamxzKGRMqn
ue7x+gTXi4OPMcz6jkfI8BYOzHLyExMjYMysqUtNNOQU/C9gmBXxK+zz/63hbRIMx0gie+O2WYL+uYVP
zrk4Pii/jYo6ZkEtGs41XemcgdioZVaFaaXG/rQf1vyHe3nFXm3+/m6r/bW3t7Dn639buw5X+t5RH7/9h0rwcb+
ooFtZWzDYM7ehg3Itm1Sh9zar6lS0iI7mfzFkzSxdnXDTvGNWNRpXaQtK23HJSNhK1bBQPez06ay1OUqcGn8
g3ik7cyjLa08k3nAblbVJ2YbzS6Zjce7AmVKq4BRrmthiyfdP0U9DYpH/LQgPfX0P4eimivICvsPBGeJmXStnMt
2UxsqGJxlNY9pKgJ4JXUVK0goMhLNMhHp7PKewF8w2Nh8HxKLzqw1AGDbMVJoIfYI7Y39awvo6Yyp6j2+
wx3vC8+afOxp86W9u+UkSLUMwkTfVN9GzQmcqgsCK49rlIQL+IDb+KcbtJ7XaPvCCMyaIx+x5OzWw2zTu
lKuTBX+1707ybNy6heiqa93dJLlFptCuc1jR2CrBscSyJR1ZscyZkE3Z17VWcnjf//fjoTZuVqah/3SxbaGGKq1ZA
qdEx6R0T6SoX1V09uP7XScvb6oOCfHZ369Z/fNT6v7u9CXrC5sOtbVj/d28LgEnPb3z9nzT/YDFfoK/9FzBmbt
LHNP1vZ6+M/9rdfvi7ja2N3e3tlf63jAeXrcZPqC80YM06j4rB+Gyfx8r+LqaLA0UXr6KzLAQNqEX1oh7WqqGff
9tsb7Q3VMnk6TjpwXq4j6lrcqHeFuI8i4prbEaWhLWLkj3gqzrSlEVHgzAp0uGzASw1mcAaHz7xl0yA4ZvjlRL7U
sFpoDEvxygX5UYWXs0/aq53PBLdhermeJXaopX7ougOZG1aKPk1tPMsHQ6jogC1Rn6CLwYuokz0niKW33O
Nf/nr8Yt3qtVOA/49VYVhjb4kvM0O3r+cPTz7k9j50x93w82NrT/9cXPnbGej+7C3tbnxUOyFuzvh9t7e2dafQjlv
+ULjb/xER8aILvDix46s9zztjlEVzTtvs/QX0J2kak+qKtdk2ilpAVU0bKeihkqMjLMYP3fzzZ3zze1/y9MiTdphtz
2+aGi8nhE9P5cJXbuRyC3a7olRJoCSCZXma71/hz2gj4hfdP49vAz5ZxDzqGmPmHRMOu9XoidgDbkhW7x0gJ
CD/Dek+LyDW8vY1f/Z3Ghvt3fLAcRRVyQ5fTv4y9tXD7bbGw/S7AEd9OOmFZomciHDbPRLmh9WK/KuQi
gAKd/gnjztdpNjHT0Pv6jr7hsFsCwWw2Ohwd8aL7IszYCa0wA/YBKJbtSPRO9vDWxE/BoVwaauykO3esDDp
x38AF0EeNWQwD/w3MVZlPRoWSuxccnmBrZhyC1CIb5rdzS8vTaMFpTTzy26b+WZtP7jt9voYw79j9f/zb2N
rYcr/W8Zz7T5Vw6Zm/Qx9/xvbezA59X8L+GZdf5Nh9y8fcw//9tAAqv5X8azyPyra+rZITt952CK/bexueXO/8
OtjdX5n6U8lRBse3JJp+uB9UCuRPMiSmWm5eolXg7xT6IU/YaeRfn/JAuTnDaib87/G3sPXf7f3lrt/y3lkfwvEj
CD7Xkl1k/Er5gjoIH/kkUk6HbSBvzzT2MC/aafRfjf3pC9hfV/u8L/W2j/rfj/7h+T/9W8EudTJmnc0GvwL+J+u
SGKb+VPeh32LqOct/8a6jeKh5V8+OKfhdZ/czN9hrihqfz/sML/Gxur9X8pj7X+mzETKAN0oAQytv6DWL6Xh
X3SDOgHvcKLvsQVvuNf9HJUvpU/V3rDl/Qswv+vw9EPMJHHgtKA5lPVgOn87+7/7j1c8f9ynor9751cubUzD
EdP9oOzNMX8O4/0AdyDLEuvct+X55T+syvMb6sI4y/pWdT+n1X3x2ca/+9V/L/w3xX/L+Ux8/+Utn8ZQW
q/N2JPbT+hXaF8b1RQ8YjvRN+to0/JVJLAqNMOnkqes1FeZ6YhwaKe6cHkOM3ybxlf+w4POZVvhyLPEQfp
0VkuMtwlfmJ+Hln42Xd8KFhiECXyQvASLfjeSKBQQQ1ftGvmVKhi4nb8rYvw/yvp+r0t+397p+r/313Z/0t5K
iyjJvdZlHVjYS3/GAyBUTH0RUZb2ywVYJpolZdHvkCuMF9kYS8a5+W78vA9th/YxAV2gw+gR94qmjWgloL
pc+P3S38W4X9H8k4VAFP4f/vh7q7L/zu7q/tfl/LUnv92l9uaAsZiXWHDsrLN1N6lWhPV0zC3xY4pYkphQR4L

OzeKLH/w5jm6G+AfGRx29A7/PlLxjm/47zflC1kD/20YXXiAkx1K+NRh6nrYpciMuZqUmfrkrQ2+PiUxddG3
cFA5viu7ptw9OKzHj/XAZUYffPutevvqxfHxT0fvyi9/Vl/+8u7FwcmLd9bH78xqVNouTGUa9TBiwKMEUFEU
VlG/ZWOHGBdMp08a8mdDneGnY7bwnn9Nma6y33lnrKtrupNWwbc8XzPpuHSp9QXB2awFwxMCxcadbMP
/aTIu8HDw3GigE8V22jFPCgAF9hTesVb2OZhHBoTLsadp7LgaVIn9qirAp4jqgTqJhuItXo3RmxcsvOqDLtXoS
cA4UXJuazs3RRrC9y5MtBkzF3gZVpTQUQJ2V1cz30wE4zCno2lzwhDlWao1Rfzp641UOEelAAb30u3HCaz90Q
+tdebdeT5OoIOP9XPwsWY9mLErmw8e1SBiScrsIvqfba7f2P7b2qr4fx5u7a30v6U8t6j/3dRZo8hqogI4m4pEAk/5
V574HSxBp/NXzsHpk3xG4hZH6tWCKYVeLorZF0wuZiRb8cthAxqPHJ4BIkMOz9cdyj7gkOFo/j4LVfVm+oPq
6TDpZgLP+cwJSaTq3dmsPBuEkavVTIOqi3UkRB0tUemKiSRNHqR0QiikG1tF210tbQEMC0SVWj/W0MzHC
ZM7Yf36WDsNH31oeOSH17OmfW7591t/Fln/S3K6nf2fzY0dd/9nZ2N3tf4v46kINUNWVLdM1FFSaz935WP9ip
9F+L9m3awVBtP4f3fT0f+38d2K/5fxTLxdpF29L8Ra1w+HozjqRkUNQRiWa1V5evHr5LoofHxXI6idW8rnaMq
mUq+r8THUQzltHB+nQfv17jPdhP+ZKG4h/ntjb2X/f6bH9NJb80oMeB6nZzLcm36RF15epYfZMOnXKqDzK3
4W4X/KRDGHATCF/zd39yr6/8OdFf8v5ZmU/7Fdl9GxtBHKouU7J0jMFyBWKejmiGzXZ3203ecT9pjdwLP5o
86mezF1Kkpf1GxZ0fvZ6wQ1Mu0ZbMZn8Zx4NeZVKxjNmK59K5zf+IqJE60QNvQN5vuG4cceVOMCJI/PVIfL
7QcfgvdR0hO/qjZPdePBp5pAt7oGq25df8kQ3vZei14UHvbMA8hmIeOAsk0aTrkiPK9rglDgzB2gzjubj0hfxV8yca
U9VUzM+/qM1ZdiN88q/40yy8n/sMr/sZRnkfm/7fwPW5tV/X9zZf8v5Vk4/0OncyK6gwR3v/FacjPyQt2Kh5dB
Y7ateznf8RzK6u1V+ogv5lmU/+88/8Mq/+dSnlX+h9/2swj/LyX/w96K/5fxrPI//Lafhdb/ZeR/WK3/S3lW+R9
+288i/L+U/A8r/l/Ks8r/8Nt+FrX/bzP+72FF/9/d3lvx/1KeVf4HN//DP1N2h+nPIvx/2/kfdnbc/f+HWw93Vv
y/jOe28z90Ok9FcSVEEjz40wZd9fenDX9iCKPk5h+5KPzrzxnR6byOkmgINsrGKofErT6L8P9t53/Y2XD1fyi9iv9
ZyvObyv+wyu2wyu2wyu2wyu3wG87tcEvZFlZZFf5JnkX0v9vO/7CxXcn/tbW32v9dyrPK//CV5X9YJWT4EhI
yWARW4+K7YdKGVXKG1XP3zyLr/22f/97YfVg9/71a/5fyzHZAeqUq/7M+i/D/bZ//3Nly/b+7D7dX+f+X8
ix0/nN1rHPeY53EMm+JfZZ1rHPa+c3Vscwv+Fjm0p5p8n9cRDHM+AKnPstn/vOfmxs7q/OfS3lmn/+DLAuv
Zwv4cp6p8Z+V+7+3dh6u9n+X8siVSi0GQT8Oi0IkzRBnez8Ik+v3p+vyX+kwyUQxzpLg/WkblgaQ4M12u03F
11fBnV/dM43/tQpzgwVgAfm/ubuS/0t55pj/52Ikkh5oSdEsSb+MZ1r8z8PK/g/8sbr/aSmPsnTIKlF2gLZw2p1h2
hOxNPnVZ8NAovfaKqipp78bFeU6Y9RwNA2vGWWSoFyNTPPE7u39acv101vDeH/q3UR4GeaebjIR9tIkvg56x
rd9CyDT46/X0xfDUXFtlmqu7/uGIRfVD9rNb45LjcQZDQwA33zy9ftaZOfC6rcecFrh54VJKQpms+1hOGr2gsff
Bb12WXZ93Qv9tAZ00fX1+mH2o6RnjRK5Gc0/9bKAnpwZnTJct8l3otv0zGIrqHa17iUBX4PdcZZBjee1c9IKivR
tloLcnX0AUb+pK7VjkZwXg+Dx42BjPfigBufp9xFgFmvHoqDj/lbDjz2EVPaBs1UMKGjru4B+tM3ZXF9/ZLV
8MmFE0BPumVF5FwqDltr9NHsRdgfNJr5bx35L8ux0ZPtBBAzdD65EMAgvRXKvCMIYGfhaFwVUeVBhdkQ
prY76sp8/ExatPThrRO3ROB9w2Ue61KcARKBwqkGZPI1FW2RZmjUbGJE8jmEF0oi7DoBmGsEfiNvaUW+9
bI/5YL0OTZpjSizhKwdLNUMvK6uRc93ZRk5lb23k2NqkkXc6RJVB2AehDYQnAoply4FngvAyjXpB2OshWcLf
+NUkyiDMkTAiqInHl3kNqeLDS/nvPQVblXk4lYiYIE9q29FoXV+SJ2qa/nc2juKeyG7i/llA/994uL230v+X8cw
8/4YHe14n0GT9f2tzo3L+f3tndf5nOY+lyNfo76ba7ggzo0aNpehsG1W7wLdGIRkKbujpreorimbxvNfxL55vx6Lm
rQ604c8nqVVAb4avzW4VUTueyJuW9cEJ1rE/et8Jf9FKrFDLhHV6BKcBeSUEoDroSpFJ1Z0dMz8000MLPRu
O/qa8u5DlrGvbsOV5R6HP3g86+Nn3Ve1i+b9RILPvUxkaXfeVgqMVTZpxjjK/Xh1B+sztmt1VPxJrt1zVh2rHr
8o4/pq902odp8DM265+oOv2Yi0i8IW5t5wvTqS789nGTeWjEbfufPO+dOPjPZ+NEPlpXF2/j63OJ/ulL36ZfrK7
nuG8x739O95TWjNKov+nc38NTJfDBAYVxsEoHYG9gOPDt09RMQki+S0vsnEX1G2Bnw7iOL0K0rNfRLcgm
0DWFHaxH0QW9a9RP3cbeEea+9r9jsc9dIiWftTn000fMDQ5TK5Lq78bw3Sa2/1PWYGSBEib9d2AtKomjVw6
pdb3J8UI8IN2dM+2UTz+D6jZph1ywx7reS09qA9Gew42e2+M11sAhg4LMbRdRYYfpqa90mierUHDMyTtOcN
acixNGRuBY8LfLetrGSmB3/kvu4QdOSFxY7zzln5eLfy8WpajKwx0K29I3qbZRcZon8H00DvTB4aP4QfzI9tpTS
3Y9S2avrkadDttanExodFKRAcO135r17DyumJh/cLpXQnS+s5VBAi2gr89E+AIfWs+nG/Bv/5rUPbufGzW13
OAqsSSYD3rpUujKsREUSn/7bo21kzxAGtIlwSWXuy/TzMkqGecoqKJgHJoj+mbkSyEH9uRPLpoN6wp02xh3

02TYbVmMyTKO9l+y8Op9KnKqDqzBn2Xf1Wn08y0QSXtl3YFTrxh8xsuRDSyNn6tZzkqYrNandY/gcvUYEz
u8ilqFTeWf0oIeDudyLqbWWTa9BiZmrGltv67lkmpmP57OqSKbZvVc5nrbkTXNGjtfBKtCqGpLirERrkk9Ff4y
x1eYn52R6+SR+gS/GL62BVxkLfT2Uxad6PoqoMnWlVUJ9WC/D01hk5JUCPWkZxYE0kz4qNT07OqQMrSA
mZV9AK3MVh/y17fu3YuN7gfcJP7nvMnlp+4dtrU9Egvbavy0domwkLdCk/k1Vrm1hBW6rus6KljHLmqfizPFZ
VSomJqEjLaqui6rxU6diSLxWNhlfhUUk2rHvPaPJ8wBe65rq94LspzZrczKfNiXDtW6tDtHpP6WnFdnqT7Yqmf
vF9182Ce0/ta54DPDdahheX2o+paotUE2jR0QxfWK6HWNcuJHl25nuCrCeuJsUdZWU8qrXkWFNfZoeeWGt6
vcYbMOb1y67MW6SrnSrWATuVBTci/JpMJlZxLj3Mm2aV9jy+pFkuVLCa3iygj1cnCuAr3qbW0z+VCjClocB
B9I3iiXk6WM1zII2DO7MbPfI2fzdL4madxmWWFO8ffnv6NIvR7/klGV2L9/Br5NG55ail9y6KCn1qfe4WtuEEnc
L+dgu2W2V96mz3zSRlkeDrhZ7VAabdQIfXn3BgoXbe1OKhkP7ldLBhJaqpldMIaakX+9ZmIRbuxJ2LKzAVz+
4jidDmelZ9T51AT9NtDMaEugT/nXuqr+Lx033hSH6zXpkOoqgI///5Dpck2XZ786cF3vm/6AuWa7+rNp59rvU
iuB23ouuJcP1rNAa1pTgJodz9wGscluuo+4jTU1cLlt2odlaDaX0t9negacJ3df8b/Uio0lXrC3DL4rpmFV1RuP1AF
KZ6v/KOKEVWlnUFfQD/NEQcJiZ5Zr6XimPBV+WG9yk24kRDB57eqmR+jYnAMNHGImf51423cXSj7wgah
rQp/WAWAD3EJNyCBN1YV0+mPT6fzXDzQKNwPDnqlYyOgkNuoHySpjuEr+7MdRv3mtzVjcuPXLKBl5F
4Jr7HNweCdDIB2AopaQ1A4oKxPO0+459GL+sA2bVsscPwbwFSH5m8tHPkgLKjbRFwFLzhg7uQqpVnLgyto
ByQfRwlamIYXDQp6lGDBFxPYdqNOehvUplFjxPO1gven2mr4jR2R/Kd+Zo7/Mi6mveX4r+3dyv0P27ur+5+
W86zivwq8+HhZkWH+6509URE1960vJcisvAn6NuPPzBF9/vgzE5obxp+ZTX2G+LPD3CHgrysyzXOXvB+13
gvm8WW1M3zrCVszs7+3gqkhcWbnX01InAn0kkLimAC/img5EzvLipZzxYMVLff1hrgZK9nsIW7+5W8V4vZFh
rhlwNU6pIr+cEK4kO3Xqz6VG4TF6UAhK0oNXyG5CJ76VSjdKpTuCwml8xDnfvDhPZ2gVImmTtWPT46c6x
qVcaP1Uyl8TP5RZznxr6orz2zkPW8JzzLidTxwa0bjGb4eQwiqU8NGJ19eWCGM044shBer4MKvMbgQF5Qmrj
T7Aa0t/M/sJIRVKySUif8aA6Tqs/pzOjSrUMdVqGPwpYUbfemhjsiwE7Bv8PNXPAMoSLyzsAoVXYWKfpm4
XoWKfv45mD1U9AuLFMVrtrC9VaToKlJ0FSm6ihSdZ9CrSNFVpOhcqPrnjxStHT7vpNWO3dxou+WBR3mN
TcPeGKqOP2dRXpYc/GoPmKJe94OacNiqc5GiYH3l9Ue7TskG9VGz090rq+DZVfCsxOMqeHYVPPsZn2nxnze
8+oOeufM/bu7t7W2t8j8u45lp/ot5M77bz5T4373tbTf/4+b21uYq/ncZz5zxvzPF280U5+u9cKwmaqr+FrKZw7R
uKbD0mA5VzRZOSmXNGD47qrkSbTxnfkknoNQbTFofSDpHECk50OYJ6Sy7OZKeoqB8Rc6VQLYqvy8cqVe5
X87fQOXSubXO/ftrwf3gBSqZOWkiRRqchaB2gODLwuw66IPCkoMsLAYAYBsLHxRBng5FMEqBtFrBkFJQg
0IDlc7C7gUG0HG6adkE1OmsrXG03Ekkk7ppvZb/skLm3ogrHURxkJHWj387YSMcB0K6jV261DjIQufoEVLQK
OKjEtWBb0utBFFyn3PaBw+CgYhhasDu6wnETBeUxwJGPgAMob8YHcBjjBd8EKfdC8y0DZVhsJ2OWRFRy
FXW1srowrf4hsYE9pLHzkOQRIKvqKQif2cTGkv1onyWYgTCC2qxdKa7fnTK3K8152c0Xmq4ad7P11L2pcXjM
BvW3+18EIKxgdOnx8o58K+gnJy7qmHsa6MVNBiDjRaZqzSLlqlHSOSWmX29uMMeXXnTbBhFURumCBvV
VtAosrFoSF+pH9X+Vs2ynmb7IWj3qt2audENe0RXsxElTtsVgdN+8b/+evDKHYsrhtoK45UPxzTbqO5/sugC
zCvkufwkZdow7lhEE5JGI2cdZp8y0eMsTQrkcgN9mGGxhbYXOUQBn/imiZKpXgEbQoPf1LHUN8intTxCX6c
xB1IwlnuGnA9TNB6eCSTmjUcGgrBA3pRC4a2DHcYcgqpechzNBXOIajv4w+NgE4FamGUIiob8gWSi2ybsyYa
pZ9y2+uYbi4m+cZDlp3Is88pt3sM931SRO5G6LaPyG3waUV7pCE3VV9QuDLNapY4h1tyC35iSw+6VWWZS2
zYPTS2pmOqbT2vfMMkpGvGzxjffOKF0xBpy4trmHMGsfsNhi9Bwp5PD/ApoLkjZ4cATQD3RYoaqkf6w9o1Bl
xMBcZnUhMRmUAIGQJGCWhbUXDROpvIRF8mb/G8tL/2VPvu4KTB7kRylNIjFmEqCVM9Wt8RY3M/nZ
S3G69fLXDbZfBHsxSi9ewYr18SDGH4lYRFdCgauXHBLTqJXRkyHRY/quxkDYFMX3yGm2TZ0unQVBLVD
8MSzSLOCp69wBmauGUCnczxIx3EvOBPA5PJOZN7NQJ7Gfz5+DBrvkarLIxgK4TLMer39C5gxzXWk9tPGI6
VK8pmfx+VPaGkuKeFiwNRbWUC4JVBSSDQhioy5IK+8gfr3p5/KZqIcpIWeBynMPDZws6HQKII3aJU8G6S
5SMg4KTVIvWWptrCmhN67g5hgbSm96QhYIssVaZkAW+LvOWvPeMIreDouAjWLtCFFHmo/5C09s3bX+P
bHMH+TFjzwKSirkZaNw9wDSS5iGZ1rgmRVrArLN0cnP1UFZjmOyjZTZd9yJiHpl4/G9kmnQ+QQ5cBE4WU
YxYT2qB9U6SXq4k1ieZB2acOgpw7AsC1+FeZ4xViX6epBkKdBlFwKsKPHOZrGbw7ePG9bcxLlB6rDydMh3S

QT5kLuWpQDwKkI9QgSHIF/ZmwXTBuhtAu8t1msVU9Kp7oeIrieSZy1psoVBu1WKrurgw+J5vz6VreJPXrXo
JpesLy+jkyuQi7Ej7RXRSS9aT4V5T8hX3zQE904zDjcBAmG3zKFaFdSs3ECiyz+GZwMwiJ4GiW9BsBknhWE
Oo1nYRyPh8HxKLzqoz+L/DfPw0sgnddRDP30GqqSdfoK6+ovxilBfL/Z2etsbWz+0f1OPlooYLps1TfcE7NPbk
FB5Zprn4sECDF+REhAJXnEBxAJ2vI8p1YwkM6pACGoG46gZfRhSizRURIYOr4ukcKnGHnTUteAr50OsyW
X97Iie0ibDVUIFjarCQJjRAJHVAF5Kz94QTFrGcCoOlPA0U23AqchAzPMsD+UC7x/USdy9q7s9KVBQEu9V
SF3zR38XfSlB7lmjwtH+j0QsehN0gCeOWX13NmgQtPuJE5v+22ltDER3vaBul2AarWBGSHXRpHuoQpWbR9
zjMDpJ0knMIxau4wx0DWqDdf7z0tP8N6d0VPdy0RO0P2Y45jcU3WGVV8ziYBDnwhgzWsOzj2s41xuCcQALgr
8BIdvTt4dwRoC8Afvjl69CJ69PDp89qIssSa5YpDCfL0jwflYHiNV2woftJmwDwwVC3RNP6PywX+m44wkVUM
bPHwOuyELXA0iMPiQJYPrdBxckf0RRxe0khUh/BtxnHkgT/xrFAAuGVvfyrZRJ4rFD1Ee4RFLoCZ+zYcT1a
4GnVdsHJN+iT2yrOdOhBxXu41OgE+MKyifpayP4cpAd4JStwZa9NROwAsuqWp2HVSciF8pS0KW9sZdul1U
d4KwzD06iVpAYD+ldA5le8o9blk/ituqRut7j0g5nYAZRW0GbgySnYKdkmpnwY/q6vYwNNJLqRdHCjw/lqqy
TuJJOdzeGxx0ikLJoJyWgysUGhWLf3KN1tyLIUhcYCv0uiFMLI4b66RnWxLi4NlJsAkS4vXRuzeHb/4SfH/0Lj
h5CYLi4O0J/OwEb98dHh+9efHOlBmdjtRCmatkfpDcYSFSwRTaA9A0qTQagRgviydI4MV1MIwoygsKQYUU
tWxo/wpsEAGLT3GVSlW3hRVGWXqe4U3NGKg1Ph+UbI0GGZ6fl3dqEyjkbcL4NWiSaHaYZgl6t7BBzdXmpl
3jdaUELlrm3Li2QbXNtmcrbf0RGI5DFHg5YCqIilw6WmGMZ9fyLmKiWok7tMCqQBvsVgu2qTPaZDQJdF3m
RsDr2WbwUYpwFpp0xHr4A8PklHOYjpkyJDQ05qvB9Usg8Vkk7/eS5p6F47y6DpFwEb+O4jDCxrFhk0KBaHo
pyxz4WQobn1RByiS7P4yvwmv4B0kLz72sTxRQlpzxEIt3t05KFwMVswnaZSLjWiGCQh9vig1Nf5Pw0elAkQdpv
8+ONqSmUo6iUAgxzRASIpZRNKekEskWJQ8QtSlGawIAB8/hvxezENsh1wG6H0RDGHMPK3rxvK+wiuZ7bq
1AWvex6/vQ/FLci+MAz2AEyCZKWRoA609ANOLK3XJ+7xssrCtVilSEB2jrzokcrCJxA2OcATmywoLYOYR
m0IVGBIid9iKBd8EPxbzI8Yx1Im5sZM7Gmy+FJp6hO7q7oJ3DOyIdQynxMbCXfGbGkCSIoVgOASE+wCrJso
gaAfFBWJN0BCT15EaUNAuqWH30cWerhsxOcQvTR7ItP9JP0b36zTeqqzkqUkdzgcaeXBDUhU6Rw87kB4AB
ltFKYUuTqzDrkWsOX4Z9lOQplG+SjohS+wxENnvr1qUqdClO0gNdciI1vUn1+b36JZDmnNRRpVrybqSGZvIy
CAQUoaeB9vDopAQQDK9ViISwJ0lTbXLiHxlYp5dhohU71m+rlGTpQC137LXiCbrVyj1xfBwluMSPOQRPnq
mQmnynU9etmtFpHZu0XLUsttD38P3Ji3dvjo7efBm2BRGSnt4JpsCBpwzq1A4+XKXa1/SCSjX2ZBGjYRXY3
dTZBQfeUnOP4obGQd04XIr5/tXB8cunB8/+A6jm8A2Ryg8HbyxnFZSH1WwkTYZ/B+pZM3KiaYFgZllroh0E
A0MXWZyeN7FSmzfLo/51U1YFC3scx61gC23kzx1d/+U/085/DDEnx+JHP+iZfP5jY3tvxzn/s7WxvfVwdf5jG
Y///MdMxz9mOf0xz+GPG539WOjox+InP25w8MM86THtoEfIfMNsxxusfq1r6MuG9MUORiF/ovr6qkahhrQW
zJ1qtUst8oJ/+3anj9OhgCVpkS1o+D947mILGkeC6uqmtYmL/91Ue1/4eavyecu7wUtNtbiKMqtyToa2+dY5zm
GpvkAr1HiwWVGA5Vlr+7N/E6XANTvjcutVtzhBB4MvZH42nftvnb01ZjJSGo4JujOcrdmGszV5OFszDmerbjh
bCwxnyxzOZZipuZ859E356YfhedQ1tmIRgNrNV/h+MsAUNhTJtVmej1Cb6gDUZi1Cvw+vQVU7LtrBq/GFuJ
cHP0TdMINi2xseiykvpCY1Ab1/SUGny4qBd3dFUwrvYWqvHqDWu9uCI61BOo3LHORW7SCJpKoUM9t48Je
XTBR4NcPcmjTMig+hfoya36XQlKOsitemJJhSA5Y12kYmdWxsPhV42vo/Vf/jBepGOsbc579B/9vcXJ3/XsYz
4/xTXMKiZsAU/X9zZ2vXPf+9+3Bnpf8v46lTUW1Nv04/9UW2OLXMA8L2DRK01H9Q4lclHyxjXeWpWExfJ
E9fup9ULucn+5TNS4TJevBBpw6OLlERjGwZ7gbwM8wolUFkynhOn+SvqVdGhGMKFTp363ToZifxlZkSJ4Tx
u1wN1Az5w4hbLfOQmPkenS6ctMqMm9zWkPYr+okXNxW9qqaeBzdOh17cOGVqNCfGjfxxki6EIqenLzRDy90
+M8r/ihI8z2IwRf5v7G7vOPJ/Z2t1/99ynltJcGHL9QqtEJd7RLyU4r4j9S27iJGpzV4K5PcyK5s8PCWXAZjbAj5
/D6NRzb+BpjAH3RvjWH8ph8oDZXPbfbJNPp+9tvaViJEZ+Z/E76IK4DT/7/amq/9v7u2t/L9Lefye3YkuXceX
W7kBz3fzna3aTFARp12VN+GKvJtnFFo0nUyZ+MZKVDN3Wps1zMbJ174ppeTPR3THG2fN4Uvb8Pd3wWO
SWHWf1cVr5WfKZFiWcIW2mY7GFNWGAHaFq5a+5SVl+PmR+cm+ncxEu1VMXjWGZPcebyZ6f2q3Yp6i5
c9Bp/PX8uxrpyNL1p/knVht0gFfX0V9uZR7pxciYGIV43YcxSYTy6ubu6Y2XLlNqzIX5f1ZioB9U4Xu9Sf+uQyr
V3o9qSQmVQcAO/eVlWFnsc8xh+ezCfiuZrSvyepZNqJTe2YiBwartsnniA8TpKBKBn1/ik+ucNDtjodWgk/ugr

N78m9sCdsou5B5PMvPtjWiTCJvF75slrJPPreme3FaLNNm+kHHpJll3VlyZpYItpNmWuO8hZyZPDw3YSadW
u8auHWCAdQpzPsdPGf5udfRr/WZR/9TwvR273/feLjxcLNy//vm1kr/W8Yzwyb5pN1xRRLwbSadx744zKc6zd
pSfVLAl2Fu3hfbCha+sN4Eiod+lD3Xwq0VHObG6XjfRSAz+ELDM1hqw66lhyksPcUjegBMTDf35IEzsps5T02d
Z/JApd5RaaFO2ZrUSKk8njtX/aIf0TM6Y52wlywTfvuGmxxWZzxO0DTmp/6+RuuuOqOqNaSaaxbPpaLg3Br
UXLdRWq/GuIDX3ijzyO22eu9Q07guaXqn5Ygn3lBpJIis2guGP9bOa2kR8AQqnUCepUunmimnWpaunnJbKvH
6xD8fZVGNjSdeHPL0l4jMxyOgEfQ1l30YqWtmxhr5yW8fc18pNvS9dp+HmL5wBOmb6FasNjfu6Pa428PblzRac
hlZI4J1tiKdP/pFT/W15sGKeVg+H+sI86MH648mQOpVFAD8CqLclstGdeo1Z8EG27x/lOFfsygnsHLq8nh80sY
nT49aPPkOsrL4t+U1ZI+MedGA1S2tc0NYxQoDBhZ/BSjjbjTPtea6nCQn9hzUFzOuQP/0uQ2W1XOrz4z2vwq
oW2gLaNr+7+aee//D1vYq/mc5j7VmqlmewbA0LoNnOUOh2hV1wXB3Wz5sMgO/jh3Sf+5nRv53nPzziYFp/L
9V9f/h5xX/L+Gx+N+Z5RnEAF0wJ2PvgLHL/BBGGdw3UtfLzVC0vFWuLEwx8SwzPjfC/smeefz/2tKZUwuY
wv+7u3t7Lv8/fLiK/1jKc0P//wxX/VTt41u7/kftoM+6Z2BfNWw0ZO8XUPJA+5XjeZ9pF2GSh1+PaX4Xf8Wz
fxOXemWozckOFTfrou1TsUe1mDNKXzVu08jNty9cV4vpbqm61200OlcwDS2UQeu1aMTHLm14+3EVnL5xUb
m3yW5vtukqmfIOZ6wqDNyiobYWPs7gazybq7S8wt0RP5U2faXqvHAz8gJlgp0PrwY6Z/DCri8OmxJ5tz/tfH+6
1NFqDb8yzEkL6VmwPWlI5WXptz8ofRk6X8syj6v8hkSkLza//UHJm8trvvKl5bm+8eoGY5CHYm7KCXznuBu
aPRGa0rdsHqrxsenHesnofuLhTHCEV2oYpOn7xPPrflE3LM7Rj+Ipx7k+eR3EnDIVXazStNe1Xh6EIp8w/jlt1V
UudYqOi1xiqPepU/npPvVq53OB5kGE15nOsX3TnelYbgZnuowF/IJOGs3h/72r8587D3e2K+c/d1b+36U89QlV
PJlU8NWJzgc3LcbeKmy04uzUtWbY/ZpwWW7t2dS5grfq1oQZTircleW8sFV8C5artargRFIyMujsbZiFQwH16N
omEmPW/ahqeeccDeZLTs6giKrFlpa5Oz5LCJmbrOHJdNtP3jNqEeMTBqR8UUnrUJ4orqg8lI5iqsWuj9jyCTTs
/xlfmWtf+WcoYqUmZL028Wt9cNBsfbOx/cg6rrFI2J7b8Xymd+UYQYl5dyYwcY/1op2AOikHYOqNH/j6q65K
eTGgS5n12OwACrvPljnTn/ZrCNxc6mn5M+ZQXqhoOQXw9mg6IYCAtTNBC2qz8/7/hA/+fvDgf288+NNpB3
TcRsO8pEgeVcZsH1z9D5W+HtmFjWvenC9dnTlE/nK+I4bg4yCqfCmv13lsXLXz8aOeOrOP0nlh/OErO3In1nk
BdbxTrRopTZt+05gw76FxzFt4XJZpVs5+OyffK+UdD4/EspoePORABf8y5uuSzLJgEwLxG5dAl4ekKwdP6S6
8GuTrSw+raYL0VW/QtL6DZb1uapyGPMuafaFY3SXK9Te1IRjWO9+Flje4pq3qj5MkDR2jU1O6hfyRraV+va
BT9IuKM75jG2FG/V8ZnHcS/7G96e7/bO1sr85/LOWxVBs1y8+irBuLYJK7afr5gjgsat1oMd3V6/+Whb1orD1w
MlDEUki1T/OxA/Eq4evczyT+L3KY+n503v4FxPMN+piW/2mjkv9pY29l/y/nQRZvdGERjmJxlByHl6Kxz+E
WLeNLdsRXcMA3lgmNPB1nXfE6HDXMW0EagEtYb+Fd48Xxrrq8D9aQcYztYnPDNPklt7+8E3kaj8mshjKY
Ulp9R3bHTt/zW2nMNYA46aXItzY2d/Vr49ZMG6okPQR7LepGxUFybY4PrxkUmNUa1BCy5ux6YhgVz0U3h
TbT7LUowl5YhE6RX0FZirBuGOuiTjPpuHgeZTg2BHwND7iuUdVuPO4hXt4rMHviJ0aJxlCbVuEiMt/IVmjYj
ShxWuEa9+937sNiXZYDuIbl9GXiKosKcSI5XOFk7QvxSq6eZT1IK1K3vmma79pnsvzHWJ8tLf93dvd+t7G5vb
21sZL/y3imejHrlAP836Lpsye1uXhi7TkgrvMZu17wGZryuMnlXYJgsKPLAO9WieO/Vt4l1/Jd6S/GP3nPSzWF
uWCK70E5H5yF3YtWEEd5Yb+jSz/KJvrq/U/chNHWC9qWFT0n1buQr2msZfH7ePdGP5fF+ibWcZ3KT1IDL
HxzkiIohwk1jy63LBd4gfpzkXeziPQHtu4PkyL9S5aOR4CNd+EVlYF1tYSI+/lJiiWjY75Q5NlgnFyUpbv4Z02yoh
nnrybD/Qy1nURJng3neanSs8VQXsHzE6FeD9390PBs3oY9lTJDHkRSqYEscmjpa3Ms1nA8xOglI/2BgqCgyfkul
san/sJn1kuMS5/pxWvqpUEvlOOU06+nF5G4697fUS/V3nnss10Q/dop+0zlrPZiUHq+yiHO1sk7p2zZiQ9R6ypJ
j90NJ2DSd69wAntOdEPvv6PIDJncRuHGALjEynwtyTk2ETwQIOh+Kj3afczxE/ZgcOL4Ouk2gfitIu3iVxzsB5j
utAectR/cGxf9P977ZICHLMJyh3zR08VT0+pCgVc20+6n2YuwO2g26VRsK7gQ13Y2oa7M1U13NTV/pmoBZx
78/Qco/SkYgJT9/Qeq345Fcl4MPlEP+c/KB6r67XQeT3lksbcvD45fBJuzVtL4KdJe7ziNUymTEUvGWM8xW/
0JFAmwjDntOdhcgykVj7GMrlnp8i0n+AJz8s8qFshYGb5TSdPDUdPX71y1qbo7VD2TGb/ASbRgw1yx6mOb/
eXyL+WrrmDB16YN8uRG9TgBgVgc9xJgDEfZj2GGrq/mMBzxzhalnbSzWEV9/NwG6mrqEu7Gicp16a7dVBN
nTddsBSr7vKpbiXIxqf0KAGw2KInUfkB3TAWbfAF1kuJ9guOkxwmlaJcFU0rpnh55IaT0w7prZotHJn6QLjm3V
1OFjQE65F0UqnF85cNl05rplguM7IIoePE+7Jm3OrG4Ae96MAbUbBzyledn4jxK8LI2uvacIevcV7W23FoHwevrv

BBZlI4x9CrDwLPMZFqsBYtC1BWb7Ns5cJsgXn8uunjtHN1591zE0aXgy9vegtqHitOkFp96WzwALWPm9rb9T
WQZXRMrb4sD7VpcuzV3qhj5C17vgvh4Cj/6YVeuOWat3Up/0P7T6Pxcgvkuyi9a9Mt8KfD+Q7eph25TP4q4m
/J9mHSzbzw+gzr3O1atQ7w+/QXGnDE1GPJqs7LD52ohrYrKoNeO+/SPvuSc2sPrzYl4TiXo1uct9dmmkpZnnl
V9o7ZdydvU1GpP/RB4oZ0BSNnYtrf+tvq84/28oz7vej/vqs8P1WeYVj2vdC3kZrnNTTTsv/ESH3nryUG3CE6u
0uBBcNwFeg2OEnN/1XfVCdIqhfoGfXj/S3oGHJLx9YsizCORF+2GsT2pw0dcK6JN1FEWrLkBWrZhXpuiiM9
/d4qtzugVXEo8LV95IM2DeJjmxXrwOuol0fkALw4KNZN1Oid4Iybe4R2cpb1zvpXwMgWFcjzqhQXfCCoCQzts
l6v0phEqURk8lzAFLL3Z8kL5KkK5ir0dpxgd6ignPgFrtPBKsAB7F/aiNHgbh9eTW3haaeF4MDabOOr3Ky1sV0
lN3auDxuggpVtpdmA1Zh3tDbnfvQQG1GPcv/N8DPTfaHnIw7kcXEspP1l8soQgwWxIQTUdzuzdkhzkBpF7eZI
r3C1fqwKumPHMkSPVPNX8rU2v+LQGDD/Qs4Cq2tueRWwxeXzJcosna37BNY1CXTvsJaY7BfCGAVi0MpK
kiK/lBOCXKGP0GTDmbVn7sI2XKCepuvL6THr9WJ0BkTZKMdEGla46EHnBUQyCM+hbXtR8+upbHOZrg
Cb6dEGzc2tus5O639LORFSK0YJ837nf+EuIyitv6LXudwLMSNsFo0AEJxlIn+Al2ud45dpLVKwOk8swp6LA54
2nWQTrQuN+5/RRXVfkB/D0ThnxEqnNu87OpmPaUkTX+rrbCfs0JnWlQ4C0yxa703+0u4M0RQp+Ngjx9Cg
GjFq+Ers/9sbcfn+ll8c7QNsXDcxkv6D4Tz9CCMk1oFCiXzKUmoYDqYpkBm52GFwkLQbD5Jl+6+Qqn4Atnb
Y6jGNpFur+0bjU0kp9x5WvGxbNml2Acijr65RCeQqR+EH1InUJoHrRilGmpdNfqy7yI/sWYLVBNaQIsyJ/Rfd
VKz1E5o2vnyflHuQZNq7uAyu7vlYVWMZZDbDy41zA+mZqOrC+WgpY3zLhxp6arbR5NStvB/e2QmuFvxnG
XLUZB3Un6XbZHEKsJ34GRWNLqxmE11lWfr8GQulOyMdC9jl6nfJ0XAzm0Ty2b0W9mIAZTWVfEWbIlXBr
BiMjBrQZRzxNkbNSFk2QbxaX1LSi/Lln1nvb71rd3bVDre26uOaCPk58ahjc+LyfyB2nuqzhMe3cX7z3rQV7l5bb
Jxt//iXki8Afg/a58Ffp3cXfJMXZ0rO3pxfXXBP2ei9+lfFvV2BaJSLP2eOP2wgjug7CmgV8ZfhIfrbG9ud8FIIMK
K5j8bjRTWN08v/LxsM/7p5tP2p8h8ZcChYQGEAUuxEMw55gu6YnuhHq5+0/d7CJ7+xWz7LOd/Qf6/XvP5i
wlLdH/FzJioHlrLh/LS+2q7YFGBLZCGP1RPAiHwFM6Hsms+G1OAcaHWfdAW6QpxnbHkHjP6JeEo5GdFM
zWiKvhdBepqdpnjeM0y+enrWEcoC5BVNju87U2DZ57/ZMje06U+Om/dWZGttzmhoVhNyCqbE9p6lRQdJtm
BruwLz6ux9byzY13PH7Qf0yTI3tOUyNQSbEDPq7d6am6u/eWlVw5zA2ZgV3IXPDW8tSBGpo0VTH/DSwrpU
Fi2X0ClW/opUV2qNMjPDVVrnGWyJIr926s/pm3WCMifqR1x7arrOHJjQnLTFvc3VWmkMsJ+nO4uaV6ceVt
LS4ISEo0wyeFgqv5jGrdm7XrKpiZB6z6nNjhPYqb9ec2q43pxbn3xmkwGcwB+q4YTnmwAy9e82pmmXyi8DfMs
2pGXpf2JzamcOcImB2PEYFcjQAmA9ELzgYwZI75BDMxts0Lx7wZoXPTNipcp7T/C2YCTt1ZsKOSVO3Zybs
1JkJN+2vzkzYmdNMqCDkFsyEnTnNhAqSbsNMcAfm1b392Fq2meCO3w/ql2Em7MxuJnyfjrMZ1G7vRE1Vu7
21qtDObiXMCu1CRoK3lo4/n0SKppbbhJ4FpVsLCZsKN7ARLvke5ppoZ5ajRwBQoMCD+KImvn+mP/ptssZx09
tVpuOph8vi54sTDKHVsJgiJJH5uVWpqlXVCZfSVYfXgb43ff6hCTyHQn/7W8LTu0Z9/ntLIerWVCQq6MYxS
oVaT9ySYYmsE+8FMyrd6Pplkgo8O3akOCCM01AyeGiSq23CUxRol02tE7ky1Set0Ln9zs9mkO6C7REkYi8UN0
+3Fza6jRJpdv6Rn85ihuwuaoZ6rwKCW97RVnYVWg7B57NblIoxCZhe0Um8DX/UW7eJrjclkng4+hzk2kZG8N
tktW2SzAuCRU182CieYtctBYQUAjcJbvgCFsktU+Pd2EwFMPv+/ubXzcMc5/7+7tbXK/7SURx4X7ol+OI7V
xV90AGDf2Pc9Ic3tkm95HIgQT9/QCa6RSEcxGAp5d5xl17ghGkcXIggxMWbYzdI8V3H4FLfZ1i0edbsUrAnW2
XWQp0ORwjJzkSA/BbDspLAUDVv0ocAbKYNwlMbpeZTT6b7ydZIWZZtvUoygDUHrLoJhWIBiLXoYtIKhT
i0AO+hFveQeDADjd8Pk+gqUVDo5cCbagdUKSCJQdbvpGAYXpP1gACYSGJjQdCxgKSy7PL4S2SUOOx0X
WBAHC2NNh/guA82oRb3LQ28wplzEfTS1kp4O+RUBYDXDK4/U2SCwK67xhOqFAdbxOKM04YCuUTZOc
GR0kCq9FNkglDvRcUrogdboyMQoLAAAQDRtVecD3IpP1ZGrM5F0B9BAHOGxMsBZHoge2m+6S/0DJBSD
mwQCb7rgunJoOdaE8XCQEJ3sugqL7oDVfaIPShFGLZxdt4OnAtArcD5gvq9gujF7p7hHUUZjijLqpX+XpCJtA
YoisggSew6vwgs+SoZdnccYNQ5zkPP1VUE+TlpBSkffgiy8zsuhgyoBWIxiqJGrWSOc5xfXeNytREHjeThMInTi
DSiKIQHyBHMGywNW8fgJdIszBzOJMQ5niuwIBa2ggco84g0piLAUAvkBCcSiX7SDw3uINqyCXAW/cb2T4w
mVB7HdqM4IMmSOBFBwsDxOSwStAEL5fFqMsQ1hH1pO0hSRmmXIuzBYOSXABIikXsQ8EgZ5nF4BTUXd
i9hkhx+BzVN5yoQywQFvQ628GGdnOHLCDB7tzjV5xyloixgvBhWBDGVjxlRuu7JFj5WWT6KULMphbscjTn

ZQ6PECFwbFFfQPcHdl0lYcFsxDznQIn0RsjOAlMRimLC4GGUJErWXiMo0ZBSlyO48Qs7AqiqDA/BamCiXa
R1mjv6H0kYTQS4FnggM5xTSvZtdDolGkjavwWs2tiMUlJopqwewTM4zCMYo2A+rG6/D6TMiBhxFAf5WOY
yQXSTHtBvY+wIwo7YALR8W9OA4K6JF7wYNRsGqRBMOzUsmvkSiuLfDC+ApZ4xwJ6ZcI271WMCG3X+
KckEgvUjqGdS83YKyOEyQvTBkBDXWzMA76MVYjLkUY+jFi+0oSVZTnY5PbDgFWZBise43sdo5CmEcN2
AbZe43/opBnlgRCGCiRZRDYTkVWjMZxDLzOh2nzMcD5C/AaBkcBxXQxiYKaJBRd4XkYJe3gJXKqZF4DS
rzKAceTA9UKhmM4zuD/lWyAMWN7iHriRRLG2FHMS6fN3lV0HlArV2EMjfTSKwYaWBuW6VxkSPmS95E
Z+mAXDaDwJRGnnGPMrxBLiQdsaQD/okTtINTS5zwN7v8CqtB94DsA1pR3LUDySIU6nYGUItl6BZzHrEliL
0uvPOP4a3IW9XoiwVQXwzTDZKs6khSdQygksDrJPqKyFOa6ixdoAFTQcyaGcumBQfBCfBXQgtkTeNQvwB
Xcmn0+0aWm/xBJLPmff/x3QaQcDNVhQpwMkgJpSLdT0LLGDb2EAnSYZ5yPkX5JFbgS4gI6Dah2i6oDCeX
INRQCDV2AMoL3i4xIgiIvMwSwHpWaBy54EuUtXbHHComUloxmVJwGIa8W2FdCNM9NHqCM4zbNBuVH
FPno825hGQLrTMDII06OG5zjJhJWwnEReezuBtcCFkKuf6yXZUQ16UYwIZnoj2Mu8D//+L/HRUTtay2MlS6
F6ATH0f6ff/w/gnI4Hp7FvErDZOH6UJ2vcmnHxYBVDKZwnJthSqfBUBxR0wDPGKQ0DiAf56OoizGFXP0Qk
+XQyWxcmvvhMIoj0O5h1s5jQ9+iZRapCYafX4BkUNX7OH5Usa5QM8xxnKTZkaLYi+Q5rYyUOZyXjNcGKf
JQyxU5arUAcyKQvGEtglnE20RSVkpgHo5hCc15beEzdVqwS/E0GqAyTPo1QtgP8SQ/Y2AQShiS4ODkdbtE2j
XAdB68xewq3BzRVC9LRyO8J6lkegQbWxE9KaZBc0fVpwuEkYXAc0VIVTQZUgWS3OPkAlmYwIOC5zAkIQ
UqAJVcU1EeEkvtHp7Tx1EBDouQsdgFARZKeqbhwdIT4tJ4BbKTMZ6HfWEMLaOzrSgvUIDLJTgFCjjHxNF
gg6QjoMXkPEeSlP0XAyA7Wo5QCBO3k/gBKsxEHP7KNgaBHsWUqpv7k+oa+6+1zsac1EMvttRr5dJaao5xN
AQ9WLbiBLP+OwhWq9E2jivBZu/x0saYGITZWVr5WGLDZJlti2XyAnDAywxyJR2kRCUaCJEvawhJxGKgb
C5V4pYxW+ihL+SBRMWllKsDF7k4ZPUr7HZBbaH8lqxYgrwLM0BXgXEwwX+NYT0TrE+D6QQL2zi7Jvkz
CM8itcq9SYFsUmCegq5ELM9pj/J7+BKqIfskejmBCgVwJLFOHxUcySillgY0eg/GRPCyGZJHPUHLFjBQCGt
mgTdVX+K9VA8G4/xMLsQ91TkNOydhdZWilMaM4SFosaQux0IQdWJjrBWOWYFA41OamSQrrwSSLinDh
WStJAK4gDwinIkuaOTn6KhV0wazfpbR8QpQvkFSCSkjA7yTQ5Y6kBYnNpgJ5hFpLEulHN8OUsk50kKhoYT
YLs6NWje4S/wGohqGmZ5hthZtlD+P8lGaY3qoKrWV+hSuD0xGhWZNFqfJPmvGg2xMS/U54AhkL+dKwT
UetMGeFCygtJLRiSo1UczTNCOt4Huk4ZL3E9bEWjxQoiapsNLxJYMBUlIVk1/GmdSvomFYsijYaBfXqIXk+f
WDAWjTeO42vaa8NkCNoMxkTA18BheGw9phSxr0ZK3KntU6TYHtqJaARnsR0DF6BRAqnGgWIJZpSrhlqC
5LSCGJuqbI9ZzDKICvEiWlJf2eg7VfSNMRFC7QBiXVsLGIg++mV7EWGIA0NR5cIgsVZkZmJ4k0iRSSzmryr
ySTqSUIayh3iYhHDBCjB/5zEfU0HsIzuULqITNTVKloV1MRKBGHBU2n0shYHGkjA1liJLoRKGCssJEahqtx
PxgTxsS33NSPaMp1BQylxxpOJv5rLAB6VNnQlxSEvUs2VGF1eAmL23Wwt4F+EZoE2coxMxWBRDNGuOjjs
ooouUa0KYB64fW3Db+kDw6CeDwcIbRD6rtUDtH2DHkeDbUgByUf7G52wPCMosJPyhtuaNASlkeK0wlHeNq
BXWQpESiS6zAli1yQRk1+gJxLi2s0D4kiWSKQ+IX5A5tR0EV14xFYoeNCkWjOygJpICBXfkmjRDLtUXYeJt
HfyeJuYUnW96LiiaRnGgpzX3wNanCu1WzMHz9UdDcEU7eL9QfSPkFlWJZM0ILKx2g0xGTqIVYE9MucSGw
esV2j7A2gpefhcIheJHL0lYpnQesR6GrcCfCNIIdYyCyHpgU21stC0Bgt50uU6S0veAPrAZRXbox/rivI0f8f9nq4C3
cMy3t34UseJjxT/P+bW3sPXf//xsNV/t+lPIslh/0QYtxeEqJaJYOvxtOT2ao95Ztl1/06MxX7bzyft/n6S9/YeK+
mBnWvtuMN95anuLqG9BYS1tp5mY9Rj3LfzJlnty5h82Lpen1Jci0JOClVrkqj2OnkgrydFIZJC1h5dxYsI+RUJL
2FCugQhTJgRCamxJ9NJ4zWzJvq5DiqZsGttGWnZq20Vdaq5rT9bebzxQCr65P0GQbmEWJuDQRUSS0I3J5m
AMa80rg+A3Cl4Vb9sMwsw24ZxWVmZ+ZdZPP1pG8rM/PwFpUmJg9RiqZm441TNZHd29K1/ebgzXMZNufv
xQxEvkku57tN4lyfvVm1DhLIBal22maE3TNhOYrr+mHYxDHbGLxkoSMAJ1BAOYoX6CaunXt3Vk+tnnTo3I
SeypFM7smd4VPf/NTgi8X1sSqlp+QdZ8f2zcG0lqSIM3Pg2S2dpcUA3+Y8IzNy3lO7VhUbfrRXU/GdrqujOcF99
QSHb07eHQUPAmgkeHf06kXw7OXR4bMXZQkjX3lXs3M+PfbxLXrPRMAiIPhPNONZZOiCZUJDWegKDOo
B9KJis8H2v9dTe6C8bfWAfE48VuXEl64WHi6boovHXLIiwm4HypgeST87jbbthmGW0ZUTZWtNbGXtClBJfB
dh1jgO4VauJUaCMzmzhvI6SCqngvwVwxC3ogkz0lefWh4I7bTQfieBOyRC/02bY1e8z3APd1Jph93YIeNQkCtU

4tTOMO+rGh6TATsLr4O/0fku0wnytwa65KA+7Z8F4XnKfgzL7SaDiNDFTr453PZNKEQEeiUXH9HPvvJp+7
oB4NG/mOMQ8VK8vL04aUkq5509jozCnbUQsxnTlpaIyayLr6kid4iA3XPhusejRQoQTBCcDWoCcb6WLDNhZ
S7rdjoVUta6ySij0IScuSNXejvuBY3kjhx5jmH6yR8a5IBqYGvWgr1s4FlLW6XY9cA8D5uwWKjIsNkCuAmtXj6h
L+QtvcR9HphIpCgYto+K2ui8v2fuBwveDi63gjfkVjBuuxA39UUIxtt5dMkbfegXi5hOr1IMT+MW5ZYO81quY2
Jwr0BuLZ2JFm0mFcDTIab95qrSX52NKbV5ueWJ0Ut5oXhFOvbYB0zeZjM2jyDWgTQFJ6yiGJiQfKW3wiv9F
H2bTOCtKrqrvEGsgWADelhGTuKLWhqbJrs9qlmr1DpmJ1p9AMVYXfHkiSnPWxbZKjXH9QQ1J9VpLWRN
KSsK7bdYKpKN9duPhf4tPuj/tZx8d3AL3LT7f/c2tx3/787u9vbK/7uMpwO6dXCfPVy5cl1RFGQcnWVhds1xN
oM0w/gT3HK9j5vSFGVAiYrRZMnOKeAwl5E1OrZCNrGGeaUt1+C8nj/HidwiGf1MRn++BaHMYQ7zX/u1Zt
1/bPn5AmaLnC0i6fSTdxSrpRrX+IPsXB5ZrgK0zh/UtVlq+R/xaUy12OhmjGMmdFu4cZ52VCahwceT9GwlDF
fP6lk9q2f1rJ7Vs3pWz+pZPatn9aye1bN6Vs/qWT2rZ/WsntWzelbP6lk9q2f1rJ7Vs3pWz+pZPatn9aye1bN6fgvP
/wfbFLt/APgCAA==

F.3 Artefact

The following text is the full story in JSON form, compressed using "gzip" and then encoded in base64. The full story can be retrieved by copying out the text, decoding the base64 and decompressing using "gzip".

The full file is approximately 43,000 lines long, and thus unsuitable for direct inclusion.

H4sICCdYil0AA211bHRpaGVpc3QuanNvbgDs/duS60aSJgrf76dA6b9YM22p7CQOPKhnetmSqlRatXWov9bqk
ZWV6gJJgkkoQYANgItijfVYPcZus9m382D1JDvcPQIHEkECCUcyQ8y9e1RSkgx4BDy+8Pjic4//+X9Z1mexvw
4++8L67OMqsL7bRnn4TRBmufW7XzZBGq6DOP/sBr7mb/NVksIXv0xDP7YWgfVtGOc31ru1Hy9867skyyzx
b9ZXfhRt19aHjb9bJmm+op9vtvdRmK0+5H6OT5P/HSxqH/9WfmrfjWb/fDf7Z9uhj9MkCjLxwV/Ef1jW/8R/i
j+HC/jyd8JGYRn+8T9umr7xpyR5DAP5DfHPv9Iz/Qd9o3+MAj8LvlolSRb8OdmmfxIWjD67UV9Sg0Zfs+h7F
nzRgm+WX5wncS7s+1OwbNEqWPQx9eMszMMkhh/EwS95+flKDLj4qzJV/GURpsFcfflDEIn/sPZgBYyYFcZ
WLt5qJoZnf3t7WzQkfhglcx9+hwPwV/n3/yietNzG8+Lj8ld/CvzF/mNCHah11NJ0zvofoejN77d+uqh+dxsLAx6
/Wm3jR+tzaw7/O/pMfvzX6uAtwgYzvk/ymiVxZ1PUo044zcdksbCP3zj8Wfd6D37S83VKp8oT6z6woOkbMb+s
QDSa4kRLg0i8wk9BtLfiYGetg/W9+CRZWm9gKv+QPvhx+Dd8yW9u8AcwmYPAErPS+uCn/orBIWjuwfB+
HUZRUHvHH4JcTryblh6E46fxmN+GmX8vfPpdFFlfbnMcEOzKX/BXN9Ql56/tvai0/XfrTb5nsTLM0Kf/Dd07
WJS+XfnO+8yiJvxPfhhhp6AffpQHaSwA0IoTAa66bp3wWPrqscvi33U+e/gjNqddJlGU7Mh+4X/Wp0D0Tzjw
LsxFGw1Oij4KvX6ToasmKQdioQdqHVSuHW1fPQ1WSw/FL/dz0dL6bi560s6WPirb4HbS97FYku6DhzCOw/j
BPfbW97RoFV+pLlwHvqttq6cTI7aAN2bJOrAS8ZDUuk/2Ir5JhWFJGtCnEbyd+IEGxtr5e3D7LBf/C0Cb5n4Y
1x3uaS580Mv2K6rd3tHeZ8dQ3e65hyvAV/SGaq56MAfVV1p4y7t5/nGXfJgHcfBDHHjH3iK+YIlviC7jlyzxLZ23
aNvq6y3CW5dhKmLmpViGf07uyU/AiUUUEgZZzoBjB8a3cgIad+uPKwhRxa/7uUM7CzTgYreKuFbBu2idZPl
34SIOH1YifPAX44YQTIzsf6Fv/ldLfdeCL2sDszMt9w28Af7+8ff/zCxs/PNc7JusRRp+AnQQoeinILMAQ9ahQA
2BETuBHkHa3ymau9UeIJwuHnG8VHZ6/HPixIQRJyYm48SklS/Qq3kaThx7RTsLNDjhtHnZ3wVrsaEVwykcZ
J6KsPJjup0/Im0xPX7z9G3xABh/9QsLf2Lhb3R+0O4xDE6x2ELYEPiRcAhrrizM0UIRKSepAAuAjXnySfzLdo
NhCQTRDwJVwjjZZiw7OX1v2yOKe+Zzr59vPcHIY0fTuvvTXG7UQAsN4XMjPqLIBKcbdaCOxv0im6dYocEv
byjXOzYNg46PQRRlsF0Rq4j4KF/NTjhjkyN+Ibep2BCRKrAgYVunnfQJFnGEWVZetzQVLgz/yJJY7BlXGG
GJP4vllcs9W3e0JS/w5PdBXEJHo26skz/4FuKOBH4xuvvrmWk2OfP5yOVA977D/T473eOGhk5zHM804BpEcZ

8ZUar2PRFLoAlYOk5R5U+wgQU9ooptln+fiPkoUaQGIKFYFbMsfIjXB3uUAYCk2ltOCKm+hktDx/SS0NFig
M+BRq2JV7g40aFRw5nZhSOQEd+Z3AsPQUZ20yFnj6D4aQ8+76bjFt+ZXG7lazhEe/aVj+9MzoSVz3kex9U9
kcdjp0N5rNibfiO23+/jT34mRmHUcGxWoxzgy5b69lmuQdc0E8vg53mw3uR0OAZQ+cmPtrh8hrFYQNfoVdYy
TdbARAg35fO7o8615xRm5yKWOybSoZWBx86kPdzp7EwNbDmXM/GS5y/MmdqR6+QsHcRNJ3nPVgboDvj
vnsmjAF7fP8RJGmQIuqOGc1u9h31BK5RswDopXun8eA5hQFi1DE/95HfgmA90AWEMrkn6gAz3COskDvYD
+eFxd7tuIlu9guoO8qwFalPT8MVvxVIciAFK6KvjczvHSvCu+UKnM4WWQNx6UIuN4/kG2mwbBxtZDSbMn
hESDu17AijIJgD9n4YLehs4kCE6MK8JHB6DYJNZOz+frwYEhMN+ckHC4Qu4GCo4l0KFliN7CheOmrh2ZKh
15NwR/sDBAuPRvgnBwvSJ++6WMerp57WIWUdtvmRfbhU7dd76XKsY3wnry17FZsP76qkncnmrw++t7+a5
jYor8X274dgO1G92oX2DRjUup2uo9+49jB8y0nSDX+XbNLayZJtz5KDUbX6C4m2VBkFvzdt5E3T+4HZ+ww
2Ko6e9YU5J0XO94Xa6oPos6vqGG9XP503QvWGv/YrzXRDkYiTzVfBlkmX2qcM0+VVk8eHLp5cRfcNMzFyY
WXMfZLsipAEHgBwO8SSxeljJchnOA66F4rAnHWi48bkvTDjWlZYGnjsgqDltV8c5Rbn1chzevIlLOk67JAryiyn
HbrLl83Uo0uk8tI/zYOyT5SLOy7YbsSPBJK9TR6KHDqWOQ6kNEI/Cvub8oWg3M1hORbH9qoUgfhW2fQrSj
M4SIF+xcMphXLG5p105m/ZvocratLFEUQsN302DtS+2sP++DYPcds/SNudO1exOUt52ANxpdAveplUbbYib
4QZYBxRnjqqZgaJu4BNQQjZgYQudAUL3eBZ0WCRivxsnuZX5e7Hv3ZP+3c8KPLAif5/RulWDN354qPeTCx
tqY38xWLDvLgULrUb1FCYcNPAKCMedOXXQ84yRA3O65wuOHMbMWqquj2zhkWeUUg3BwvOuY6c0Mc+
wjvHpZl72OjYZ3lP1z2NyU/uMrKaPm36VpJskFQvI77KNGAfhCvap47Hi61bx/dN+eLp9pv39fRr4j9K5fOFo6U
MgcHK9EX5Yyriw0ka4FtYIZMmthZ/7XE7Y1MkORTRG577Qs8xGZyPPHRn0dTHnVEIrg4s5/ImsL8/FnA7p
q3bPOgydbdAhWadz1L5uhukDkEeAMI2CdIHb8Fbs00msRw4oj1UpK4MWvFLfXnvNLT20nWkcZ63Zygd1AE
aKMrdk5ZeGAzdKXVlx1At5Sn+7Z6R1fz/17LQu1pXZU02/grBHRD3w46PfOmdz1mz33Bc6nRa0R/4nvI5K/lq
n1tqlsl3kjehA6swZOz9Inbb5SVBVxOPQKBtktTWUA7jKHQUg2EsAsNO954Ox8+/uhcKZd0E4e9LLOQNqZ9
p8hbanxl/O6RTeS8ZfDqNuwYT4y3lqQm/7XULbh7fw3zPKtoao6uLr9+lM3xe0fvMdfJu4fj81PbjbNGhvAtdkO
FMv6mmToVKBD3/jNJzKHtZDpMY1TnuqQQYGJ/Iz4Yd56u94CyBKW7srQr9OtilbEcTTVugcY/ykF92iQG
63F82r9hr2RT+hKG7XF32yKu5pK3QvetJ+eftjkuVYysA5daQK3/q8RZHBxta4srShrqkfYXXsPLECf776nMpo
yysp/KUIx9e+WHSSpeVDRcGMLU+70rEOHOy5CkX2jGPdOW/bmQOkmsd28JhTlGp3j2FkQV+Wx+j4tabi
ySwFIM4/WgccXU7Hn+g134YBFUtxTp2Hl+7zBRTAaVf/5vQz+AreHBW6ATIgCzbiG8UhPibcYVpT7j/Cb0
RML5wsJEGU8MEsiJbsvlbpeFdySjPiVd6p6TGKvyg++wCxP4T++Pn0HIPknDsKdc/l6rssOq4OQ1hQSI2/aU
MR9R5I3fztUizoifP3wKyWc/hDuSPsMI+1z+IRWxFPU87WY/O45uVBR/rMzYORHHx+np1+zzw/2w3l8Rw
9/N2vfZ4WJrunjpOY1ll3kJKqBqyzbrvcUJpK57YD7rkCFC7LaUqHXuhuVDgjT2tY2Z9hMXJPaYyYFyOX8Y
bFiy5GbgdNkXMu0+a5HbhdT3o58Rn5Ug8n/ghlTn24rvSdQLQcSmO6pw7JPmIBW/yBVfzitO+eeQTXjWZK
qoz52bUKD756LF7eB8VABTCDiC4KcrhjMifruFy8sb8d/Puc+zqdKkqfKADU2soz9H1/jztXRo/B45hL5b14j+u
QA+xw3V3T2ggdznU5Qe3tdfAev0rWcJUznRC7p45MG91QHpqqVloWvelkCIez5qmskDynpxzYye99DT16Sp22
duN9UKmthS2VgmLN346XqXh18utnk/ycc8UX3HN6S5clC7/Xi6iWdWvTSsvKbgO/DR2QdKlExAQkdSufjCS
ymV5QojOFZeHLHtW824GeQjwel7xVuBC74cExpd41XlCpDf3lUeXcpUSXRpVWr+I8rBw084orJ/p0rrLsswUo
zOVlX0CA0uFE3T2X1O+eEyS7LEfuvfql8/Azuq2GgOcCy+u5wv7PuLwyXgTw0pbXDtcAuGcPUC88JVp1rNe
cOFPE6klzQnQHpSKbyN8HqfhpGvgLH/zMbTjzBM8nZQl93xI/gEML4VXW5kQ6a7un9PTun84e9/z0WX/3Pt
UVNqFt24e0cJppTy9oED8N4AV8oiiNFxychQzsCXzVdts+pIUnzPp5gtdwvsrvCR7fCetPT4lch3UM7+6JjnG8d
Wr7kPOO4d71dIyG88gBHIPvJLK1Y9RCuYE9Y/QcntHx6NAdtfGMd/Pc8RpO9EA97+he9OGPer7SH2KpkP8
5uWfQx9ejx6/D2I8OlevCejaQP26uxbs5c2LbcFCt+9KZMxEVXbd1hYYzjvOuwHcecQlX4LuB8bi5Fu+mzf2K7
pndg+LzWnypVSDxox/msL/0Gohq+OwGd59vdU7R9POejtHfF0qjNC8oC/LyO/iV+hHse7hYE5YY8qM/ig5lf
xLofNAGIQS0dLAjb5TS9+Rgz3bq2A3kLGgXNYhlKH5Igmwn1tIHr+EcHtZg+JIF37Lwa7c6tzjV3sXd49g4HW
Xdwg0aX3VPBqO1gX1e+Qd/L68A8RrIZPHp2btbmlvgkJ8R6LwRO8F9srUWCagrRaQUvO3/8qtGt2e1vLuDq

f99sgODno4dNMEVdvRChhZdmvsxftD4yvpihwjCsw0UJ/Ma2FgqQYAfa8GisYEX7kdVo/WrTHW8u/hKP/g4
b5omZPDOaBCfhC4N/GRHdOHjHn8Ed8jECgaekMQ3ZMJbsb8MMyvM4jek7wb0ZYhJq13ogDUjM7BG16UG
rDkTrj4Ja5oIz05Yw8dlPq9XVbvQCnmml0Cejqynd0ad3xF5wJBxAxEqgeeUzL7x9z0d5P2btRUF/ifhHzf48FsL/
pQGeZiG1TC6H9SQ1R2QxuZGmvqOqJcvne9RDWgO3lhvJ4IC4OjJ4wbaVOZInEQaTRMGeFLF7jP4QoM+E
Lw0LT7nTdPhyxka7in40sCldsIX1vvJ0uANXE0XxJYveiw2jwHkncGSk1UdRfoOK+J0SGnwHCMQR9ejY8Rhd
KvStxuY2a6Iw6gbv4hvVXrSBoPsi2BQR/7XO8PyPwWDGljbThjER9t+n1h5uA7wuTfkHNJZbqEgU7KzxIcQB
j8G+4wVf9pVv6JX4BqBP7oeHePPmTOhp+FPA/nbFX/4+N7n96tKL9pgT6cDBDbs6ZhQ5TE6itpYjnvzxmM
+3hjU/bvV/q3142pvxcmOlSoed6GKPW6IGYS+0XbpmL4ZD0AVj/tSxWM+qngA16na2YajGV+CHdaapsOQ
M+rXJ2FIb3Z4zMcOv8shhs1y6yH8FMCy4lvL7RzrtVHFj9+wgkoXTnhsBqi054THA3DC476c8JiPE34OX6oa3g
plLsEEa03ToQzbalN2fKKngluizISPDP5zsrXEfHiDDvJJRLHKVW6wWHVxoyLWXWE9hZp04YYnRiCOtkvH
iDNhY4dL5540aWq7IM6Ejxp+br+qdqIN+kyGIopPoY/WNB36nJHfPYGjmfTkiSd8PPHXSYqrUGZl/mNQ5e7
U2pSLry+A3ROeEqZWtgIFoB+l4cMq59pSUac6QNGUG4qGIG20PToibSZDkMaT/qTxhI80fgGOVulWCxZnc
hEGWWuaDp3YguYKLOsp5LaxER+J/OcARFvvrUexDbfCXB07pMn2AeorzcXjI+aYqAt7POMGomFiolb08e
Gr44uJmrTDnWIiPvL4ufypanyrWGgo0vhkLNSVMz5Tfv1JaNObM57wXuWAN4ND1psf7eB+cPSPKHyEM4U
wu8Hybvtk+0Zs4uPgU5BS8TY/jMUQ3AfLJBWB9odtKta4tb+/p5OIFd7CG3/yM/EgaweNw/28G9HLxFr66e
0tL4R1YKfHZgiZtV1qgLAB2OlJX3Z6wlgMwmQnrY5IK1y8BA+uNU2Di5wyMxl+TntqFad89NTXaRAskrUK
2YVnxLm1pD/eWl+n4iNwOjiJnQfVP0ThMuA81592YKvGRigZtT062iJOh1AyTvsrGad8dNXl/azSqxY7xOlFd
I5a03TYxKtzREumegKrZcw2ZZU67q1dQjRnDqveDSxn+zdRRPV1xV9uLc7watqBqhqz6xsHCa+0XToOr6ZsD
lUuuNMGrqpTeDVllTc+iz9VjW8TCU2HIqRORUJa03Row69onPZUNE75yKj3wBfA0QlG2kBeZv4ywATCGys
IoXYHa7zTgYmq6/5ebLzTWsc4ZeOhqmtnfx3jlI+Kei5vqtjeJqq5iHpRa5oOZ3jVi9hxPRHVDmdYaShcbmjrjov
Omncn1YUgYpcvDoIsrfihg/fEiCwN/FBXZGFliAbyn4q1bbBkKPLmNJZ0ZW94VYzYcb2IsR2WMF4lmKTpX
mynYbHxrTTMHsXWeuV/wtqacCUZK650UDCO2RWMg+BKKwHjwTtjxJUGAWNXXOGTMD6PL1Usb4M
xQ0kYT2NMRw0jn2K+6PisJ0M8Y8xmtxa4Xy5cIRCLD2yTGaFl1oX8ZZcqDgEt2h4dQctsCPJ31p/8nTGmsQ
/pQhWDWyDK7CK8rtY0HaLw6hLRkllvXnfGx+v+IQj+dgPBa3CDhwGZ9fM2y6EKPmO6ujS6A7SwSw8H4X
O1XTrmc2cD8LmzvnzujI/PHdqPqka34XFnl+Bxtabp0GUAXeGst65wxqgrxPJvYsW5xWugQCuRBtZ6by3TM
IgXtxZ8IVsl2wiuoAGHWQfWPWYD8mJPF47XDLWhtksN2DOA2nDWV204Y1QbXtTLql1qhUyX0CBqTdM
h0wAaxFlvDeKMj/wln7mx/Hm+9aNoTyr5VRLBLT94fTyIteZitDJ5VoAW8KJSB354YoaAUNulBlQaQEA46y
sgnPHRw5fzsGp3WiHSJdR/WtM0iMSXRljpeO8s+BkjhUyVc/dFOiFt0oWPREmS8wJPBwJ5YkZZVG2XGoB
ngBT4Wd8U+Bkjfzy0I1WtboUvl8h/15qmwxf+Sqiju57kca0BhpQcKLVS1uWmurnClkUC3hFb4dKSBCFnyqno
RAe0MUJQrO/SEalcfYW9/aqgMUd3/WnlWhvGOVe1Gy3YZvEaLkE3643ToRB/vdTRXc9E+FoDXFt1axsvgj
TL/XgBhGEciO6FbFGONLsD7hhRIFXfpQbcGSLbfXTXP9291oYB7lQ1vBXSXCSlXW+cDmn4NcSju54i4loDr
LpPWJIGwZgOxPLECPGwvksNGDOEfHh0118/XGvjRTtS1eRW6HIR4bDeOB268CuHR3c9pcO1BhgWHixuA
Bcd3agjB6yiUjtumEO2L5aA4pUWi750AB4jtMX6LjUAzxDq4tFdf3lxrQ1Tfazam1aYdBEBst44HSYNUEd1dNe
bQq41wVJ3ZRdE0U1lw10SgHM/W5V5do+h+AeUyIz3O5+3vI/oVAd8MqPKqr5Pxxxz9aX2dLaS0hzd9WWZa
y2Y7Wu1TrVhocUruQANrTdOh1ID1GEdjXoXYq010f9qgb3auNM5BWrFsBKBsCjdxpYvnKQsnQmuxAtPoy6
ctBklWfV9aoCn0QBFWUejvlVZay0Y6mS13rTCpdElCrTqjdPh0gBK6NGotxS61kTf2uFUBlPqMPBaAqzYBCL
5RVLd+rPeciG60AGMzFBG6/vUBEYDaKNHo77i6FoLJnlWrQvtEOgSYmm9cToEGkAtPRr1lkvXmuh7oy1G
08W6JesTsF5/IcztgDZmaKH1fWpCmwHU0KNRXzl0rYWX6kU1c9shyyXEznrjdMgygNp5NOotd6410dMnvhX
T50b6w9p/xKtRslWSyNJLcmFSm3gZJZOe/r2IkaOIef/Vgb6emiF91vepCYQGED+PRn3Vz7UWfgUOV+tZO7
y6hBRab5wGrzjLVJZd789kj/iYbCi/O082meWnQSkmu1eFm/x4b63DeJsHmMVjvROBtJR9kOYMClbidSy8sN
WB1Z6aIZzW96kJtoZgtUe9We0RH6v9gvyu1sF26HURhltrnA69eJXW1HW7P8Nt8zHccr+vEqLDXBb6vo+2yy

UlAoGipCqSFZ6Vr+A/pXw/efT3vDST3YHznrLrsIcBL22fGsDLHoLztntz3jYf5/1y3K7Wv1bYZV+EBdcap8Ou
AfTZdl99ts1HgX+fEHGwo3TqP5PmBJwmX/m5lSVpDpdHbYI0S2JWQZPdgQSfmqHW1nbpWNBkD6LWthn
U2jYfC/78zlXtRhslk30Z7bbWOB0KDaDdtvtqt20+GvxjurfgXjp1R8HCp6wiXsDpwINPzZBua7vUADiDSLdtBu
m2zUeED+pHVYtbYctllNta43TYMoBy2+6r3LYZldsoW4MF502GylrhF/kKLqbjzQyxuzDcZgi0tV1qgJdBBNo2
g0DbZhRoD+xKVaNbIcxldNha43QIw18JemT3LAVda4Dl5APXnNtbUp3BFSfrgJhBVpDpwkcbUQla36UGkBm
iFvTI7l8MutbGy/emqt2tcOYixaD1xulwhr8a9MjpW9HD4SOZfxcvrK+S+JPYLuNr5wQWpwtXPOH2g1P4oLX
sGB+cQUpvOAylNxw+zncIL6gaqhnt4ae79tG66T6EQNnpL1B2+NhZ8OovrP8lXvn/sr4M8zlzUoTThYKdPoc3
nDet4ZzHGUJO7PSWEzt8ROoQflCzdMBJf/I4Rvtk3ZwfQhLs9JcEO3xc6EEW8Hu4bHq+8uMH0cE1ihEWzCj
QhRedPS8KdJD5OkPIfJ3eMl+Ht+zx8J5Rs/1iuNCVxBxC0Ov0F/Q6fDzmO7oj1doFZVGA76UzYHLJcjt/hBP
+XSD+yaskcTpwm/VbVYaHiA4iXGcIEa7TW4Tr8DGUz+4ktW5cDC06EpKcF/+UztVfTuswFoaorxX42kPh
DKJrwa31B2CV4GYx9InHYJ9ZvvCch4Q5sujAVs5GzwsbHUSwzhAiWKe3CNZhLO1wMW+p9edi+NGRaJwN
IWh1+wtaXT6u8WvhAur9g3fswhj0hFFkPYSfqCqacgZezHA7EJH1O5YGxwytaQ2Y4Q6hPXV7a09dPh7yeT2k
1odL4YT2yTqc4BWPSs/qz1C6fAwlbkLX/iKwtptiE2q9X1IUikle0glICli91hQ+WpNKGY62uO+fE93sACXO80J
JB3rTHYLedHvTmy4fvfninKjWzYuhTUdudMYrEpXO158bdfm4URAUy0TSj6TCgSgV3v0igXVoOCjpwJHWb
18bHko6cKTuEByp25sjdfk40uf1kFofLoYTHblSvtsBy5N3t6/g0+UjSj8m1hqToUCkl6Sy2hdcq86q93S7cKJm6D2
1XTqWWriD6D1dBr2ny8emDuxJVZvbyLDcy8g9tcbp8GUAuafbV+7p8lGrUMyLiljgjVuVYsxvLVaA6cKemqH
11HapAWAG0Xq6DFpPl493HdqVqka3QpjLCD21xukQZgChp9dX6Olx1sutV3+HG27oZj9YezAB4ZYVarwupC
t7ddxBoEbbpWOo8QaRjXoMslGPszzuM/lU1fo2mONd5qI2rXE6zOFVm1LX+xYC8PiI3P/ybRj8V5Wivc2C5T
YCO1bhGnbSgXWfZBklcos/b+cr9vRcrwtby14UdxgMal8PwBukHoDHUA/A4+N5L+Zj1d60wqTLlAXQGqfDJ
F41LHW9b1kAj4/uFeHx29IxVj6QeVayza1lkuLOPKbqgrw41IXqZS+XOwwOtS8T4DGSgxXHZigT4DHWy31O
v6r2oBX2XKZsgNY4HfbwKm6p631ZZI+RRZb32OCm3F/mAXkGVZb4CJP8TWZtgmQTBVYC5ZYhhI6RIE
Svyik9PNkF1jqJgz0WO/24CrO31vvc2vj7zEqWS7ql3c+wDs56by2C+5xNUCOHpD2cHdxd/XLxrD1P7Q3CU3s
MPLXHyFMb7qvVQWkFkZchwrXGaSCS9Sr4ou99mXCPjwmvXwGWWMEvm8gPY+EcWRAteWGsAxlevej
+RcNYezbcG4QN9xjYcI+PDX8Gd6ra3QppLkOIa43TIs0QiuRxf0XymI8U/2F1Y+2xAM97KwsCCNmxIrOkEz
LxTnair3B+AqE8373fqiddAMiQarraTjVoh8ZDKJrHvRXNYz6K/BIeVutJq7q544vUzdUap0WkIbTP4/7a5zEfZ
f4hD+HeHXWOAlV6CnUqO/x0YMdHd+zlcgeCnw4q6PEQKuhxbxX0mI8dH9ydama3w5qL3BOnNU6LNUMo
n8f9lc9jPir892kAB7RwW85KbNGzPNqDq2B5MIqaMevGt7IVO/R0IMRHd+yFcweCng6q6fEQqulxb9X0mI8Qf
27vqvWiHRJd5F45rXFaJOLVVsu+969DMeYjxiHjD6jAuC6mxxxAMXmsLBem0eU5WS4eswgWN9aOpi8esAC
NuEmicM58V9O4E9PNrsgeCKc6lLcYD1HeYty7vMWYj+h+Wb5X62M7FLvIbXNa47Qoxqvgln3vXx9jzFsfY1
HmCv0ApyK7MAugvLNwFrwODNc9dXXOA9RMiSL0IkbJgepYF+hi13oPBF0dSmyMhyixMe5dYmPMW2Ljw
g5X61g7vLrI/XJa47R4NYAefNJXDz7ho77fL1XR+VWyA1oSJCt4SyHd/MUrBp90YrqftRaw1rTjE7PJIKLuCY
Ooe8LHWD+PY1RNv1h1YO2jtaAwgGB70lewPeFjn3+ffJ7ESuTxI3gB3XVTve2PqwqgtL0LLpih0Nb2qQFQBl
FoTxgU2hM+DvrZnKpqfZuD+MllFNla47SoM0SB4kl/KnrCR0X/9vQV76wbo0kn7pldjT3MxkjbqYaN0WQI7n
nSm3ue8HHPg7tTzexW257JRchmrXFarBmi6PGkP9k84SObsZ4c3nuDq5Ci8ODC9hsrXFrvlViMGXa6UMkjdtH
0QLDTgUqeDEElT3pTyRM+Kvk5PavWg3YIdBGiWGucDoFGQxRSnvQniid8RPHXeLP68rDM5YmL1cV/D
hYOdeGJR+wq6IFwqQNPPBmCJ5705oknfDzx5f2t1q92aHURmlhrnBateEXSuC+d9qWJp3w0sSx450fRW6uo6
C0Wtb11nyYivBa/TiBxB8p7g+Oskm0WYCnvPPWzlRgDPB6NfL6TednFLqjFLp0ehDjS9umYOJoOwkRPGZ
joKR8T/dJ8r9rJNvzS9DJVSLTGaTGMV1ZNfe/Lak/5WG15omGFGVaBkDeWgMds40WQZrmf4xuBHESM18
W/b9M9L151IbpH7FrrYfCqPdE9HYTonjIQ3VPGktMX9LNqh1ph02W4b61xWmzilWFT3/uWI5nyEd90/Xu9i
FaYW2kgVr09Hr3eByhNg5UQwnX4TyvwM2Z46sKJj9j12MPAU/sKJVNGiW3F2RkqlEwZr/q7rKtV+9QKoS5
Ts0RrnBahBih9Pe1btGTKR5fLTMWFv47Ja8Bpdj5vRZFpJ3LcjMrX2j414M8gFUWmDBVFpnzs+KCOVLW4

FbpcptyH1jgtugwhm572Z8OnvLJplZ6IxyOrMLOicBnANZP3yWJPf89uqySAz5yQNu3EghuiltZ2qoEF57sFu0K
nTnuz4FNetfRl/KzWn1bs9/Qi7LfWOC068Yqkqe+z/iVCZpwEeLCX9UMxXzHM5eEIL/7MOvHZ7OWyh8Efb
aca8Ifv/tyKQ896lwKZcdLZw3lSzeJWCDO7SMkPrXFahOFVXMu+9y/5MeOjp2nxEXvuZRrgWpTX6oXSfty3f
sYjj6W8BDMUcLCXGYr3zEmvs05cNbsoeyAs6lAXhO+Ozarr964LMuOjql+Gz9X61g61LlI8RGucFrUGKKI968
taz/hY6x8hiRAavYEUw7qYP8uTDVw2w0kPzTrR02YU0Nb26Zge4rxdr+QiZgz09IyxgPYz+VTV+DZM0ewyP
LTWOC3mDFA8e9aXh56xFs+GDXqWUzUrkKuJ/XvOfE4/60JE22aUttb2qQFpBiGiZwxE9Iy1tPWAnlQ1uR
W+XIaJ1hqnwxd7gMLTs76Fp2eMVzBC4fJ8JaNbDIxvitg3hapVa14J46wL5WybUX5a26cGqBmk/PSMofz0jPE
yxudyqqr1rVDnMkWotcZpUYdfX23f9dRX1xroWx+YrkygGxRWfrxAhYa1CBci6A38SLhMsoavrFkLcogudAEf
I/TT+j4dgY/NeYtC4d32XX/9dK0Nw3yr2okWGCRewiUwSG+cFoMGKDtt3/XmoGtNcJxNzNMky0SPfCuim
njJ9mF1a32ZimGDjXgYv7U+grIed+VKWv/W+no7f8yszH8MSF72KSDpWJTsfXUZH5WcCvyUTTekxqALjp
lRw1rfqWOu2uariV4SnvZdX6661sJV+WZtDNpw2uINXoDT1hunRUF+JbZ915PTrjXQ+6aYJI7g0QndXGwt/
NwHS+bJJ7j8am8lu7hQ9PtZ9hvWeKwLw20bIcDW96khHhuC4bbv+jPctTaM9LBqV1pFZRfhu/XGafGIX3dt3
/Xku2sN9PaWLE+iQLkFymazQLyGPCsD95vidAT+y1ol0UIugGuLnCq4tb6htElrBScsobyaT/xhmXMe0om+d
4EwIzTc+j41QNgQ1Ll91586r7VxLU5Z7X0r1LsIC683Tot6vHpw6ntPFr7WAE+SwC5NoAY73BcKzhHmt9Z3Y
hOw8uN5QMVISbnCil+d+Hh2Cfgw+NWaj7c5qwxWHLw/H19rwzz3qvajFRJdhJnXG6dFogG03/aot/a71kTv0
xuuAEmZ1gVhzBB56zvVQFbx1faqMBmjviLvWgsvwWVqprXikEaXUHPrjdNixgBqbnvUn0kf8TLpUAZQ9Izu
2luIQBkEtVL6L5aWjQiXczbZkupBF2gxQ7Ot71QTtAzBg4968+AjXh78uTyr1oN2CHQRFltrnBaB+JXZ9qgviz
1iZLHfiD24HxGDeA9XCsMm+95/gKIz6yQO9lggi1fKJDrQBX2M0Gfr+3S8deIsAVFG5CMG9nrEyF4/q2dVu9
Bm1zS6DGutNU6LPwPU17ZHvetr15pgEPLfFIlCeORBCddYAVleQcwc/XShnh0zamvrO9UU/QxQW9se9a2tX
WvBEK+qWd8u8rlEXW29cTrkcQaoq22PelcSqTXRO6tRxMIhaEMonXFfVHxgTpEVRncBHDOKZus71QQ4A
5QLsUd9y4XUWnjZzlQzuh3OXKImiN44Lc4MoNi2+yq2beaCICcKEFfKx+ywGmhuLYMgglIzj8FbYS9mWcOf
rMxfQiPgWimep64S3sRZ0e8uOGWGzFvbp+ONGWfOUhn02wwyb5u5rshLd8hqz9vs5+zLaMO1xmnRjr92tm3r
Ce2WaMdHZ78TW3ryGhFmv1mQeBYSCoTn/Jhso4UIvu8DvB+dF7i68NmOEfWy9X1qAK4h6mXbdgOd3Rm
4+Ajt5/ataidaYdBFamTrjdNi0ADKbLsvp23zcdp4ZQ0eccg6EOoyUdCQARuAV9X4yzxIreBTkMo7bHYBqP0X
ScyMTF24bscMpba2Tw3INAjXbTNw3TZjqewX4XHVrrXCq8tw4FrjtHg1gHLb7qvcthkJ8BXU+RPrFziQ8JS31
rsoQv4gDuBSmkRWnMAqgOsAz1Eegz1rRW3Rny4wZYYaW9unBpgaRI1tM6ixbUZO/JKOVu1RK3S6jMJaa5
wWnQaouG3b/Xlym48n11yPLG/7E1H3LoTDlsHuwhV96QJOZlTb1neqgT7nk6FUqFq7N31u89Hnl/GxWl9ase
r2RVh1rXFaVBpCbe30V1s7rMR6bOEVyj9DYZzKPcoysQgvUuYFIqcTP26IIlvbqQYg4jsVrni301uR7bDS48/jV
jXzW2GPcxHVttY4LfYModp2+qu2HT6a+/vk9va2djcWLlGwhjEDTide2xCdtrZTTYAzhE7b6a3Tdvho7WF9q
WZzO5S5iDJba5wWZXiV2bLvehq7NcrwEdlfBnMfrigW3uDHePvDQ4IaE35FpNOJpWZXZA+EM61o6qPXxog
zDTR1R5zhI6mH9qaa1e2QZigC+jTSdOafh9BgO/012A4fBV34BsS96zDL6MSCNt+8QNOFZ3YNkV5rO9UEN
ENIr53e0muHj2Ye2JlqRrfDmYsorrXG6XDGHUJx7fRnkh0+Jlm6xo1ahLCuMRR/8fds9WqV0V1wxhDFtbZTT
TgzBGXs9KaMHT7KeGBnqhndDmcuwg1rjdPiDK/imvru9ueGXT5u+L0sEBV8CmJrk2RZeB8xF+dwu1DBLr
tUehiA0XaqAWD4lquKM7u9qWCXjwoeyotq1rZCFvcizK/WOC2yDFH52u3P/Lp8zC+kNWdJmu5vyqNJTPP
h3Sa5XXhf15A61dpONaHLELyv25v3dfl43yE9qWZxO4S5COurNU6LMLzaZdn3/qyvy8f6vocbF0AMUdyg+WZ
hJctlkDJDTBfK12UXJg8EMR0oX3cIytftTfm6nBWkB3SlmsntMOYifK/WOC3G8OqNZd/7870uH98LgvVshTk
zsF3GnJliGeJFmU58L7uueCCU6cD3ukPwvW5vvtfl43sHdqaa0e1w5iJ8r9Y4Lc4MoRx2+/O9LmOFjXAe3OKlK
vKecBHzQr6LqgzFHNF04nzH3N5xGjI6ULfuENSt25u6dRmLZQzvFzXDNWM/PCZ05maH0O16/blZj4+bFV0
Qy8N9mM/F8vAH0Fiq8gOoteSFBK8TSzt5VkjQ2tYACd4QZKvXm2z1+MjW4d2iZvelEEH7ZC0i8KppMbfK61
sxwmMkVPM3GdxxZEV+HuDVasC5s+Y2ep3IVHYR7SC5jdo+Hec2eoMUh/AYikN4jGzqcG5UtbdN5qJ3mTo
QWuO0yDJAbWOvbx0Ij5NITQM/ivZNJJiUQPLCTCdC1Yyqxto+NcDMIJUePIZKDx4no/o8PlU1vhXmXKa

Wg9Y4LeYMoaX1+nOrHh+3+u6gzMeNtSqrgFhRGFhZYt2n/t+CONrzalK8LmSrZ4i4Vtuppm3SEGSr15ts9fjI
1uf2rlovWrGv3kXYV61xOiTi21FX+96fffX42NcPoC6gB4NIciGv/RBOQimtzFRLF/bVM0Rxq+1UE/gMQdt6v
Wlbj4+2fQaHqhneDm8uorrVGqfFmyFUt+P+zO6Yj9n9PlGnfrV7E1lRZtyF0PUMkd1qO9WAMuMhmOBxby
Z4zMcED+ZGNXNbYcv4IrpbrXFabBlCdzvur7sd89HE3wTWys9gvVkmKRQoi6FOEPF8gRX5WW79nNyLRQ
lODUSntxtm3OnCIXuGCHK1nWrCnSEEuePegtwxH4V8ERerdaUdJl1Eqas1TotJQyh1x/2VumM+gvmbADJci
QIs7hSygmzubwK4LdqHM4ltLL3Jv4+YD7fHXQhnzxAFr7ZTTZg0hIJ33FvBO+bjmy/iYrWutMOkiyh7tcZpM
WkIZe+4P/s85q/kIOsJ5T5KKGABU3IKvHuRGYg68c6GiHy1nWoCoiF453Fv3nnMX9RheL+q2d8OfS7COGu
N06LPEHrfcX/Gecxe30F5iR9bfpatkihANQYoNFZpskNvCcSytQgotr7fMtfpHHfiog0pGKztVBMgDcFFj3tz0WP
26g+XcbVal9ph1EVYaq1xWowaQn886c9ST5jrBuM9QskGR9RaJIHM9Kdqr9sM66Lxns1POhHXhpQO1naqAZ
ImQxDXk97E9YS5dPAzeVatB60QaHIRLltrnBaBBtA7T/rqnSecBSSEHzwkOa5GGDMjxRjmVpzsWPWIk06Ut
RmyZ22fjvWIk0FkzxMG2fOEs4jE0N5UNbuNEnFyGfWz1jgtzgygfp70VT9P+MhpODsVvrHB66jhklYfkmusZC
n+RTS5RWe4LVQceKfG2o/3xdoFs58tGVz2rgsgmSGQ1vapAZAGEUhPGATSE9ar8F6K21X71wq5LqOh1hqn
RS5eDTX1ve99eBM+CluG0cIPGuJn1rs5J1146zG7XnoYQGp/6d1kkEvvJgyX3k34iOvhvalqdiucuczNdlrjdDjDp
zSr9F1PV7fEGT6yGq5DxIJreBciK650oZ/H7FLoYXClFft8+I44caWBfe6MK3z8M7/3VM1shSNDUcpncKQrpzz
mVT5j36d6Srkdjkz5CGW4lz5KMhHHiig2jiCU3SRpvo3DHA3CxYYVX6ZduOQxuwh6EHzR9ukYX6aMC1Pp1
9MGKrkrvkz5yOTn86qq+W1wZzoUkXwad7TGaXGHVxVNfe/LJE/5mOQfRSQLaTiy9hpeV7gTk9Ly02QrvG
cb52FEh55JlsHFzlhiCa/8WTMDUheqecyujh4GkNpTzdNBqOYpA9U85aOaX4C7VfvVCqkuw0VrjdMiFa9Wm
vrel4ue8nHRsrC1vJoD6kU+xsmOu3K6tLoLErFroodBovYc83QQjnnKwDFPOYtwDO5OVbtbIc1luGOtcVqkG
UIBPe2vgJ7y0cdQWxIeTT7xZo11WYIFr8Bw2ok5NkTxrO1Ug5pnOoTiedpb8TzlI46H86Oava20O9OLKJy1xm
nRZQiF87S/wnnKRxpDmcpb6/skt6LwUd5xiIeYfpyI2DcVI+HHc+ZEr2knPvl5CxtrbWsCjSFUydPequQpHyv8
fO5Rs/9S1Uy1T9YixBD64ll/ffGMswrGDSbpLZhucK9Z2QUHDNEQazvVACCzITTEs94a4hln8Qte76lZ2SrWm
F1EJ6w1ToskvDph2ff+NS9mjARvEEU3VpasAyDSVj4UuIXMu0BsdNMANFXsRbxmnYjcKbeLnAaKDtUqZk
NUq5j1rlYxY6Rjn8k5atZfKs7QPlmLDrzqXulU/atPzDhJVVojrD9m+/mKeccx60Sjskt1B4o0OpSWmLERZVU
37l1aYsZ6ORyz/9TsbBdrXKRuhNY4LZoMUbV41p81nTFWLY7S8GElvOHbAJJnF4kVcm9eulCm9WTB4UO
LDsznbAjmc9ab+Zwx1hgexhdqxl4skujKafKlrZanRbO+KtgZH6EJx2e5iCWtNVsIIU3sMt3N0MBq+3R8EDsbR
AM7Y9DAzvjYTm7fqRrZ5tR1dhkFrNY4LYbwK2Cdu54K2FoDDH6wSqKF5QtfEDtPEAGJXehigCRCYXYX
XDFC+6rv0xGuVN8aH644d/21r7U2DPCnquEtsEYM/CWwRm+cFmv4Va/OXU/Va62BvttWvOkiLcqOhfE8
WW+CHC7fWfnxgq2SlDS8C9oYIWzV96kBbYYQtjp3/YWttTaM8Kiq6a3w5iLaVb1xWrwZoM6vc9ebaa01wX
Kor1LW/Yc0kLLmML+x7rc5HfOr4qwPbLfKqY50gSD3OdzlvG3HvEn1hfR0lHI779z1ZVRrLZjnJ7WOXIhT0T
9ZixkDqFCdu958aq2Jnr6ANxjTzcXW75Nb68tgmaQBaJTFkvKAWV3rMOZVpQr7u0CF97xQ0Z5irb4HRqjoS7
HWWjDGPWr2XwwhOrOuAyhJnbveStJaE73P3x62QZZZO0iYEotEHIieCVPWcIbvi3FIQmYdqbC+Cz48q45U
b1sTPgygI3Xu+upIay0Y4hw16y+GDp351AFUpM6ot4q01kRPB/h9kizu98GNvAqLFQZGnSjUybPCgNa2BhgY
DaAGdUZ91aC1Fl6aF9TMvNR81z5ZO98H0Ho6o95az1oTLHI+uUGEhAHcOMI+Ef8FGHCqkAf2PSRIViFtlQ
XRkhkeOnGez6oB1dvWBA8DaECdUV8NaK0Fw52m1quLoUlnxpK/8qsz6pltX2ugp1d8KybQDah20BGAxRZW
3AfWEvioZZqs4T6pzIrCpXCP1IqTnLMWiOhJF/gwosqrvk/HRyYjRm6rpOVH/TPwa22Y6WLVvrQ5QxldJCt
fb5wWkfgrujqjnhVdaw1w3Bt+g89FfjxcAEG+DvwYKpVjpiSU5by1vkrWRcWYW+uPYlHLWFVpolMdwGlqR
MVXfZ8awGmIiq/OqH/F11obxntbtVutcOoiFWH1xulwirPwXtH3nlrYWgMMxcvTAJarW+vLLV2qkCyXQYr
XSUEJYT+iEleZsPQGr1rA+15C0EnvkjRnY2pk17qglREaWn2fGtBqCA2tM+qvoa218SvxuWrnWmHWRbS3e
uO0mMWrvSVqwe7PFdt8XPF3e4q0Q9JHDsIZ21044ym77HaQhEB9pxrYJHsIstnuTTbbfGTzYG5UM7dNXqA
Y7AvkBeqN02ILr9ZW9r0/L23z8dIYTEtPsH73KYgtf5kHqRV8CtI93Ev+cFMonvIUVA3cNQlEb7pAD7sGdyDo
6UBk20MQ2XZvItvmI7Iv5WW13rRDpqFkuaeRqSvHPeVV5WLEZ/fluG0+jrso+rmjqsRv1lRtOPcj0HDfWl/Lo

w7W/ZjdhdqesktxT22rtKYdb6vsQRhqm4GhtlnvIXtGB6l2YcBzsNNbI+2jtSAxhAzX7i/DtfmYZ24YUAZ2wQE
zqr/qO9UUkQwh0LV7C3RtPhKZ0XFqBrYLMi5R7lVvnBY/hhDp2v1FujajSBfLaJG6AgvzodYCrmXB0BRWlL
1cabASOXx8D5Sd+IQZczpxwWNDMKeD6NceQvRr9xb92oyi38s6W61T7XBqKA74NE51poCHkAs7/Slgh7UCg
/QG0TfxQvCYAA4N0iDLZTHAFOk9XlRyOtHCZlSk1XeqAZWcIWhhpzct7LAWY3g+16p1oRUGORehirXGa
TFoCAmz058qdvio4j+DH+xWSRTUzhFwqUotf+OnObwS0F1EYo2DBBexDU/DgLFog+pUF1SaGoJKHRhjZ
wjG2OnNGDt8jPGFna3WqXY4dRHiWGucFqcGKJzrOP3LOTh83LG6Pgoja9ji430N7CSR04ksNqOErr5TTSA0
RMEHp3fBB4f/IrIhPKlmcTuEuUQxXb1xWoQZQOzs9BU7O+xi5/dWlofq9hd1Xy/raZTThYWemaFl1vbp+Bj
LGUTL7DBomR12LfNwzlS1uo3sz7mMVFlrnA5l+G6KqfS9r1TZ4SOmZeqf1ETAlQ+82NKFbZ6ZoTzW9qkBW
wZRHjsMymOHj24eyIWqtrZClMsIibXGaRFlgCK+bt8ivi4fhfxbdAMsMILJeysxLkEq02gGSMVyu1DHM3ZF8S
AQo+3TMcS4gxTydRkK+bp83PFz+VTV+DaY416mmK/WOC3mDCEwdvuzxi4fa0xeoLSfH/BK76+TlPE6A
mVyF7gxREWs7VQDHeMOwQm7vTlhl48THtSVaia34mPcizC+WuO0GDNEAV+3P+PrMjK+b9ZWVpWYQ
8nF96U+lBYnyBDGW/TYqWC3CxU8Y9cNn4aQDoyuOwSj6/ZmdF1GRvcSnlLryqXK6GifrMWNIdTDbn/1s
MtH5Rb8flmyWTjDz5B/gh8wo0QnPtcQVbG2U03wMoSq2O2tKnb56NxncKia4e3ilIuojbXGafFmCLWx219t7P
KRuh9XQUzl3Mglivokwld4oaYTvWuImFjbqSaoGUJM7PYWE7t87O6wvlSzuR3KXEQrrDVOizJDaIW9/lphj4
/oRc9QpSBvrR8DqD+yYE9Y8Drxu89bZVhrWwNUeEMofL3eCl+Pj6Ud0iFqFl9qb6N9shYFeNW6yDl7fS9R8/
hI1+KGX1wgsoIp406Y9jqRruylhE8d1WhNOz6q8RhZ+PIwwGO4Bc3jI0+Hdomq0RdLkdY+WgsEA9QK9vrW
UfA4tbD8bIa0scvMN6MKsLZPDZAxSI0Fj6HGgscpf2V2nqqVbY5xvcvU99Uap0WRASSvXl/Jq8fHk35Ht9LEw
Q6TMW6spZ9a/k5Yg7WgKTHja/E3WRo6kBfYwP02bz4F1sovLrfhBaEOjKp9Z4ZCVtunBhAaRCHrMShkPT5
K9aX5XrWTrTDsMoJarXEaDLM5Lx4v+t5XUOux1/59DBcLuARY3ZJhhZSUD0XIcH9MGmyfNZda9qULWJ
khudX2qQGsBpHcegySW4+92O/zO1m1N61Q6TKiXK1xWlQaQJQ77ivKHfNxtVARGvxhnmyjhbph46Zyz8Y2
BkElLGv3SZa9Ef+2Xd+z4tK4A49r35mh09X26RiXxoPodMcMOt0xHwN8QTer9qcNMo0vI93VGqdFpiGku+P
+0t0xH4tciKVUqegBxTHjDkyyfWeIfFfbqYZjqPEQ8t1xb/numI+BHtydama3OrQeX0TCqzVOizVDSHjH/SW
8Yz6impLV1CElrETxrfURxJhQ0cOCkmi8eNOBv7bvnleyq7WtCTaGkOyOe0t2x3ws9LN4Rs30Sx1ja5+sxYUhJ
Lrj/hLdMR/1DHWeIXPV+jEQ0Wv8KYznkGsWrLF+othrR8nej5ixoROtbIhQV9upJlAZQqg77i3UHfOxys/mV
jXz28UkF5Hrao3TYs8Qct1xf7numI8ypuxWsVvOEuEk88c9Vh+TEm/48xZu0fHjRWXj/LDdZ+BZwuTEWvjr
2HpIkoXl5yq9JNhbi4QZrzoxy4aofbWdasKrIdS+495q3zEfsfyiXbHW5XYYdxGxsNY4LcYNIRae9BcLT5jFwu+
F/2w2ssgZrH4QbQcLXpSadOKZDSklrO1UA0pNhhAaT3oLjSfMQuPhnKlmdCucmVykeLDWOC3ODFE8eNK
fS57wccnCNfYgPH2EMmdrWpPCSj18ZqzpxCYbUiBY26kmrBmCTZ70ZpMnfGzyMzhUzfB2eHMRPllrnBZvhi
gCPOnPJ08Yhc8ZugGoMNLAj6I9XaVsLfbwp+RTkL7lRZxOfLIh1YC1nWpCnCGI6ElvInrCKId+Dpeqmd4Oc
y5SFlhrnBZzBtBIT/pqpCd8RPVHsaeG9SiGu3zAMx5ZVTqTLpz0yAyps7ZPxyqdySBS5wmD1HnCR0oP5EJV
W9socCaXUSxrjdMhymgAxfKkr2J5wkc//wny9W6s+22OV/Kskp0VJfHDW0jbCxgDGGl3F3wxQ52s7VMDvgy
iTp4wqJMnfCTyszhU1fJWaHMZJbLWOC3aDKBEnvZVIk/5iOCSttsFUieap3vWGGbahQEemaE01vbpGGOm
gyiNpwxK4ykfBTygG1XtbYMs08soibXGaZGFV0lMfe9bjGLKR/1+n9CaEy6t98TNgWjrhgoRPAS55Vsr8QagJ
kGa31rf+ft70GJQLCz+NYiT7cOKF4m68MMjdrXxMEjUvuDFdJCCF1OGghdTPoL4BbldtX+tkGsoGvkMcnX
lkUdD6JKn/XnkKR+P/Ocia8aHso5+lnOGRcrcLmjkcqPRMNyxtlMN3PF0CO542ps7nvJxx4O5Uc3cVnzx9CJ
8sdY4LbYMoW2e9tc2T/ko4z9A8gvswOVaA2ZgHcfthko5+mIdyvMgtTaRHzNjTic+2RCNs7ZTTZgzhMZ52lvj
POWjk5/dvWrdaIdFF9E6a43TYtEQWudpf63zlI9sfpeRq/gZSiigPtwQqRXTTjSzIVJlbaeaYGcIqfK0t1R5yscyD
+lJNYvbIcxFlMZa47QIM4TSeNZfaTzjI5g/4HUaqvgkr/pm1olZNkRbrO1UA6zwXYda8eJZb23xjI9YZnefmpmt
sGR2ETWx1jgtlgyhJp71VxPPONXEfv4mw1yXbBOmYf4bXjjpRA8bIh/WdqoJToaQD896y4dnnPJhfg+qWdo
OUS6iF9Yap0WUIfTCs/4874yP5/2Y7qEoGyg5M9gjY1IwfvobS0nNSZd1H0Sh+BdYjW6s3I8e4TdR+EiHB7zbp
VknZtgQVbG2U01ANAQzPOvNDM/4mOEX5Hi1DrbDr4twyVrjtPg1gPZ41ld7POPUHoeZFdJqdh9kORJ6UP8

2DayHJI59OO+8tb4Lbq1vScF+a33PV1FHdqcDVNlmCJS1fTo+Uue8V6g8kZ0xCJRnnALly/lZtUNtztBnl1Exa
43TYZM9gIp51lfFPOMjloX9Qe3SEahFmcTR3trGeRiBL6WBiMSLw4hks0nSfBuH+R7qPAXxDUjJHthqZsgOd
kGr0fDLWwvTGkBnENXyjEG1POPjk1+WA1W7eLFrbrSP1oIMv3jZvespXq41wHTv6iZN1mHGuxOTtnbBCy
Oky/o+HQGNy3k5QOHG7l1/6XKtjZfqRFVrW4QuYrQvEbrojdOiCr9w2b3rKVyuNcDhEJY/z+X5Ja48YV7cu
XofWPQ5VLLN8hB36gFeN8Ja00L2qwsCGSFZ1vepAYGGkCy7d/0ly7U2fg0OV+1ZK7S6iFhZb5wWrXjFytT3
nlf91Rpgy7yBQttUdMkKQgiPrZ3PmsklzO4CRuyK5WHAqPXtfy5n3d2KR/e//a/WhgH+VDW8FdZc5EJAvX
FarOEVL1PfexLOtQZ659bkZbGlHMovDRDwdCKU2RXKw2BMa0LZ5aw9WfHk/oRyrY0X7EdVg1thy0UIY71
xWmwZQIzs3vUWI9eaYKH8PsLNj3CFmui4H8/FX37PWzhZmNwFYsbP4RjnbTs+JXf56rmVp6zuXV9Rca2F
l+wRNZMvdPmD/slaHBhAMuyOekuGa00McGMQcXSwWpSlHoHlxzMAKAK53s5XkGWX5YzXDauudcELM
2TG+k41AA1fyaWK54/6yoxrLfwaXK7WtTZCHPFiLiDE0RunxawBpMnuqLc0udYEy0pFuXeFpwiXSuIgvZH
KCTimZEamTuzwlNtLTgNMe+Gxy1cLpeqmfYXHtRbM8Y9aBy4V12ifrMWIAcTG7khP1LbGiKEuu6OrPBZ4
wwfeCw1OkEKtNmaM6ETazp4XI9prgl2+ygBVN+2rCa61YI5/1DpwMYzozK/yCnqlX/UuDlFrgkf2tCxqTq8D
0RaKEijezBNyDm5SZNSFd3Xunhcm2hd4cPlSaque2rfAQ60Fo1yk1oeLIUVXttThl9e6o57y2loDfQsLBZlwgVxV
pA8z1jOYUReC1DGiKrC+T8dnMJx5byXjP+qvr6218SI9qGpqm9OX0UXKAOuN0+LJAEpau6+S1makXCErl
u61SMMMU8zuE/EfydLaZnTVBSvC2F0oVccMYa22T8cIw5n9UXq1zSCstRk51WfyqarxbTDHvozOVmucFnM
G0NnafXW2NqPOVoSrsJ214gQ1juQqGMaCv/DiTRei1DFDRqvtUwPeDCKjtRlktDajjPYZ/KlqeCusuYxKVm
ucFmsGKOnr2v3ZV5uPfX0XEXlmyetKd8isZXmygd0yK5did6FcHfc5fOO8bQ1cCp+esbKXt3tTrjYf5Tq0U9Ssv
hR7on2yFg0GKMLr2v15VpuzdgK8b3XqT6vEwZE/L79qd+JXzai8q+9UE5gMQczavYlZm7NOwnP4VM32Vio
R+xLldvXGaVFnCIWr3V/havPRtugh6BeQ8QV5Xalo7IHlmvSaxV2w5nkFrlrbmiBjCIGr3VvgavOxsEM6RM3i
i8UenZnWIfStTn+tmMNHfOBLx8xOOOvHEmC5v2etZSnM7QIBZtSy1HeqATv42LOKNzu9JWUOZy3LgdyoZ
m6rCMO5REFLvXFabBlCY+b0ZzkcPpbjT7SdhQxyqJuMFbrANVSuuOXH+x1zHW5hfxewMaNepb5TTWAz
BFHi9CZKHD6i5Pn8qmZ/O/S5RDlKvXFa9OEvR+k6fbODHT5K5c9Upz0NHlKx2c1XzKIUpwuB4rIL1E6dxG
hNOz6J4QxvS77fYcjvdfiIkIE8oWrrpYqw6R+tm/buAFI0p68UzeHjNBTDBcHnjfWeIlL8E+/078JpuGZo0rR9a
sCNQTRpDoMmzeFjQwZ2parNbQ5vncuI07TGaRFmAHGa21ec5vKJ0w5LgXLCittFiOaaIUTT9ukYVjgXp9K
DXQYhmssnRBvCf6qGtsES9zKiM61xWiwZQHTm9hWduYyiM+UF+GjKsXrEC8LhGoYkDqyVn+GuVoyr5S
+hsjDjWbDsThfMMUOMpu1TA+YMIkZzGcRoLqMY7YJ+Vu1QK2y6jEhNa5wWmwYo5ej2LeXo8nG3X0Pm
Z7Jcwu0J7LUb3S4creuaATrtaze6jJKmigsz1G50+UjaQRyoamkrNLlMsUatcVo0GaBYo9uXjnX56NhKIU9rnmy
jxQCbp06UrBm1GrV9asCUQbhcl4HLdfm43AHdqGpvK2S5TKlGrXFaZBlCyOb2F7K5nEI2P36kK+lkvayPmH
6Omei+CGqZi5i4ndjf51W0aW1rOCh2h1C0ub0VbS6nou0ZPKNm+qWkbdona3FhCGmb1790o8dbuvEh8hdKJ
ABrBd4H920A2aB813kpy7vAwuRZYUFrWwMseEMUWPR6F1j0eAssDu0YNcsvhQraJ2tRYYjiiF5/wavHR7r+
PkkWordJOC+viBT7U1gPlHQxXIRJHs6tRTAXo5fEzDjRiXF93jqJWtuacGIIUavXW9Tq8fGml3GVWl8uhhy
d+dAh5Kxefzmrx0eJyrTMh22QZfLG2WUYh9lKdBDIA2aY6MSRPm+pRK1tTTAxhBzV6y1H9RivTx/eL2qG
XwwTOrOaQ5RI9Pqn7nqMxOYSM6ZE1LhKdlTxDgp0z/00eGshBY6KQ8zEXCQxN0Z04Ty9562TqLWtCSOG
SMf1eqfjeozM5fP7Sa0jF8OMrnwl3+6z6l/9+UqPj6/8IMZ8x5/U73WhJT32+8RPg0EHWtIbgpb0etOSHh8tyekA
NQsvNsu7so/eACrRcV9l15g5q7YeEi5QZ8O4TZA2d5n0zvBe0cK048PL8SAqrDGDCmvMnCI7pE9Urb5YSor20
VooGEBINe4rpBrzsQZ/DvzVjWKaZYEnFOTlKa8AYtyFMKjvygeHgvbaqPEg2qgxgzZqzMcYDO4TVasvBwV
d+QI+qqjiT31VUGPWpFTU3Vo7sRUsL9e4GTZC6MQReM8KC+3lTeNB5E1jBnnTmDVV9fn8o9qDy0FEZ3q
AV85EvtU3gXXMn8D6ORaOJSl+BsL8+IEVFDpxBbW592LFkto+NaDJIAmsY4YE1jF/AutArlS1uY1gcnyZB
FatcVqEGUIYNekvjJowCqNwlSkKqEgprY+3AWa5tUkDYQJzGcBJF3WUZ8i9tdpONdCakyFkVZPesqoJo6zq
udyqZn6rqjyTi9xNqzVOiz288ivE3UlfWnTCR4uqnKAbeZXgxs/TJA6zwFoHSn2HdRb4tJmyC13Ah11ydSpq0Zp
2HLVMBmFJJwws6YSPJX1uF6l24mLbIO2jtUDBq7Yi9+pLmk74SNPKe16Jkbbu/TnvHSyTTmQpu7rqJCK0J

0sng5ClEwaydMJHlg7mC1VrLzf1O5OkA1Tum/QlSSeclyH48WN2Q6UKWKd8FyJ0/Kw1+7SmNUz5QYjQCQ
MROuG8vIDZB6pWXm6qdyU7xwNU65v0JTsnfGTnDyviuLFKwPBLfhfOc8yujzo5/9tTl5NBqMsJA3U54aMun
8cxqqZfDhS68pPjAaRT074F9qZ85GRti3dj+Vm2SiLeI9FpFy6yrk0aGgm0ph0jwXSQcnlThnJ5Uz5OcUBvqNp7s
emvfbR2+g9QE2/alyKc8lGExSV4ZYlEuQKs/cfAyleBdR8Ib0iWli+WgoUlnrPF988LEV0Yw/Gz6iq1pjVAxCC
M4ZSBMZzyMYYX9phqny4HI10JxDGv6pJOWab90zWn3MLLbJsGZWK/tQvlNby8p5vTLnTimF17efKQUmt
bwyHlllI1QrByDTXsna065pZcDekXN7EslZGifrMWDIW5ZnfZP1ZzyEYsf4CLMG1gG5sk2zYIblZG3o7sxoSoQN
yx0ohzZtZenYaFDfuZ0iPzMae/8zCkf4/hczlGz/mLo0JmIHEB1Oe1LRE6Zr0Ld00UxK7hAShixSLA6cr6CMh/+
fbLNrZD3FpFpJ0KSvY7cyT1Ge0JyOgghOWUgJKfMV6M+m4NUu3C5LUVnYpJXOInONetLTM44VZNaPS0
rLMw6sZPsSslBtNnaPh3jyWwQWnPGQGvOOKWSw/pS1eg24uzZZW4E0RqnxZgh6tPN+tenmzFqJJOUgs4Q
w88kzVdw/RQsM5gN9EasPmt/QcQWMl+qRBnr1mXWiQB93ip1Wtsati4zNgq0EkDPelepmzEqJi/oMLUeXW
o7o32yFkWGqFU3609+zvjITyhdCNWOAytJH/w4zPDlWmEGqw4mEiLnBTL9fcDMesw6kaHPW7lOa1sTdAx
Bhs56k6EzPjL02b2k1o2L4UVncnQAyeWsr+Ryxnk7Bx6w7/w4L+/QRu2ddfDRfWD5O2HlMk3W/Knqsy50aT
2f6uXufNpLO2eDSDtnDNLOGecVHpf1tWqnWu2MLnPPh9Y4HUbxpRdW+t6Xop3xUbRfBlEYCFfBSBcWJH
CTG6yXmOVhFKEnhdxUTBeGdmLGPc/aPjUA0iDU7oyB2p3xUbvP6ljVHrRCn8skzWuN06IPvyjVu+vJ/dY
aYLgxApi6CO6J+A1mOK/9vVih4INdCrQd3qoZC09KZQ0XiJxX4ZoTkESXugCSETdE6/t0BEjVN8oHSN5df2
641obhvlbtVAuMEi/lEhilN06LUfzKWe+up3K21kD/6lGVcnLfocuEOd5XQXF1mK2W24iIQeZISfSjCzAZcY20v
k8NwDSE0Na76y+0rbVhooNVe9IKjS5yf7TeOC0a8Zc99e56ZvDXGujpLP/l2zD4r9Y3Iq7GMg4PoQixfStb8Wpo
hMVdcMeIm6T1fWrAnSEKAHh3/QsA1Np42a5UtbkVwlzkTmm9cVqE4a+m6o367slGfHsyiIGzICjq6ELM/JCA
GEtYk+XJxloHVu7TNV28qDPqtA0zQqKj79Mx6owG2YaNGLZhI75t2AXcq9qPNkg0uszOS2ucFon4y5p5o747r
xHfzut3v/jzPNrDCQbJuuhUA3bl/LJhYXgX8JmaAT7tt1qjQbZaI4at1ohvq/U8HlU1vRXeXGZvpTVOizf81dG8
Ud+91YhvbwU5bLfWh0SWyMNSGWIxSoAP5C6bJOzuAjczM+Cm/Q5rNMgOa8SwwxrxJkUO7lBVy1uhzWX
2WVrjtGgzwC2X3qh36mStib4S0zAO6NBBTBBKgBFLEB5N7AJ5TIp/9YuLkMFSyL9nlRaKPnUAo+mzXnip
t+1YWlh9Nz19ptS1eaO+CZW1Fox2mVqfLqQz1D9ZhyScFX1KV+t992WtiZ5u8WMQReXNJrJmxyKx/EyEul
HIjhddBDzTZ70TU29bE14McCemN+p7J2atBQMco2b5xVChq7ZmyqutIYeye19IUWuibwmfeKGya5d+GNG6o
fJsUeHAXrJFmN8FGtilNINcSKHvVAOm2ANcSOHZfS+kqLVgilvVzG9zIYUY/IE2NyexR2ucFnt4NTOy773zL
WtN9F14Vnu57QXxJwoZoIbYW1qBlkn6EOQWSK32lOkPLiOcaLMJYjEEnDkQqmtdcIldSTMQLrXP2Ky+W
0Zc6puxWWvh1+Byta61w6yh6N/TmNWV/Z0OoKyx+7K/Nh/7+32SW+ESXQd2zgtczebJWibrrVlzsoThXeD
IDIGNtk/H9K89CP1rM9C/Nh/9+zweVTW9Df9rX4b/1RqnxZsBSud5dn/+1+bjf7/yo7VYsXYxPfzGug/EKgU
VBcLMEotVZsGpZLIUixTzvYGiF13wx+PGn4HCoQ5UsT0EVWz3poptPqr4ub2r1ot2kc9QSaCnI5/O/DFvmT
7Z9/78sc3HHx9ckb2vSdI/roI9SrUwM+YhiWPfigKKslFAwQxNnchl9kuUB4KmDqy0PQQrbfdmpW0+Vvri7lbr
VjusGipl9DRWdWa1B7hm2XP6s9oOH6tdFI1cQC2DJR6Igs9YO7gYF7b/ebKdY3kVXmByOlHbZty1rO9UAzA
5Q1DbTm9q2+Gjtp/Xt2p9aIVCzkX4ba1xWhQaoJ6g5/Tnt52h0kL/XIrZM38ZDMBfO534a3Z58kDg04G/dobgr
53e/LUzVCLoQC5VM70d5lyEn9Yap8WcAdTJTl9+2uHjp6EeJeg4MuEOj1TbCepRLkJallRZSmsXqD1+7IciW
Lb+AAchEECvAxFN/4aTxXY6sdhmiJi1fTpmsZ1BWGyHgcV2+Fjsl+R31Q624bqdy3DdWuO02MVfCdFzelZ
CrDXAcjJblIHCFL8ED2ehPPe9v4j2aNRbVnDqQnHPjCh7qO9TAzgNUfbQc/qXPay1YZJjVXvQCn0uUuNQb
5wOfTivBij63rPGYa2B3pcQ3Si9mlyOkEbkBZsupPXMiJKG+j41gM0QJQ09p39Jw1obL9iPqga3wpaLVDDUG6
fFlgEqGLp9q2W4fGQ0HLK+tf4QZNtMhsbrvRWFYr8uAmHIvVkJLwljuX0XcXMciH6rCr2VM9lgb6WBH4UZ
lczECxRBpMZ7Aa/oehecMqPSobZPxzjlDlJiw2UoseHykdim+GS1820wz71MXQ6tcVrMG6Aiotu3LofLR32/x5J
0UEMBDkWki4GjRHtkBhLKR6Q7UeJkB39U6QH3wRAVpUXvusCaGXUStX1qgLVBine4DMU7XD56/AW5X
bV/rZDrMhU+tMZpkWsAjbfbl0N3+Th0uqW6LjcpSsEkYpkTC+UymYt1U/gPL0B1YcpnZui9tX1qAKhBmH
KXgSl3ue9Af07vqnajFQ5dhg/XGqfFoSG0325/7bfLR4nD6cjt7S1xlb51H+Z4TWWQ3lpfiaUqBT9KRYTuMwu/

3U6suCHCb22nGnQE7hDCb7e38NvlI8Wf1bVqXWilJ3AvovrWGqfFoCFU325/1bfLWzUEsyDhgsvVXixW2Qp
j6zJJiV1E6XYiyg1Rd2s71YQ/Q6i73d7qbpe35sizuFXN/HbYcxEVt9Y4LfYMoeL2+qu4PT7i/Mtg7m+zgHKz12
GWgU/cHFjCATheJ8bbENW2tlMNgOMNodr2equ2PT7Ce1hfqtncCmW8i6i0tcZpUWYIlbbXX6Xt8VHVyjPkp
hyEtCkee8D6FFv3ARxniG6Ld4XZkDm/cNvrRE0bItzWdqoJf4YQbnu9hdseHzN9KS+r9aYdMl1Ey601TotMA9
wk73m9b5KvNdE3SBYz8qYUzm4iP47pbFWdVBRlyddsUiXViy6IxK7aHgiR2t9AX32NjIjU9wb6WguGeVetF+
2QaCgq+jQSdWaih6hC7fVnoj3GKtQJZFkncJgKZxbMWNOBbnbu2EXYA2FNB7rZG4Ju9nrTzR5jSWp2/6nZ
2Q5NLsIpa43ToInDedFu2ff+nLLHxylD0SsxtwPahFs5cIHrwTSNyvwuIMMuvh4IZDpwyt4QnLLXm1P2+DjlZ3
OrmvntsOcinLLWOC32DKDEHvdVYo/5COXvkxu8yvufZID7T3TFiqWWJ1Y5z7gDqezcmSGj1vbpWM4zHkR
GPWaQUY/5WOVncaiq5W0UPOPLaKC1xmnRZgAN9LivBnrMRyx/SNJ0LzWo92IXDY7iL1M/FMtjwgs1Hf
hj584MabO2Tw1QM4i0ecwgbR7zEcjDe1PV7FY4cxnFstY4Lc7wKpYpohv3Z4rHfExxeeXTLoxvrW/5Ky6OOxD
CTv1u9MGv89Ha1rANGg/B645787pjxmIcw/hCzdhL3eCjfbJ27g+hEh7352bHfNzsnyndOMv9eGH51hpqz90HeR
6kYgz8eB5AgXFYLYYR6407sbeGiIW1nWpClCHY23Fv9nbMx95ewsNqPWnFsYwvwu9qjdMiEptmGKwIM6y
uJHzfv0+2OXBdeZL5e2/cwPiiA4WZpX5i4W+QIMOSKP7+9pRjtXpW3+Ka503EGFi4mvDI+0B8HlE9F3gdV
gLOSEH6ys/EH5PH4OmM39OcQ/tKa99p3jOd25roX4G2DMbT3nf7p/Xd1rQw8mW98eOFo90bb16pTrzx7/xH
gVTyhtYPqyTJCegmDYzqv1rw7cqNrl9Y+IvTAUmbJ3BM6DwNgwze2SL1dxbeLbCNLVhNstJIhkWjGnAcv4L
GgGR87hujSb+ooo1zeLguNSxf2kXkzGGO/NasjZu9E+9CvAbxjuKHTEw9b9LAsb6z5Lcs/BpI1LTYcbJBDnfCi
b5i9JsGizsEtaNpv2ii/dO1L3r8NDxBGmfSQJlq4eQUidqifZbF4gBN4AKAGpogBX8RMJmcdZVZP1cxEEwaWN
R+YMJIqZZhw4rPbxos7gAm9l2/5ab907UvetIZTH4ffgpwMPNV8H8H+8ybNLCjDZgCv5PBGxQcgp+2ApeTz
+NYYegutowKHsl1RpU+eghRGwm4A0Y/iufD9+Df5356EeAZ3Z11q9FzRzEtfAiGGi6WChbqZT7iy9SxqfTdis
PA109uWc+0zuEqwh2Eo4S0APlRlOwyZWHCehdNY1+6IIvdn/ToYoMOX0Z3nfEFOWwgl+T2pIF/bUAX/B
VxUu13QScexQossL3FR7zJZDmiz8Glw1RscbO84NWySs01cLBkuQxS/ONDQl0TOHQZzBmd/YY3POaM7p4
COv5DGgSLPHlIKm9ax7jSl6tDfrDtaMCdcw/o6Uq/DTM/XeMqRHvpG+vA1J+TsLjTDxl2uCcrE5C5E9EOlH
UIuAo7NHe1y/Zp3B+XOhmhBaZR911U7u/hibTRaaBcmzZSUHID/aj9Zkr3GJYAuBLsZDXbEHGW/hzrPFo
LH+qDZNYmycSg3e/xj0n64MfCG6FF0cBDkF8Mj+yz33Cee/PVwp3wFSj3jZMcsd6baOnccorDrS/47ZMc7smm
WdznAVbZMKb1iXxpcexLXAqVhv50wRqXQYfS3gQt0thtXOPLbRbGQZb52Tbb+pE3beB91XcsAev4Le2ydK
o1jshmkwYbPxUwskxoYwRNiHXonuHNH9teHfBeb/R0023epduKF4kXWRLm98FDGGf+gx/G3rSJZgUSK7H
C3KJvWvhVPTlyulWW6e2nKe5wRLwKW16xUOQC9eA7HFxJUwee+G4biNVzrbd5vU6b1/tNuBDRWBjv/D
D3pg2EKn0BtonwFe0L1bbT/85CK8ZdRhYE68zKwkg8FEAD5+48hRsLg+wGreOpgHrQFbYJe6LdNq/Ta/M6
cV2P9qtkHXjTBgJTfn5jwTe0L1PXSs93+W4Jwgsf67VZC5icsowJ3EUJD4SCt/A2D6x78pus94NtduqbbfMeW51
4CLdfBwE4tDdtYCRhVsjP9bu55ia4jrFEnBT8sol8AAagBFb+ZhPEFECV8fXfuPC21hu2KalttcWLtFttusQTgn
iRLGF3kfgLb9pEEYrhCpAiwZGD7516q9r2BpueaiW99+ePajmFOiCrZJuxkIRHnWKbq6ebbvOaW0W84jE+D
N/az1fetIHlg3dcfOPU221uxtxZW+0P57zVtdsGgludE/0Qg89sReTVwK/9QBdNiI+177Lx98ZO0Upv2Oamps02
b3Da5g1+m+z9KN970wZ6S36mfXtNvzV0EpZdYZt/zU22QdNWRyhfA02RrL1pA5kkP3ure3FNvzV21pWd4Qt
eG5tsM+cOZRT/lzRBvYBiBD/7YxT4WfDVKkmy4M/JNv1TEgUjGEn6k/D6cL6Ck6LUn8PQ0p30UfiI8kgxM
/biqRTjgvlqtCU9k6I73lRJaJxbdjHJ1qKBe+Bxdk1TirLQ8BxrkQQZFLBfB35sAVMs//sxTnZybgZvMvFnCLQ
t6QdRdAPffUhF89uNunMoy8XA5pmSfMJhhfAhpJt/wtX/h4oJP30m3Gkpfr8P/BS4koRISMVART6cpCXbTR
QgYtyLIMba+GkeB9CmeGp5nPOFsCCA2LHpMcL4JALmQ3RxfR+kxaEzcSROwZaIL/rWp0B0UIwENC7Aq
anBW+sDDglaFFLXH8TURNMTOKvx7qhXt9b3CQ3sMvBzVB8EsTwpxAuahMm7JH1ULULWMcwhHPZMv
gz8UIHmvXjpip71I7yGF366IGPEQhKr0k84ESM/h47LYbuRGYhgJwl1fTXCwhC0uHI5FKp7cjoAybdpAcOfvY
c1C3kZeJhbiQWyHN5DlgebDFr0rWwtXEVsabNwIdw49CPhd2GEbIovvCcB31mC74s/3Cd7uDgBX1ZKhfWyQ
IxXDj3LwA+3i0UkXr0vfoe5DGIUBOaIBuZi/oLbwYVWkZga4kuLUIzfpyASP7ix5lGSw576k5jt92KPLR5BY5Q

sl5/PkwjKpWcb8SXceVOihDAdkiSw7sRSdiSnl/qPv//v3ydiw56tfvOPv/+/yvfEE9bCznAhNjL5apuFwoHDOe7
pxRvDe5OD8GElxj2FY71E+AzWCYSH3QvsWxU9sZZpspYDiqgKBi2QmYdnyNbgOJ964YuhWS6x/6L724Xo
b0gDI+Bl8XmWwKhlK+FLMEVDFGrTq8KyhtgsDT9AhXjVqlnx+DQXk164QRR9DpfzrOGt5NJN4WdLEO3
JXRu++BsxVmGEbzgvG8YeCT/y45heiJgUn2dwe09Mh1SW+HqyEV21wvXan2/Bc61NGIPBG9H0NhSG/Am
4EaLihKXQgQ0AdI5gtNnCy7bIrTPxLeHW8/DBTyHZhcYwFiAYQ8MR0GlB+gVwaZ9gYlCHYTqL583hKw/
gJGEcgYT9Rzkc2OiNtQiWAkzETAdsxmdHIfW1eJ6YR6mY8mgsWST+ff54A5C5F/C+XQfkVsJZ0aG+E5bBl
x9EkxE0fAuuBYMKoniAmTmW9v+dMEG8CGnxz3AFt3j9wmxsLlkH9EyYw+FDjE1DNuEiif/x9//McXbAW
xaPX/voCJgQRJMwzYIIlvLihqVb631Oz8gSGaJl6tIlAu+fk/tMXTAn0ecGEoqghsvSj+d78To3aYKiK7yVQCy3
W8TRt6J/tz/F9P8raHk3zz/ukg9zEQr+EAceQMtPsVqWwb03Po06HIODqTgKmyDZwHvJ5ts03cOjcB3141xM
5nmaZBm9nATyifLgtmzyh/nchzNanKUweuBTYuWD29DRx1bh+oaGNVwDNGwEWDyEGXaz/HOc5JVGoZ
QNLq3CKQhEKK4l8AVUp6vVaRjj/Y4qiQK431r1ZhCpKxi9gpd0AzMLwovqQz/sgvST8jY5H0V/ExQapFvwG
FyVl4idolviXS8pK6wyV8XIpqhdUZq4MN/D6vFYNezDNn2QwLYR7xw6J9b9DJc+AUoPtHwnOESiOXSmjZg
LYtoDJAL4rPxFQEslIkQQI/AK1MDJLV5bsHgQK1/5zPLfvg6lxbEVrDf5nn4te5fBb2GqyxMY0Y2dL1AdH0N
ughCILdyLmf0lrXYrfOs78dJxPuPiDrpk0Cknf1MeU0Raq+BdtE6y/DvxIqF7f0r8xbh0VjFpwozmGyxg1lp+DS1
T9BbIg7ADsvFvxDfEiG5jPMqSb34XBI9Ai+HPKT4K4RgglzI18QxYVgTYbwRsPQLsyubeLymAIFfDYI6y/m
6KXy7k7WnCqcA4wuoMFhZYknB5wejGV36GB1zUaLVF9WkZGoovoWVlhARKFwiR4FdlmOTJMIka+FC8h
VWyk5e6ifUwWG4j+Q0BZh/yEJ9QzD2aaWq4Y+gLQicYut6u7yMSR4g5Bh5/8CbreDOp4A0SkuhfFNXC61on
quIvPYeWT+xPts024Rw2q/L3wgeEnz2g6EJApQ9rooBv8SIfaoujjGBw1/QoVrDi90sYD5hjWOAzg27j3EawWI
iXja3IUEj8v5TgXERUCuuCDKBNWB2LJQdW0sBHgjVN8lyeZ30Q8z+DTY7aX+zwHof7QIX0mxUgYhFPLs
UEVsHZypc2xNa7j9/dVsaN4rk/irBDtod+tkgTsYAsYEqke1qlwG5oRoYgWSAAHBBnLlwl9QXQ5T7+pHBN/
IF4E8tIbMcgkQDtE198EH0KZBAqrIr3+FXqE10niJtW6JYYxNynYZwHae5LH6dchCD3d6B8AFk5DjlsZat9S/
1FSPuzrAz8YEMnFn4IkDYiiMkE9kEclBRqV+GHgC0QbxIIqCyINIj8X2ipQdvhaG9ePPCHOIKOQPCaIvbLRI
kAZy+eFBFsC7RUoI+QHYVrgYSqmf92n/7zv+I/6A9/wKih0iyGjjE0jDsJtY0X0eN9cvRhZUTUNPouEFNjL77
2lVxiP6bb+eM3QZjlU8X8LraJ9RgEGwnIidoHZWLNBifG7Yaf0a20wid3sCLHkCUILk3DI1xZzMZkK6YiBoKBj
Hn99AH8a7uuTSuIkbdrXACpXRFL0Z7Fuo/8BQp/YWMiduEQecJ7lz/fifk+xziDHqCamQNsyabA5kwOuuiGC
geLLkjkgt3GRnrmIknSrHhP/r3UHWdRuJGm3BbZkNC4VEmr2OELxLQoXEKZceFMxS5hI9oFKkFsAgLhIzv
5ugAu/fkct16wWgMq3m/XMKFUbAM0RITLH3i8jAhhgu2oIgK0nichyOgrJzM4aGJf6d9DKIrDVHUxOst5CItt
kXpbeD8MiWLhsmK5ycAdi2g2lbyB3D6qfXVWrJrgQfd+KqZMVo1yIDzBmE/ESwRUAFJyN7iG/Su9obJL4j+
wYDJsE0tFxA1GWuBgW+ShIJgI1P5ePE/gSpoXr09uCJMdfi7G9j8/BbTeZeAFeUKeIye06DAuVbAtky1SA+Q
Fsk14skBi/HSVpDlsYnMMx8RCuwukF+W7xPLXGzGEGOoSVyL3wUkMDkqsqVVk5/oPYS62NAtYmIX34D
IhZpawDdYFnOrCe1C9jNFQ5kPLX4D/yKt+AjE6mNgL4xvm/4IMBS7x9HohDICAnt5gBPEJzqMEdrOw3gX
pUR/UlllGOuiI90U4JtYlsfBlZMRKzMwUpiXRUBhPvLXewYqIjWRIkwG9kPvZo/gI3z2oJcQ8/cff/48llmkoLQ
kmVj213HicQLDR6BXCXiHsFcJeIcwECDvGLxzDj2IQMuiZeJT4KF/NSpEgcEJA8As/UKReBNOx+krpLd+g
QcCC7S088RDv0M9VQh31l+hqahMxTGCfn5eSdGAHpSIxXOPYgJMtw1TEpMAo+WLX8hDDjMxgtGAzCjs
guO8SuOxMXQkuZwd8Rnu/ldgjA6HxCPsBOt6Qu4adjzezwMwBNhziaLF7zJEyCqjGMDxK7hOE2/8I8LML5N
0KME8BbHzaAGZBGgJ+l4bewHfFBMbdldhw7mjTbP2O2H7cKqrWsu0cNmYCVtUsOmhHwEtG5xspnDBCR
7+H7TBAmvg/2PgSYSR/vg6BFRejHojuhEojiATYDvYJqVxK4NTg37fgg2LbogZINPhzco8TbJ5vlf4M/idcb8T
09WH5eE/TxAeVcJ4DIAmLgTjAwVzieEbyLBkmUNU9S1+Q9+JAXbMF3N0Oe/kgKF4SuPgqKDby0gq/ZJA
wPRzoi/fiC2tYc3GjSagl9jLhPFjcWt/AqkRN4BmazHRItxHl+QFq38hsv4xk+PDXBA5Svgkk9fEQplFxpiUWC
hotWI4eEqxrguQHXbyaJwlRqATxQPqqc+yHRFH1O/FUAlP0RyBliI3F4z7hKzeKsajMGzlpcKSgcTyPC4ob75
FCV9t9cJqjscf5QcezamLjegCNkepbLDtZZY7XHFL0QR3YyqkmReK09FOkAMC3Ee9fbeZh4asubJ8CsV6Ad76

TIcXOjx7Vqqy4j8q64ctAaAXcAS21uM5/CoPdDQ5vAIEPuHPqi932vS8irmhfO23I82R9IwAFTwPUo9KQClyB
mxUsuYIQjOZkfIUtythNrF3AP/gA/DGw+YrGF1buAwRIpPMfkmRzaz0Blb8VSyrV4xzdXQKPi2OeII3paCCJ
Jc8zDxQ2p8TlAV2AC1eh3LgpEVYdLwjbBCZss/Io17cW/jqmk00xOTLxAAVSMONoAQ6IFn4KkJDbCYTIbm
ixVzC7oVQnOExPE2B+IKwUkLaiXlPYJdccuFIQpAM00QGEw0ydi63FJLHK+adD1Fvrtwmdq203IfwSNwNI
DdJfqPPiEeo8ZYdQBZRTOY7grnIIZfYAjMOHRmCQEw7TNmg1lbENKhFk6FO8GRElBikhR3Gyj4NPxzp4o
FFBl2wlBgI8BdKCErVEUufzJFr8i8KugF5tFMJ6ilEcpNSLloRdr4j0khDp6bHiyH4NFl+Dxddg8TVYfIXmFxEs
Oq/B4muw+BosviLSMwaL4lnfiCe/jz+hYmrklhgEDHVm/fsWmgY5qxoVEBbgikViEHiXxPauifhXaiPZETOqo
VOEG6wyB8MUwquUo7MQbxwXzJVY8PGwA8UP4t0mudSXKq0pHrdTkIZaCD+q0ukYEOC6CEf3uTzYgC4
EeQSSolUYS7UlPELAsXCM7UZMoDAlNr88ss+3i70lNVwrOh7H2KsCKvcBOaMIOqrDrLwqmwPeYOiRJOtC
AQ0t4cgpR5Yip52IEjaykJCUPyPDjDoYzEBX4ZhU+WLoJuxE8cFejNtbFaZJeFlD/+dbjKOLEA7CnUXorxM
8JIIVglQbhDKVxaeKJ3JhIamTMhTt+xqDdlAFR9EXpVfEUkSB4sB7mc8PASoI+uG4CKVr0BouOWpsYJ0A
UStoEQ4Y8Y+VlyBfpI9yQVCyideG6EXmBdWTD5WAC8dgCxSCUSeL2gjgLymeyuWICMKfoarKQr4W+B1
+qXJEqPwWnIuOBzI6U3gsjoewC2cOJWsTb/I68V4n3uvEe/aJB896/xCLXX2G9o28ItkGZbTwpmHekW4M3w
3WW8opUARFWSIejSW8xGyZJw9x+LdaNTkYuKVwB3Be8U3sszofxYGF/4W5Wjs8Bte9pfCbdv2+VF6LuHs
eYNwto/J7FAvStEDfw2iM9IEFVXAjdefrLZyIknaS1MIYM5P4jIq5L0OpDaRrxiGxJAK3BIEiaA39LII3Qq5/6C
3vYBzQrMMz+1WKJAj0DZPI0AGlqN365EdbH0WdMBjbhYAc4ToryiGig/g4CTPaoRM+qoZVHF6Axw1BJ+
CO6IDEIPQwiPdxnKXAEmPGJI1BFAekDmaJWNsYouMYkyJEyIeiYpkUlwOMbkSQn98UI7QSCJlTsS14bb6
wMqvVU1+GwrdqLqmkFJDPFfsPBGqFGAN8omCvUhJACFN8EYSuLRSfKmoBdIfS7dfIeEjlJEj1cwrXCZcpw
L8t9wyyTFTq39Pmkvi4eEFw7oPoH98LTFuVfoRbJR+P/lMftcW7BMYIkl7KPQiCvIjZxdfugygMlqUa5D5YIC
DD9JWrR5DN/U1xuo4bsiQK54HcIXSdyN8K24I4k9ePjMZlJaSEMiSzQiMvtxXy9dcm3TeUl6XeoVo05UiXq6w
cxIRgCldqBO04qTgFbB/EPiKALeiStLuwdoKQmNwYBAhi8IS7LmFPJLby25xarHkE5OssAW9By7HBnBJ4M
LiA7EqhyUClvNiqi5EPgr8F5WK6J0hTlkNOUFYVG9cWmCruk9f9C7XxWOyCYUtN+b0Cwg+AQErwi9RgX
9XPRHmsP89hDRQ+sxHrEowReNI9bLMy6k+JFoj29ymkNGQrmWO2pe0fLfBYSfE+SCErrtzZi29DHuZDUM
h04BFLsSYVtYGRU8FEqBXygnGZvSM6iJkoKL4qPRhFPvAl6BdOuMIUUI6sgNYBeM1WAJdAq2xj2rSKxVZ
6eTn3Mtk/GSogqMdl02K+3yjji5U1LVJ86rN04dPgGDBLa8vt9HW5fV1uX5fbX8NyO3tdbl+X29fl9kKz9N08tz
Hl7eMuse8Oct4yyMKO6BAV1iw48YAUyBhOwTGZDQpQSxdNcB9+U0EuWaZA2DMPVM4dEhpwTBD51BN
/Pg8icAsgNzBrUKyyabSXDDkck+CjsISAMFQ8bC+PH+7DIun1+0TVS8ihhoZauefJJnsDfwReSkADpDGXv8
iDCNPvBBCH+RuZ6VaIvOFY5Q34P1hMaaRAamUqP1yssznURBHzK/jl89U2u0d+RAyIejp2PJNkA2Rewom
Nj8Ju8QyxPu9UXV18XrSl1HYsfEAaZEx+3IFmOcMFQJ58BHEICnkBlvAugNJ6EFBbZqYJ37mnC1l8Uk3IpE
c8nVNfeyfzhisLmEp6TsplDR0yRNF0GD9mReVx36Ij69pD4cMQC4Yk91BooEyv/q3ArCSD4OE46bL0v9FBjjcu
hDtEYAkGDxGemi0h7ZWyh6FkOrmeWNb3WZlITMn1wnS/kqQA+XDZ4x5QpJpQ/Nlv/XUc5j99hinZsqsUL
UKaMnRXPBlhm2LLe5XKjQzTjWhBpueVmXmQNRvBa16CEgLdi14pTJlqPORDRQ7MOvjps6YkZ5qJWE0F
4ztg9kKYJ8mODlKxPALOnTjB4t0C/6gGgMxyXvmYDb4IKSjx8VAI8g5FAFZLM/9Rhks0d+IM6UtAqW16D
93H4RGh56JcoiMRZdNigJnDqrV6FPAdFRUUzX4pZpWNEqJ34g0BGVpEmOED8MGYtV0whnSEthNTWzi6
mHzEZMNqN0+THVTBoKR/DI2gwwICU3n2mOflx/Mc2l6mPmXo4zzHSvrzZE2KIXk0iOtPuo2zsqyGWubgD
9E2A1wL6RkIjRmedlarS6DfFEQkXba63WDIshG/l5GnTFEARyhI2zTBkz5CTOwpHRxiqmgGSQH+vDyf9KN
6lEzjk8AQFnEQJIOKtyMWDvKIenCpggyxecDrTsAuTMlF8+WBMJZHleCBRWgQEYU3pz5pZJZwrKjei0zA
gF1BLmNZ4reryxqWe4GQYhurSyBx8aUyU1GRuLTGKhyl9cLp6oeToAVKcNukvk7J/jfYlU9JSFdvLNRRfOp
nmz0JY0gFROknO4kqGF6S1gA+w8gcihuoFKP1Hl6FaBSTQ76hOiMZVlZBAQS81rLqB7Yma8bA/gIGFd8ela
HA0gZiXRIfRAFMDiwCj+lc5P4JQkq2Qs+hUAS2GNkKRx5jAXgivnZ0+e16I6tbFM4opu49wRE6HkWhKW3R
cKpV01XCWCX4VPUhwS+bgJZUeDpKQyq5WoQwRy/pG/CkfZBJR1pvRJyNvkQ/hfmnSlGBQTcqOeet9S7e

W2Kd9cEHxNC/PdJzoMcSTKiCODigMk6Pggcqy/MVnjthBW580D/+/v+o9DERQLwt6gJQMY8ghYOrf98mc
pu4RkEBNL7ZikcBRodQiSYF/BWRTVicHWBxKkgNqrqmhb4p042gslYgYvBFhq6qFmU80KpVJVEbxCWyB
6KBHVXlQm/E2lH3+6Z+UDfCebUSxDrBvZScg6r6QVkVJoz97SK8j6SjUm6T2uQkYhcrJihMZFjtsHyNCi2DT
/5GrLh5mYi4p+sL8LtrsX6sSih9CCRAws4FAQtP+9JaDRQQpGXqGJCEbwApiHJiTS9P1nY+cTZvrfd0rCgF
nPBtMUQ3UteXAr0iJUeFLmVDuZfH0hJkkSCRLFO0UUh7wpUSz0j7JYSRdAdzzVQep3xt4PBo7JcBVYN4bz
1K7QZYL76mGB7o1hGSvctz/z7Z1+AsDTaYa6cEV+A46BkkZhRRyYKco+QoBLaCxhCSQyHJMFUCKRESB
kvEdAyRk/hoKA437wfL9kEJHqwmkG2wCNQ+Cv77T59B9az0C+v/dzeeevfOv/z02b9+VBMcRZXif9ZQ7CU
n2KIrUW7/2z9DI/960PBBmQL1/71GDa9Rw2vU8Bo1vEYNr1HDa9TwQqKGcok+FT+gk9Fx3XYjfAJr1DrF9
Q1Af+KrVtxIDaVqNDiQirCsHJyUJEjQoPgZ+vpbmgDokLScApuGKRdQdANXEFydSYFcnyCqGuY6eFsZfG
qdZs1jceREb9FPoxCrRgFbEhy9pm+oVJosoovnSlhQ7qYUcsET8C3h0ygXSDgDuC+wwHhrG6HyHIIUYa2YfY
i2R++EHnj0vbc1J8FDsAKTYairCyDVngjXRdnIua9gSTKs1YapICMRzpUF8EYecSG7LfsMwOo/InFJ66efIcf5
G7k64pEJngjKZWadUI6TsANeKM5NEY0h3BevFIWGWNcXlwg4IVPtw4+OX7IY+P+svloo0JjgW0XyGS7sF
BgvXQ7r5AYSHqCnIpqFTCzd20bcCaJMXdNYEyIukreWSje4j4BNw5vWZMYRHiHe/vQZnVdAO2B/kfkDpD
WK/FFUCKET1M7AUKO4hlR0cauqZsiXB/lHO9UYVOgMaObAf2YrVegNMy7gHLLgpf28SYtPIVZGZUgB+
beY2Ubug1MT4tIklRklMrWMTBarwmKvkkFEhK4OUWNAHzxUBt9Zw8CtZCFJcMN/QTIWjuULVvtWIRr4
ZbqXvkXZVbI8X0JBOHZmvaf8EyqPQreawSu+qU3wjKrHHAIRxt1l/EM5NoDu8yTJq8tTOZXo6NAX+4hgHp
TbjIZ6vrs0zGurLDQvdQWo0KQzfyinWLW1KHYDgx3GWwD8NCRppfgt+vBOZnHQ4XI1NQQhJ04WGZZor
MBkRo6izkDgYBQEmbjawpLo77+wVFIhnY3AuKaywiDEw5CIclN8pzgq6LDXROvSYC2szRAKbPcqFgolaYE
S0NFexQ6NIQO+4xj2banyCrnsH6HRR6XzTal0KCOKimZv+FBUnmgPv468L9KbJDCXY6IU1tLX8beyHvLya
FuB7wsC3Ud8KTgT4dhcSaUJKfCRYRmIqswuhPobmamMR/bCpv+jhjNPNhmeIVWVOSgihzroSkNQy8+7V
blblUqvSn2uVhar/FxlQdHx9K2MNSpLUhlsQIoSbOmhFzpIOfC693JhUd/+VEQ9y60UV8FaBgMvF7O8CGIRe
LCuJvo+3jtqVfZw4QKUQ2SPWofk3hakGolYYQTQP2xFdCtHHI8mMXL5FODMSjYbme+I51j44/lWVUOVE
65egepwkQ/k26IqUUqGLy9rrowAdR6raeG6pArZNgxacSpb7EmEU4SylmtCAn3UPYUyYb0a0RUBZLmhEVE9
yRA2SD9hgh1uam7lLKkvqXLhUKo1WfYUzv7L5I4wpl3TY7hQjWjWS5liKdfL8wsaLb6bcC53T4dLp9pO5TwL
3TOtc9X/v/P+aPwCONdf/ar7uj173Z69bs9et2ev27OnkXq1jdrkdcV63Se+7hNf94mv+8TXfeLrPvFp+0Td4vtV
kuIpavC7bANJKg+BXVyqsfOpgPRD5MvbUbI8CCLUDtNldmW5hEeq2lBUhQHxzD5R2VaQyqWOgEsFRpjX
khGKIkwxSmIyrBVehEgCT/FqNbiuLKeD/RXoP+hMeO6TQfIsfOnfp+GcVACQkwbhmawnjqbAJ+DIlixhI/N
+gl8E6lG0KGKKCMT5pZx+Dle2gW9JgQbemnRr/Vu8kPpwLH4Pn4LMA+odHK7+jbXW60XvVUE7dZHhL
VzVQ42vN1ASA1IgFihbwHagZN6OTvcBn4vA3oeBCf4mM8rQDlWMDuoM4hVIlFkC6Y1iA7hQ2QcJSl0yrCO
HhQyj/efZNv0U0AlyWfYI3wDIa8Tz/Bz//VOId0yp83oqBzRPwDPlq70Pc5UeGPthpMIVVV4BxzVIP4m9BQ4
g5B3AFXmN5TVyKthRKj7UaN4c4CKOH136I/ezUEsR8vmKGiRrVayksnDcl8mK4bJ6sdBOXmMga+TTGK/
UNUrLAOrvq5pUVJj9PsDfoZMW68k2C4orDOBmRvo6xh50ladMAtqDPEddZqYuuFR5iPCORKv/Qh0T609A
sYjsz1IWPBE9ub/fF5koqhWKX4M0p0BHdx8AfCl8gLsNSwdQ+WeqLUwTs0YeJKBRglX1pf2AOWCVjDThO
OriNBHsEzOhrp8NxFxPcYcLApBajZQyzQtK9keVyYVNrfYZ3B1HmY1QPBNrc8zFQOFahIs9TQbUs0nJSwk
yG7EW4/17MnNoE5ZJu1T2JsE8HRHyL1JfvKp/Ka4h/bcPX4IDzB+rAjtEuGJFX2+20KjEKCWTEy6BxUcy
S17zm8n8UbrhQtXdg57EqBtUv8faZeviAjq4qqr4vvQjqPZPHAQ0d2u9g9mWyYwTyh75ebt4UJceYl4fjYdyFcoR
hVXpMVxLx1B23pA0TLYuk3zo+VmRXQoJcTjuKGqhq2K/ULK/04UKD1cmZ/RCdoKvC+Prwvi6ML4ujK8
L4+vC+BwLY/vNGxZWhwrr2A62Lx668HPfLssiFPfYFizfXHjVViwAWal5z0AW3CB7/yaQBToUqCiZOBSLm
wMhhU3T4qYmcllpgpTq5Wuq1D5RfoDPqJMa5VXCquqBeDDUIUEWNaRjDRzrMC8U1ShurQ7kNwHuxuHD
YBMCrSQ3/lDvo6zmKxz2czSu3OOH6LF+RDTmGdLznfya+AnVFA6J1HxIsK5tcTKzI/CF6V05FDwuz4AUR
57sJBLKFP1DSsiXJBa9YcXHVBiVYi5XjoCApzsggywlbT8yBHX02HwYCyACeTIwWoTyAppUsXaS2BcnUfA

mq7Uec7/2htBMkmAjIYeZ43s8BoKCuRtpcUoFb3y42lQyH1T6kIpBQiI8/Jx0zs2kIHS2HCL59vDx0IGKkPk90J
SwTmDKRu4jx4JTVTziuBw0XW2Lb4m4siK6qVR7QGcvciXw+jpihRAaNYBY0qz1yhhFTcdvVD4M0G2AIhH
m/WQ0fxOaao2/BD+VqSfJY3kzGdwOdiPfHBF5QECp1R4qzENVBM0YpKHM+yhmUNP0rjg1lNkobg6n1B+
oV3Br4aoIV8rBRXrqnl0kuLOCNkOF+zcC0OE/cGYVZ6aIBAWdLiAuWN9HarmqLJ7Y/QegSLdYIFOeWyL8
Ac3rA0BC0kKWV5hUStMp5xOe+KrS1bflHNSAq2RpoRACZiTtqDZALrnmblsi+A3kQsWQZhZFR6jv3F0l6lt
/8f/6l/u/1lBtKPT/y/yvf1nUH/Vsi8Bfgr/+ZflX3qXgLw9//cvqr7/CBeEv4V//8vPhYL0vUQP2fwo0mtcJ+S4h
qg3E7NlvIO6Huvpl0fQPlXMXPFfTYCWOHUweVV7HL+LpEj1x6ojoOqCzIXnZahAFn7C6TQroiGcfKE8IM8k
FbGMxqZZQKxhOkGH3UKQ4wSjtAkqagtJUcO8jERSrYteKITB9pXojOxlalIWPHquzuNg4qQi9slWqlCYRf5F
V71UZXrguxH8IqrD+l8e//iX6668D3LNVun3ohe7N0bxjvwQq7NqWldfNxOtm4nUz8bqZeLnrzcnNRDca6eS2wn
ldfl53Na+7mhewMr3ual53NS9rV3O8zLyb5x93CVXlhCKsjltZPuBKOZqEeMblL8JE3n4Wf4F/EkHHdo3H7cIPf
LjFjkqRipnvRwt5N15CfYEIg0owfZmkeHz6NZ5GlzVopUKvWkrdh0uHaM5XviiGS7QnIoWft6l8k+EaZJ3qGiQ/
fhSoAK96/zmIDiGlIxF/yXIoHCv8Ud6LhJAAB74/w5V0+Y06lALPlY+WtS5pSYT5Qzcgit6lhUXwgnBNfoPtx
bIGFawcaiQptpEn/kWtpCxZ5jQ4iLlUweMh3ca5LCsqFkUx0WSBV/JrXDSTHZaJxUqjeAst9UgdR2LBGSxJii
VK1Tkz1gZWVVp3siKuPJrDMsVSA7wKIlmPhUZI/OMRryukoZBnY6ITqtNUwfa43GvdtQ5qisGLLOqhlhOac
qFEhF3JzoCCqFi3ewflnPF6KJpyx0qPaonTbwI6hq5Hx2nwKYmoSCrEFUru6WdlOWA4N70pyzqD5xY3/qF0H
ddx6P2t9U7WgcXir7Vn18viy6BfgemNAuKND3cwPVTt/umz7/y9rEkkb8DaKZUEHYFCUhJGEhswgb4d5m9A
VCEPw6mwFxakJ0WJH/8SBvm+bqJ0cqzB83MILe+VXSBt/QRvhmQBCWpH3mQ1O497G+bqttkM1Adwri1
roEkRMN1SqqQAYZZt69V53y/phLaiXZgXChHIlMj2ltREyBK+wifEpDpwPgqf/5hkOV6k6mBuJWaDwdWW
8vLl4iB8J2t1i9Bko2I/2JY8hqArrhYUJlsggqMQADMk5uLnb2sBUKFrhqZpGUF4BjlM9WGVEKy67uPz0wc/D
v9Gfr4rJR5ZAMXiMnnar3qgLvIqbwu+VXWaoUuZhQkpWMwZA20pnYh8kr7Q5RR0ExwNDX6SorpkQzqJUP
yO0hs/Ko2InCFYjnvjYy15CBgzufQu8MpW6oGqAwUl0tVsBED7HHI59jSB50kqQowkzeTl2vSDwC9VF5+rK8
BKTUftYrQixQdiqxAqkKPuH6egwF5Uh1MyGDT4KJqXMQVufjDyQUtIVKAkFEpoA7eEyjFCeIb7tdfrYBGK
DRrcjgGJEIThsMiLH6wFxtKiIixb+/AgrOhMV65Ro0FO0RQNGQzJhtT30BG6/GEBOiNSjaFjfUdvK5MFxlH
FpKKmkLbx2c2xP75TMQxFXp/2dCHbHhNKU/GuSdxGFRX9tRjKPDvIiVU6INoeUP3tBKACJoSiD8QcgTr
ZqPGHsnqw/M63wunhuocMdFygzMF5BQvXFyI8orrzG9EbksQt8bYAsVGVBbbJyXPcEYZVvRxdXCylK/Dn
NZSyTqFCVwG5xQuDewn8KCsmDWGRvMwBpxMuFyq2E0HtvXLfbBVUnAKvYahkHmxkjkhVhUJTysftI9T
almUToa4+phsSfYOl40pJIrSLN3zTZQeVEvXyN8Jdla0iLpX3L9CVFQ8UN5FfUAcprxHumw9hP0w3zlK2JRaJ
p9G7D+aP8GrQWyCJKlV6t6J8HhZ1JAvXQVVfKNU/ibzfRFgh524mb50hK+HmQDmZDkZQxpclbmCpThQ
7wgDeHpPxJajPXgDV8bqmvK4pr2vK65ryuqaYtaboGPdidflW7JYSMN+ZVC+gk3kA8v6xWN4FpNhsNTb0H
FocCNaQ+YTUWlkWFXWltff6tpwWj1j2FV4B0nbQxfK+K9UXWCFkFnOGl/cW1J7oPh3j0AAQE4TcI/JOU
KM4hYTHmyMaVNHPRXFUEB3Lmg3yHiu4lZ54ABIWh8tlgHeQFDL7AiWggIlYUu8jWONi4P6k8FytM1Rwd
IOVUFdElxeVJNbyzmhJ02EWAbDYYCFVYBYmy8K3UEVD5qcXBr+VR31UhCJHEogSegGX8B2oHISft/Gj
xPlKeqgqGgGzi3wdf47Dj6d+4Sdy4LU6DJTZIvKuMfyxzI6/xyLDtK+ez4NNcWtR6Si/TxSHTMnHvhVDwvsmj
POmwjR5kTQrx6C4abAcfzx+AFPrTIQ6eSBKX9657BeziEAB8UOCwA3Ab1zYTIMhzx+JBPkHXYuoDCocq3
q7ISVVF25WGI9BDNxxCIafCPc+wBVe8GZxUk5/LZNSXScJyxI+svlty1mAjBvGbBvxJrdQHxzDHmL+AF7h
5GsFF5BlCV0KV5L9pTsm8TZDPylLXVChA7hRMl8BpfL2+EQC8432mGC0CIrjFcV4qtScdZjh7XLJdkNjgv5S
GUixCC+XRb/2RdkFLE3wMy4PxDCqChRrFZsUwSRUZxCBoH8fCUvpqFv25qNU88sbNhW6KXfFFJoiw6a2
LBTTqtQBYJSFQQvFjXglkyp2fmu9j2mFUrfy0Y+WeLc81gyHzH4ZFe9Cym+X1XD8g+I+9ecIICAgggkWfsK
krnL9p6V9l9CRF11tcCNXfirUUy7xG5kLUXU6hc2qZBDhVUyAjuiEF9jVgDrEabEIohDv9ZOXa2KkUTVMrvA
PyrNjnHhhTrsEdLsm96YJUySGQbKYAoPmamrHq7R79wI2g78GPHoNEl6DBAOChLPxey1ccF9EfvKvAB1eo
5XXaOU1WjkbrejQSWDKRyibFSzeqZNv15ZHk++FwcBsIO8n60LCC6uzbtBtiRyS/TxKf6bRK6vLlZeOklTsz4

G/OiaJjy8QwbUywVf7Psc6XaRYkdUOsxDUm0GIEEkvcF35lry1CYF7G+9CKPWWJWQy4KeUh+zl0fZDoqi
1zfZe/KtwqpUUkcqCkp8D+Ypnw/ACiPq2FqLHn9NFw/j+yKmBEpcuRQhOSi0KWIo8cDFgESzPVWZYvAB
UkSFDHCwqo1gIFD6vEORYSGCbh1CxrqQq1wJKfpHMWNLA/PvE+39ekf2AVgjwebmUQVjFFyR2q9X4wC
UPsAKBQGqTi0xsFDqAFAtJUVAO/ezDPdvRmm50xctfsTgf5koXNT8XdN02RQcLLM43J4GXQIRtLAIsSTt
Lc6JkJ1pR81rdlk4yi0LjLAl1QsfbAxkIEo0g3BEzGilnC0VlIJIC+Y6fb0H/IP6MVGQiBzS5/zmYyytzs7m6r7dybZ
JM7/8aljW86A1KPUgZUrYSXwbNl083dSlllohgoZIgdgOsj0Xc6N+LDucYZuJ3QPQB8jfIhw8UWJUJ/kW9BzU
MKITOZSmINChuMYNTlpq2S0ISrBxQGU/F4VLDJq9qKgOmhmOyJqh5Cbf6vSLdK9K9It0r0vVBug7hFdj5F
amTKVfPdWS8Rc/0s2yVAAy8V2f4qhAJJfkUjtsUCdaLecJFhjQmVA0qpxN9gRU7vFGxRDeqwa32N6KN5FH
VHEfNXZE3AfVU5KDOxUuEaxDhna8lN5DAFjALqmI5tSXYxstEKqTlyCcEjGWaDdWpFo2kPhUHouO06qF
31WNvitIy8rY7X06qynF1FtChZSkS/+RjPXLluLdKMAE+8Y+//z9yI3aYmQSjYJHeVMXpD1SwiEoVrUjsTi5
PN05iy6LFj9Ri5XWhoBaG9CENo/JuT/RUqLL+Q0UVQVJqKhePb3aR4GL3Vm7YvhXDQ74itntFSdXtRnS8I
QXifanbFOvLjaqvLsXNYpoBp4X4jpiGEt4Q7haAnC/xAMna4MOKWsHCn2iS5rIKK12wufFDRFXlSFDFt3qM
CgreHdTj2WwOkgjeFptRmBDqd4X+vdzowk5drjswSjsqxyyneW1fjA4vhinCvBaCAQAjFM6COKaiPYmTZKM
cbr2vruHvczlOeVmbSvyFckcsdSeDGuFVuFDn5er+SquYd6J7X8otcvV1I0NR2eyXtznmMoehfF0+XdF6L6kRe
Y0tMAy3innwo/BvAV0yUC/KtaEFU/aSlhVwWnD1TOzQQ1yKsaJsTsGVmq7fBCjHztS8hZswwcCaLABXER
UlYaWwykytLh84MJWbJkitIHnAPJwXIhYEplBV+4X0LLgrEiiisHaZwQ6hw5qLB0HzgV/XLNVCLXUBLkjfb
w8HXH6R1PViE56mYS5nJMwaLM9eY7PoF/AkyjECiPTVbZ/RBn9V3k3wtTC/oFiKVKp3WUEvUN1rxV6Kj
jSqUuAzLDEIJIp0bAgEKzGMxGcqYYWVlAt+AmE8wrsnMFLItg9Q5lyGh+jZSz+MsNzaCtJqmrQNyNLuVP
V2FVt8WAWVG28ReWU8liVLX8aQZW8VTiuVEHT4tkZpV1gZFXPA0OXwfkplvrJqRStVEZDdUtLmAa1F0
Iu/yrGqMmDCDRkXQs32rLJIVpeVNJgnDzHOLXoGlguEhz5sY5wjsnw2RHaFFEt8RqbKyl0wlZRyTrjIAvtIsT
18XfwLlq9XC6aYwZmwjtIMK0UexZAF9FuYx6twjWGJImoJjgBog4D0fAe7GsodKO0Vb3ATqIRXMSCbFKu5
IdOFeqrA3yRULl4RpIATADb4a3kbzQ0lrgUVMFNnE1m4UXI08ZpviG4urs39kmqq4atEpk+ARbpvPovXxlcxC
gBlgOW+BlivAdZrgPUaYHEEWIGMsET7lOt47AQ7VR8VD4bISLVErd9aAuB2AXp7mJFwFs6m4JqWRQCV
/SEXS71vqAuZpHDEWjgvZMdi8Qbx9UU49+XKXk38LItGWD8e21K+fQKOWC6tmFM8h8AmlbVCG8+AlB
zUn1OeIM6xyokPMhU16Kit2SVHIPmiRaEsRU9HINmVVU7vgyiB06Lf0rXgxEw9pHuKPGlog/hv++rJ7RfqOP
6TKgOLo0wJr1kFPG/K+rB4BI+PVWxSJThey8RfdVWMXDPw0Ke8KmTpp8W50zOEaVlzlFaXdRdRVz1ew
5e1S1TIIg/AlE4V/4wRRTV8+lrqiPP9cRCFF7qjwBm8FqOhHCTWsgeYZF5epaJ8vkwc8CGp0ieFtFgcIaOwm
FdlAEWhRyWGsojkkQELXAwEwwSQv2oXWzVrvXHLASWBgX8SgY0KPCtI9Q+6BahhYwIPwjtBilEKfplH
vgjLipFq3KR0iG6q7NFLuKTxNbZ6ja1eY6vX2OqVvHolr17Jq1fy6pW8aiavOh8T1misl3C56Wuk9xrpvUZ6r5He
K4v2yqK9smivLNqLZNGOwyzxEAyDKAoSXRLmLIQdD4FbXGFbi5NAZgbfkUvCQwA10DBWsz63IKXnc8zp
+cL6Nixe70+ftXjcrN/jMImo3Ky1eaR31/2R8G0ZkVpFSPoFOZKiH+mdt7JgxG2BjIsPTXg3zx2vWu4eAIwWw
7VYlqkeLU5fVT0OpgwxBnQXIbEJdGXjFtOVgt/Itn6Ere48CD/JnQjesRZAIeUgwNQzy1988mNA7SyxvsH0lM
ldvpKFPlUzHwRCCuemmrggnEWpKl1dTzU708Kkhb//zU+fqXJ0RzH5Oyvarjdg8hqfXypmofiMn6t5ncMgi0dk
AJ501zZk9qlY80ZW46C5n4Uy1ioqV8isuoSukRY/WifCF1HKSaxNjBsCWQ9X0jc7TFnBojlwB7f1XZAB8m43C
oypbBCtIjDZsWKoiOak3PYguFQgFOZvFWZR3W5E6H0azjO1CAEGUhFQDN+3WThHSS3h0ipIi+UKC/Zk
24WAMKqFjPmO4rk3cq9PZWTgd0VJQMj48tdrWFRqa7vKGZQ3N0IKItayuaHYTSx+WKY5gzvvHqC2T70o
LBbIhAweJb9WZQ1rrn1QShsHmipLq/VpK7pAtUOp2BCoY1UOJVxyR1eOC++EXE0qFFmrdvhRVmnOIJyV
9QzX21T8n9prLyOsGw8RM449zhqUGFM5lzrCN9VmfIft0FpRUCYQmaprFGWBTWDhICzJYGH5hMGVrBl
pUYl5eqHhutaD35V7OlLE44b8IbH+CTYM/2RhVWrZM5x/oD8ON0WaqJgrGA5DkeCycP59muwaO/Nv8X0I
DgTVXQV0gZpfuBBdxwk4p7ZhK5iDGI3D7nYuts9STQ03N1KNbyjmCsyCGAlY7uIFzheKxevOAAWuITz2ZH
FcAEtwHujwA0wmfy62vQu114188cp/+kxyE0hLyGs3YRykXh2rwWNNzDVl8uJbwuCNXqqs3wn//lOsJPk32L

HSncsKN1jyqhKCvoHqWalS038Ckz6qiAqB4Bd/DkL44hdiVshoPM5/iqFrGWzVYD8nty7UgvhcrB0pNnKYHog
y7WhDMTEEhvsijLspsvMknQD3VhI/IHeC936aBpF416LTiDlvYDet7BahIoQfkZ9i6gWW2k1D2CTeyMwMZE
SzhOqCyS01VrJKK9WFUlhBqimzN2q07sUwJypbYh1A7Sqss/RTfHC3yBJvqS2yMoVZqY8RWlK+iFu17iAEy
UmH0ThllWNFJChiX5RpgjdUf5TwIFXwF2J1eYuCWC/fQ51XDDh/IycW0Dt5QcFAPSXx5wQ5l09JiOQzFW
vDLZfYDIQLsQOT6O0LaCmSj3HL8I28ugJHqwA7sY4UQwfspJxpVOHswHZ4ZcvwARYt0eYGPOUTJqH+9Nl
7CAMwuWUt1vrP1LWm0AfcKEDWi78Oo9BPyXjxfuerpE7XIOub7KiuFqUzqGgXh7882hWWwOR7EBvonQhi
HjyPYQ6r61uLSRykahJn2llcuSC5/Uy0LjcRJevaZgqKeIMotg0UgZcJNsCK3cgq1ciDqiCo9HiVbk67tQ+4/VmUc
7P+pwLDcPHe+PJUSEa4MX5vCa9fRlC4pT+cv19T1hPFYFR4EbPK8HRGbPM3QXlAQNUSMxkT4SGOrw7
A1G3FbxSLilXiMdqJ8aoFeJfZit4wZmMdzBDomYib1liLXk5cmkpFr2RgoYp6PwawbYVoju7ZFc/BZbfYbMNK
tw7giuHqqwMg+VrgB/gtRU6HKTU3hd/CGWBGddVEx0T8iiRcsf2xsIajGHyxhG5zAAr4GpYVjw8H+k+QVk
YElKwRsdgul5DND6UiKP0bp620Pk+SKJMPVlB1AJGITm/kKVGaJOsbWWxErP9QITut3Xt8aykmLUNGB
LPR6shCuFkluiAMqCGJqooBbxhx/0kgffzqZQJZwV1gOXii8qhIfbG61O25tX4HzBAFSshqyrNDuiMd7juWiW8
PMDWPmUYdYh8Bs2pZvKSbcjWoJPqp9UB5Wom5H/x9niBGeiiXKS4p8PM3ktRbJJIXC94WSC16L3Zi/mP
mVSruAYfX7veVpyLJACTim6xIhZSo/daSJSyoWH9AUN9gw6xuw1NaQ4ugiTFyAu/frDFqxziOIA/+lAZ5COt
Y5WeiZbJiPCrGj8xo34Z6tC3JAJo6lNY6X8GxG7w8sDertiQbbzTGOTCmT6vKPAypv0+IoaQJgL+WrQHKpl
BZIygwsNE078C0p7aoXGiMjvslHiHs31pwOCq2TA2+Oj7wVe1PKm2je77LYVQEmD7gnehAPipKlioX/abhYQ
dO2b6N8ukT9MU/Y4FW8FrcR94WTcn1S8XLtA4fWzIZ1S15WnuFG0zQS4GrBfvFOiBQt+o/qldUoYkAUYR
JVDpGXpT0tsEvJocuy/aIYjjRgTHRXJ23hbmaE1SSGGgsiImahtE7GMZO7VSsGCvKryiDJa92oORdOpaCkxs
AcgGgbz4FMnDBJG4fiSB1484HVDasizsoVnDKEMaf/AzrRiPVhIWL8RzBT29vm7p2MDFegHGFu01xDnwtFv
SFWEelDxDBvaQ/3lpfU0gA6yUFkuUfonAZNKHQ9BCtuZ6gXvNUgTlINWiy4YmZ3MRC+eGQhvDWOn4jU
+fojXRopxw89HiMFoojT5hAuKGhmERuyJuG6BCou7WjTFDujrZWAvB183uZHC9cJ3+pHoNA/QElJWSoD9
fTPFqyRh7EpQJFGh85O3hkl1bk42cUNcCR9Zu8/K48j2p66uwoXDj/Y+VbM/StP4gY9wb1cjfor5lSXz1Wl+/S
p2YHPtXu95Wnumo1QkMpaAcISLEE4TINRQR8i8uL1LDkKTQo5vw9rq9NNh2CKkPrFYvHpcUCseY5XjtHa
8hKaVmwaCAKpRaZ9GXScTVYO2my9uktVyydVoLvfbFAky/gLinJmww6CDJaNlC47ejuTi2JbylsljF7US8SxS
qwTV8qB21au0d3h9781CYLw+yas9HhAcqXwFlR8xbmTfNqdHcYR7RvpHh4A2wWZSl1jz2Nls0/Lx5YOKrUu
vj5jXJ+jGZqjl+t4dlsyyGI9mxZeenoblpGUDu83KB8iaWvQanCcnmCWxap2OgeSNpjJx7dzZoiq57tV6we3cmNy
155Ak0RuutV1qeDiymwrkxZ3V48psnc0UE83a/hqp3o8/J2UCUmhb0Jxk5BWRpUOlLDFmc0OgD5J7RWtQgn
wo/4Joo+yqW+Yc8zGh3A+ZlfVp+EM4C0cPRd5PrWpGWUEY/shHIIOcK0VLzHQoiN7+sAtfkeUrW/EEvM
gUMHKUIBePcqRoIKUMTH4YIlXk6kcIhwEcJJ3JM1deNglrA/q9Ib+67iiSpGkHJB37qPtlARCtY6wLcqsBd3b8
qVKHn0901uao8a3ZTtUSW02jZNfnLDHcUWfyYApApdUGczoeqsG7E8JHEjptqHy8pTmywMw7n1Ee9dKTa3c
GNKoAsZR/bhGtPi18XjxiV050SQ7UjuKO+KbH7i0UrSqoHiodNyVqONt7cEjrCJWct7ThqfexiTt25DPdpBF/5
djJoYuB8YzwaanuUcxi76HxUTxLGV/35h/S/x/f9lfQlyrqZ56xxu5bQ/qrbvNgQE72GzTcwY6lrhdLzxiQ1Bddtm
qjagx7yjzSUJ2GXE8L1sq+TSF6jdXSRNc905wN8ntli1bNowOvgruAcZUnBurT+AixQ3bD6qO6YeksYRO4xAej
ZdsZWK3cOpjvo5pjOB1ATPHZAOVJrFGsNZsc89gMunNFe1ySaOG4hIOO3bbgo/sN6T3oqWveIoq6jjLHfAeFr
ZzBdXzT5w/YGeWO2Zq9BeLuMfCang5cFPsQDwWbMP5s9TmiuBiNKQPybWGhe2N3j8pSQOYfbYiLvuEQ3
S5vfFI+Whyl7GMLgfrIT2b63GZx5ibrsG1EO9u8pCW2wvYKNFW1HkUehmuqane4co3LGlwgz07f/ybRj8V7Um
bzNIgZIKntuS3SQ+LYfryrRLrne47PdsuTDTla/obZ1thXLYWzpIhvcdU1TabNphNPCE1gpzaiwdvmqSHqwL4l
2dIMnkENKroo4hV4+U+RPJTtXthrgZTt3eQq3WDdhYiON8Evesoe7qfd54UjTydGTgZQ0sBm3aRPoFvyANL
n6I+XqN/Tqcaa3bKICOjil/ALJHnkPglYc5BfvSPbN5GuykKgCvcG7ikEbjg8Xl6Y1W7cNp+AE06+XEldQ1dV
NjzMGS0bKF6pNxZv0eJKa0aVuJN53lICR5T4EjjTWulD4eGjUacrAIPK3Bql04xWDNRvqrvmyoQznQeO2VW
gDEagsQze38kKQPUl6ySaJw3rhJPDziHOJx1T4VgdiiXCN/gIm3CzPMQ8E0cMj/elPZvT0kVI4fHlDFo2pHGiI

ylmeU05dOV98v1W5mRSlxgJu4kabNaPNqNTli7zs0UxiAc+T3yedJrDBMQ5g2cq5HB6YdWyreIp2L/vY0IdLw
jg5PRFu2UH3ymAJR8Z5wG4fWKrcDckMSgBIXG4048PjujVXtmao5qt5aJbo+QUHkybmhmh3PS45HlM40lbk
s6IN+FL0tNzE5prlB4WgSaMFxijxBx9xzWc+cMkqkMmbezCwfHZsO88CiU3ZlilakO6o1RejnAdbpVjc1i3/fpvv
mDhxOmv6NF8ZW5AX1wDUs0uhVje7b8ngAD9YDP9PYexjksbRfmKzOHaAxTP4ktpj4t2aDGs4Wzv26mF/T
Yr2oCFAqx+gi6McLmylh4rbqUX7jKj1tWCb6NF2xdaaSw9TBO67vVBZCs2jNDiKp8z+uPk8SlWDlmwylB2B0
Xovc1aH0zzi3lnKnD3cMyDM/kBw3WXYQVnE+pnSnWXFcIMVc/uECBApz2D82edbsaD/TqaHCiEJfQ3orD
B0l4Z1rUGHWsNE4+/PigbTbhi1GvpKDg+N6UwydPKlufvbRtrtbS9IMm45yf5A3O+DmZ4UnnXj8EkLqkMCI
Mk+8MbCxjw5yn9ag8mr7rpTB4MUHkJctJiRGpcAai4galMMkeX1LeY1KGoyrwlsku5QGTCqOSIyU7H2196Yw
D+4Hb/B++65JTfPM5lReFJ0uk34X69zgArTwcx9TszF3C+503MXFWuRn2W8aX9fRqXOPZgsDKSqDORYF
6ieI71kgNn95WddpfVPMRUxfUNIH/A96YEB1J4pDx1DuwsUflo1aAvvo9PqZLSmGYVpZHDEh5VZJiJEA/G6
PLDqlE8mJ2jTD7bvDGf7kNotpRUfaPzYpsu3D8+kfm3TX9qiYmBAwr+CGODqn3WHwIJctKCkmxjlvOre3D
8+auzdWDjadNEMEnPsR+WZR8AHutld36dG1L83jPDqaDE9orhygcf3sG+AY5xZFFriVkHRE4+BMDt9Cl4a
qdkwpLsgLxmUdVCU+jQu+fXha3Or35euwy+DnRBx/Wz8ogfiGiumA5OUtcNYQUMCfSCkYyiRumMWgBW
2c/vbxFuPZrCi6b6ujL2pRvKI38gqpHBMZrB9RL/Nenbc39+Rwr/G0BgujijNBmk4yBFIbfsA2cC3cJRI3WinitA
tgoYLzimZTj7YZjI8pOjBWxxJUrIcOFt6iNKEQohTiBKWTP5VLYB+dTzO0Xsw8Or3WsBqlTmQXFkIlPU9h
2wcTsk+zFRsdNVFjYj7kyXhBf6hkKeA/msxyjrcsXVqqWiL3L3A+XxeYvZcaiabHH+1Lzv+8+kycEl8Gc7xx+
n2huQLyD06qNNh8eEDeroHqc8e1575Rl9OeJIHsw4PwVr+vPnVaeeqNsha3BQkyuU1KcvvwbLvV7ytPpQPs9zJ
YwjJqGxE5h/dRY/RxeFR9+ofV59gqAsDCgBUhFq5TTQN6fL587sfV58kwHKqSvVE39YHnYc2zipS9+sADx2
nx6+oTC5WnlFtW2Hdpb9MzG0THZ39ffSrFDyFmLYCQgTb48vRaxUeNvT2MIdq2UXk6nQoT3XmPaheST6g
VXCd3s71DyUPLJsrlhk6CkcmA/JII0uiJDvYbxU720Vnv2d8Wj5K+JFm4BqdQMsLG5x5v4ro0VI41CXYO1uQ
bPJGQS7aIiSDJVoRT/t+gtEvTDD5M6Xxag1W7ytwMJdZTB573gfj9p0AH1IeZna3bqDx9rNS/corUNl8Nzzw8
Dj3zy+qT0OG+ocJgb/DYnYrDrYPiHKKoZvOerlCEOiaNVhxAW49Wqxa6ZOEbTE0Apyq2HjKlvpC4QLVPf
BDcdNlooXdo4ZNbrVpYW1llICBvma+S87pkR/soybNjU1Vbpg22+LEq8KoO/KCiFFaOWgeyxhGlXDfGW4fn
mgytVyyelNEg7jOSDegXM6xJScswBXRbKpjdNPsPs0W7N1bC4qTUmT0kqmYs7LrBb6WsoAkQj0422zZRPFh
tleB3G9zyYhUydd081CrOtz5VGK+JL9Z4S6/sKdWBabSwYb/E+6yiK+PKKwXF5PHwN+7oJg2UdqsmigcXI
jLiCWAz1figJtlY009Uw3RS+Q6v3s2I1QM2JNlARZJtDJcQi3gULWt84NEZZNemCkNs6iGKYlVMJXM3oCwtl
efcxnkYlRIiLBIUl0q4RgsP/ZftGYXpMuCgcabYvWBBjoPeimnHsUbLNgqQoUNDCAZhcOnbb9YYmARNemR
7egDJ535afVZxIE+HVDLzFEhGcFw/pnMJ4kwbn91w8N6lqYots6rAUWYpNjzx8BCw+QfVdu2SaMxkKSqpHk
HhK5Rwl2UQG593ECl0a6hqh9oQUULDH7P9fNU4podJm7qfVNum0DSSW/pvA1jagIlpHsLDCPTU78pJMStO
lzF3VsMSH523Nf9ANurcFTUY4EhBFcCs53U2rhHOcU5k60aKh9MCKglLFbCEMeTaBznVnIoXjdSYc5QH2aU
Z9eIcOqyiWaMWL/8hDSQ4qQrCUnWTy0Pahpfq3HlNM/EJbVatQ7f6Q8FU3Vq/h0wtqlT1XlU50adKOHcHn
ta1qaotUg36sIV703fyEFexjkj0Qd2VpFm55xwmQXZrqGIHHQ39PkkW9/sTuczO4TGR5hfVlitAVZFZKaKsTH
CkmEbyaEvJF6Q1KWvVkEYA6/uAchLR0ZLK+qvkGhQnbIrclFoRqAklVoOmpd05OmPq1W5h4rjYIVeSuW
jzDxXbIdKVtTdAhPpVNU3X+iMIFRqxzhkdBoFcjygMr56Rir6VlbyQBcP9CxbMlbnwVO8QYnd5VKPSGZrN
1xycMj2ocGw67fpuT28pPFcGwDnMXjzzy+qT7AMqRBYJOzxIKdkNUnw0r/2OfaiW7tVw+Vrt5vSzA7qvpAK
bXl7jkVLX5sqBI/X04TeqY3EofT7VGmE1aWoQZEjLAZCTqNtPwLa9tJnIH/ExVJ6PIOunyYJDCOdov2K1o0
IR+UU4Zw8WBQmk6qXiIl+rSlOx8fC85wmtVS1SVRpgmgFpUZ0G2Ke0WtP+qyQSgwHrGhTQgYIeTRyJc3g
oxNJ+1era5glfCPLZ3yfaiXZ4YnT+x+Vkcqrg/l7W8VeZHofkdTl/HA12n2uheOy0slrLOQ87gOaHHYvQTvxOP
YKOhionmbjUrURIG6RyjTmxOLmH8XG3horXSQdH9LnCvg+4m/0a856a3ufhyVGLX1efWIhVsirgQsD4viJEo
Pv1Ap/KRmo86+hI6emtVi0c11y8DKJVyoruTM05PG5q3Ub16aoYQvUoucwfFM00Pfi4vsHZn1ee6ZXU57I4ofo
xQGmyBq8Pj5jO/7h0fa9aq0Pm3maF2+jWxKMTpnYNFA+VwNU4+pWnHHM8uvdFzaKzfEcbC7ixDFD2Bg

qyUeGSooKpsM1PK0oA3INkUvSBtX9pf9Js1SGeDfPAolPVyPQxXKAaUO0SjjXNxAFpy8U5Ryl7PVtWZtLpl
Kx1JascF6Lfcg9RYf6TLHsj/m27vm809KgMae+2iyk21p7Qn4aUw7Osli1Un1ypQ6MmqExrQ/VkQEWWmyqM
OYfnVB1aqVpQnN3DUgga7XkSf1LX/azV+Q2KgButaDjF79BS1ZKKKukez17nyfxxf1vJfbjHCx6D4jYP+WIft
nuqFgNH2qiifZDli1XpBcj3brS+Ubw06NMrPa6caongZ7vZJOWBGR13NtnceJB17vfVp9YEsqrKFBgfVuL6xidrd
LFn26g+naA+UymbShFAuf8LvJkAZM0NR3jOYV5eh1ZKYFLnTn5eVl+Eut2NoNNw2HTid8Uj0JP/RDlM9zJ
PHbQFcCHbW1gHg7ptlQcewnGHVtTjp7Jmo/KInaoyr8kScY4Ons7+tnhUUYQIDJSKX1gXBNpIqguu4PPpLh
S8AO9WrI9UN5VG8h4KjGOKQqNpTdWJWJ9VeOa04Aaox74qbFztesUbpw3VaE78svqkCrsLFw6RTZTMsA4
qlznLm2w05cGdw/OnJ7ZYtYzKQmfUio/CPVJjaReAw4Oo8z+uPI+Onj4kikSAbzfN/MOzJ80vqi3bxTSXNwN
vwjTMG4q7OYcHTfofVdsvqlytCIHwglFc8ebA4f7moMBrRcxzU2j3S16yyawD/2J/VjmNVWoZ5Wvg0gYsCV5p
scPdwkMSxz7ML7jWC86rZL79981KB6ch8axv44WxlaPTyu7iS7zkXKwBxZkzFs0oXL5ydo4lNeCKsaB+/FIx/x
CGh3ic7JB7d1fd08JVKGF29KoK29yj47czvyweYxePgcKuclJiR8K82I7ek1ZnjvpkImTUCY2W0nGPj+T4nlKY7
9ZXNVUvXfyKqi9a9SqZFeuOt41tGykeTtKAJC/jm7JGW/NDDyfA+R8rbHHvKh7+0aciq8UBPvAmx2jhHh6z
tfh15Ymj4nKIRplxQZLIE0RVkQYCvjXUAvJRZ/HYFDW6h+dxjE+p9sAux6x62PkRL19J8D5wwh6Yno12Ok
0j2KGtqjUN+7rbSsHeouQrsSRN1pzc3bVoq2rNuIKYyyJmllwbbFJweCXrpnGww7yvpzRXTih5vgaE9vsiyT9sP
PB3j0/LTvxMPYCOvt6XZcWguBZeVQSHznTVJ+4TGh95lKvVraHCCKnUrt/wq8qc+bm2Tpp7lGLVvpHitd
NhV8HEyX1iJfmpka907QPPa9dA9bmlsq8kfWWFqtpEb3Kzw9OuLs1UbSiZWvyJzDn30xTLQzY+uYmnPfnjy
vMcu3jez1UNPwQLDTGne1Q88/Qvq09yi81lrZZ8UUGANkVUNbohlnYPj3y6NlW6t1NU2RDrdxo8pAGx+I0ef
XTsc/J3xSOm1dgIxuRGR6pVHnVchqzF79Uj3bsKWhYBX9Nzjg569D8qGpdUo/yGPANSJ8hH8ja4UV0edWuo
d9c91hT3bbww1i3OphOoVvx9oo2x3MMY68SviuZVOr4KxuT2WT/eDQn0p39bzBp1cuMTeV2reylXLl8MSONS
fHyA07qVigVeEWI9RP5CTTWwF/c6pABsVJi5h+c57RupPl8W5UoWSmOlNlqyJHUhn1uESR7OrUUwD+E+
m0aLDuCrT7NVG90KIapkYshmhnGIRZXw8KTJoMPNcts2qk8fS/FEpeDZWla6xJNiqpFBUFWWSW2y5vCs8
altVq2jZCMoUqhbO4+yio6+XE6+sa0ZapSuHAxROQWb7l9r00LxWE0tKYmaGobSPbpbrWULxWOb7qFQw
fRNu56fuXuiTWuFObVV7XOM6QiIswTZs0YDdKvayd8X/iOrAkpVTv3wrCAsoYxF0KgodQ+PHTq2VHZe3r
Mm1wd1YcHGz9MkBvpiHSggw2W6maFxj29Ve1KDhVGkpSy/hSQy3PLZ/PQjteTpXxaPGRfLkLqbsLH5hmO
Hpl8UzaI//bAiJ8RVt31XDt2qSzPKADpyqA3yjUr4anzq0ZHD2d8Wj9IKFKiJtapffi+FXr4welHJVWo0p41+oX
P7xdyrVtCDI8RypVbS30YK2D06YmjXQvXJVY2WMHaOx/mHFx1A6NJswOEtqJ0aqry0cjsmeXul8loklcthqZ
ZN80VE7tF1Zk9pThk0uzuDwI0mNNxt1qaB4m3MiismD8S7N3jbhEqGVsXkC1JHL693Dw8v+jdetddVMSORX
9XbqGVhyTKfCxaBfdDoRodHGU9ssfL65NahdiER7VZp03PwEeze6wKcxtd7vL/geEBhtEy7pcMZfElKW0+qY
SLCT9x+6x6dSzyhNWmOd1dsSPAyL9hB/AZXc7rXEvPXqJDXn7HKDJwsUbwD7wbqwjdY6B2fTrA8oDBaC
XMrcR+d8cqrdeitiEAf69eD12vG0mu6T+2prRbm4YShUvrfBNUSmUf1syuGHAYTrX6vHjkq8riyIChC4lq5XVn
pSOWIa8wYNaV1PanNwjR8Wb/7xZ/neIdgrYJpY5n1ijWHb6dLM4UBxbp7C0fGFBhicCMsx+J5uhDMO8qH6
dCKwk+vSrxLHVFR4Z1uaQ6qome/2Bwf6f9KMPWaifh+zVdtrsiry+MGDIOgbDOAIhwlN1p2eF9560Yqz7eLL
Gq5tC/9MKL+qUX+VOVc7+gGrm4tVS2RadTVy0IQCFBzQL2Bqg9BXq0Uhozxyt9sgljPV3iHCS6MTynd33Y
PTi3h/S+CQhZy4qpF7yjLpUsz5RDiBPjKj9ZYM1FVOKF7lEnx/QDVLmEGi6ASsjUbR+vA5Z/WYNWupou
W6mwCSipSdQk0SRTqB5RNhp6+b+mpT6hYXqmLtse6OfeBLLcuizLLEnHHd7RUzGwsjtaxuapNDYvyn8s1o
7hMudGU45yYtq2Ujk5nIvV71WWB5eNKVnQ/F7pK7IefyjNePJR/SJrq0XrOEb/N/rCiM+MSdsrkS5RXEq0P
VYn8RUT8fpOK0Ds6a3lCa4U5sshRmehVUS80P/343ulzP1YPo7MXmN5vrT8E2TaTA7suExETqtuMtY1JSv+
+rh2poIHwYDgjBhJoR/tUil+aWQDv6DzneQ0pBkEKdSDeLA426PF04k35S7TEp/JQGCSQxbJ2H5zaRXjHR0
bczyq6oqd7q4lmUPk0mW8PReoVi1vxvy2aLDDLLTSYUJgRZwJVtoG9e5DeWl+JXqWknQHmqwm7DlOKntB
a1aIi8CpJlX1ZW6WWJ9RoTUP01aGliiV0VHWqimPD4w8Pqdr8vPpMu/pMdbAlMD/FyWXhfVf3ARbHpYR
OWfa4eVk5PKDq13DVTlL2+KG8EhnxHbSMMc3nQg5TFiVuOIT3Ds+rntZg1a6xWgIh++CG5kTjkw+3D5qf

VNsuKjVv4yigN6kqi2jxrPrIhprNHVoq4WRcVKoB8uCf5Mj8k6RkVE8aEeQofahDK8XjK0nuhJFUzmNt+cvUh
4sDGs8qvKNDs7ZNFG9gXKlW8md1rc63uij0MDPo5O+qT6nqOfA6eYFieFopRa2yhDtWeV6fBKOGtKAejYaZ
4lyQ0gVHyRPRrkcHafgY1BbTlyTxS+k3CRhwi4ONpYeRqruPKAACY4WrzWWGLCojsk3yGBwECHoDKrH
OUBZAPqGvtu4foKAyvS460fspxobFaj1fBRlVEodwc5PMHyEdAkpzp/4msyjzGIafanNB8JIHv+TbVGDeQxpu
VOmeh61wkm9kjCMCw/LqsQA0z1jUOb/5KVZpUNmKOCDYb4WQCrWWTG7xw1UQbW6tn+Kf4m+QMQ
oyJCOCjXUPt8+tZEpVGgZ0tQ8UdsIIWg0jNAH2YDlplDpQ8U4fCAYqkLFJk3sxqnv5bFX2CkhZ0cYNNIBtZv
IqCyyq8lP8O5L9QrVs8WowAf/GkqUCauQ0boUo1QmoSdmZzRZ+pCrwi5HDnizDNMhkykVGzi5eNNzJQa8hT
4P1fYR+IgYLaJu1CB0gTkCJaR7Ec5QW3m9TEayLVjfJDnIZM+i7+L+fYtxQJJkYMvF40So5zzzdrjdRQJWx
oBJklCQpDfxPeOJKbAz98/anz3BU5nCQk8lsSWiX3gnaClsU8RmSXLJNvGwIOpnFfo4ut8WrKazFdrmM6rcQ
qFESYJ/AVgm/JkxSnvbJp/GaR/76PkjBe2kIAuimeGGi//Lp+MRNilfioY/T5Uei8UUq9lUZHf2qNRKkTajRh
OPKn2I1k96JoQTnxWbE9zw61P4pfoc+bVHz4oNbpf5DoWW0oGG4j6i5/3af/vO/4j+gd4BgcBQI+Q0xYhsEEb
7Yz+9JGfSPv/8ndV24RUZ7wwfxPNzWQtpv5WHZOqASWkvhQAIhI5jVNDvug4X4DXAbJPrc3lNKRyY+3P
gbGKIHP4zxoFZ4yiMM5ZfB4q31AesKBVSK0Qr2QXYjnWMrNicZ3PslBhrCeLrkKg7zEHW14KGYA7xSgmcai
yyiwp3iJUDWRpxHmCgjngePolkM0CbC3+3mxgof4iQt7pqB2z/F/62KYZNMVgYy1iCmRhdbEAYmfgqEqzzN
E21uHzJ63r7WVzGHxBAKV1GqRaxcBAOcBYg00DsIb7LCaumk83QvVqRI+B9E52JAYAHeiqkK90UC+HxS
R70iMPjH3//3D/KKeHyjGC794+//Lz1qvRUzmjoubEJwgV+8x+MDcC7xTRigcJnLIRWRHuX24c/92H+ojhu
+c1LolXCdJono6pfRFgYSXrmYuzkMBAA7plxF4XpjLcJPIVzxBivsTl7FILq8z9S8E4gNoL9KxGuD/u/8lDr4Ac
4Yij5V8JK6dIPfkWr84hZNEati5+oTQ0ypZJmLoQ3nj5a8AJ0gWYyuMgQ6RO79iTLg7wMx8WlhBKQV/16pz5
+m4ULgmXzOTzEYEwrXzML0N2g07GxoqmFzdDovggmInhMxxGQ//ITkV6KF/0Q1NXlkAK1UW38vPq+m
rECNNDG7QWIyz4Ul4uuVZ6bBBpafmNyJIruHVMRaMJnIIHj38opZkMaJ+Sdmh3hpUS69BR+lWAS4pBbuV
BFzbolVX24J598emmn5a9h3LgLQuIlwGu9Jot/hSwozHB5aJI7eajmgMH+RPhUrwAJLjEKKTomfx5EIxsWk6B
E/x/YxElGBCOQaHgUi8sKtdoHIh9XTIhECBn0kglj1pFAk6x2LNE6uMhjJymgkXGM0gthbxh8QKXwTvFkQ
CUPFphBE8pX8AElnZSGhjYw9ULYis4HUODwhioGAoE8Uk4kYJkhrMQzGsd1DmOwohoEUyCKGyToFMR
CRwLUp8iAfXjMeoO2gi3iaoMZsuJgGWu8V1Di9gxrR76cENc8W03xThDRQ3uIpIQ1MrDYhzTetI5pizHpGNL
SFaohoBgho3q3kwEEOZIqLxEEsIzdKFBwQ4Frr4CCYCbMimHmJsYw2lPlYKUxdLBGymsVrSHOxkOYdPi6
GV4v3Qfg4weCf67U/3+KlJRuYLCJWgJosYS5NRhD9FAa7cojvA/HmZbkW8DVVnlg6WznyP332ozoFTUt+Z
i1mDCwytLzivfI5oM1Pn+XKd2hhRtzyAU4WBYf102e62On3At2x36KV/1ssNx7pj8XKIoAokoVMxSLg77JiSS5
WJAqobjBU2pD4xrrfk4nbv/0tguI7wgzgV6EpXE2STSZv6T1YVH+U5QHyZKcqNtMkRlgG337w/xbQm6fjFYg
N8YMl3G1tfcD1EWdiGAVAZMH8xWUD/uiH6S0t3t8ExV23MhTF1RvPn6G3InalA6fKFZe0FkurYWVFqU9cc
FmiD5/9Lv452dPRCtR+WiRrHHcVjkZKDiDDvEzg1I0MHiFSQs+GpQHART0awmYsspCHa0qjrhlUvAq6NxZ
CDKzWigEbSLXWYihktyvZQko5SLIuKeqA6Fwa/KNc6It4UbxFar0abJQBRri+lz6fq5BBmJAFfq6JONCPxWS
WMU9REySiQG25XcPK/SGYJ1AxCuZZis9HVj4OKt4MXYHOBwvlxo/oxt6rG7+6sTluXANlPBeBxiS9Ph7Sl8
XeKfkkV9m1iP3+Bl2E8cDbmNHLpYPQINIT1EZIpico+dOejnYUoSv8TyxR8FtaosWiuwaj4BwF1B9+RurwuS
/CD7EuS0uD+Qo2BKirQp+PogAyf8E7qbxS5fJADGMryaSP4JRgh1Re5SLSE2uocAkM1sGt8PYmWCNhLyV
GKpYUM8rRMYb09wdPr0wAEddv8H3K140NyI0+Xsf7U1GjHjsn5yG6PpZeAQ6ikGijIgeHuthDwhQ+4b/4+g8
cuKLwkJcZKYpFXr4JfV8jyaD6pyLgRG4eMrFFeIDNDSjqSiJfbR6T5mlx4Nt5OUvmUPipsp0sq9Xlu0RGP2uIS
X0c5jClljE2E2+U7tGpF6yks/A69uO1Bos8eUgqE2byOmFeJ8zrhDmaMHXaNPf38EaIOZ3Wpwx1pmnOFB7de
s5k7ScNeETDpPmzkqOktLcHkwvGTc4Z8aP6nBGxh+gMTZnTMwScTmoAsJofyKZUCOGnYQEhdX+ot1UEf
NLBlOlNeYtVv72B/NBcRUPoSyV/B9YV1IA6sd9gJe2FSrfDqGkbicnQbQbI/a7qlGSFzzk5trTC6Hcw/w6Vf8O
2ujauEHd/LhAJfEVGxxXvxv6o9UD0H7WPHqWVvnr2q2eb69lfbjPxnCzzs2229SOPspz/8ff/Ld4B8t+YHQWM
mrzFEW5R8rNHWR3MF9tHkjsJZ7+RxQ/xLkyZxBFEWQDEFw1CNvcloZ1tUxw15IgV6w97ueKX4PQYz9B9

i6EYVSI94daeTF4BJ+xalyd5YrsKj5JeIiOJbEc89ErqNj5JCQgpReURxU7srYvd6wK33D9sc3yBSFareypgx5iHY
jDvBRb8TYxISptv2EvKuOXY3anVLIfv4uofYQ+wuNYODJUBwzyFK7bhnpcsDzYVndPcJyvliUm1VQIlEUO
BijKZy6sqK7qdwuVEF6hIZpIXh49wdpTLxFSal2IeZI9hmhfc8xwuYoSHV3NO8AMfT+jQSXBf3qw/ulGvAWR
xYubC+eimmLorX3QmU0RzsHgoZjKYKScWjK7kHu8jsUUvMC7+WsZzq+LYQLS4kdOrpEqFYwrb10kOukc
/U48X6Cx+jUoVmBcYAxOJKvAGN++SJU7wtScb2qvTSRgczdxI31/66zAKfeJZxNTNYWoTexPCoQOeH0L
sJg9rZBcrb4QYCHhr9OqFP8AMvoF3WhAa6AY4mGII04TEcPABsuR02CGJm8qUeKvOB8SsFRYXp5H5Du7
jDukcAl+GOsQSJgQRvXOxggkHg+s1dv4yz0rOGfqPBtFkgXOTOFkQGCCnIo+rIHUgI0Yf8AsDb3gEDBic8w
V5ioV96DD7IVB+WFqnfEQOWkxCeNFXyjIBvwCqHVrOkNqnpXMThWADTAI1fve+eLGR/8mnGURIoNgx
egGVI0fhrUmYI7RmeHDlUUGHj/gmYrFSf44Pl+8YWRmfekVTHd81TN4tnNuqbkACP4pB1/Rm4VgMJ748L
YnnUFUE8BGd6dhVbsodwX1aQBt4a8VP39FfYfWUZixhQwVvR64s4PqZdHwVuuBRcAq5jHI/JfxfeCKutGJN
ywLqJDm7rPoKVaFCFDbAh3GQAkLhc34R0BEgaFLBxGLNFCauhfNa0TaFipcwwwWA5CJ+2eJhyUrNgjral
FA2T8NsQ54ArCV52kaELniCW/hxCV/RWni9cAo8nkWEhesT8VCNxA+iy8vkQev82AGUG2xQs1BMA+Ebh
9HHB/R6mCw+SUDCmJYJefaGswdvusVgI5nPtxvYgMs2/HvxmwQyHgEW4EVmK3nrb5ZQyLYTr/0RDi8ha
kOHEvtsOoUVjrmHG4mhsXBdzCblmBFNHvJ0cORl+LBN1XDPIasEaUQ/Fe3higwdBdjdprIKsBLYkRgC8sK
UpmIpYpltSrMdVq0aKp5GJwwOAJ+qG3kVbBGu5HSerear8AFfXYVJfg+gQy8KBkudEQK8ELbEv4QBuOw
Z5KD4UooqaAmVbMJ5/FDY8U24QBErXBPsTaWivl6xA+MMManjgI5my5n2L2qtewjBLeSKh66JECIm8Kcg
Soo1FA5jaR0SXr8JEhHqwmuH/Oj3FML9+zaEnccCQmn8d7xfji4xw0AlzFXyhegjTCEpLcF4DGj4+Au47CUJo
RqK+MN2sYAzSzEAa0QPFbNJATj6UalbIKENJCoFRH5EIQhnMDQhXcBK9iZBIKBpIFc4Os7wURGEn+Jo
IQW2iyVu3Atj8ekf0LBoL4PQkErVbRd0nH2D/yWeIxCWTgmwR3INz9Y+bhX8NQw1rdPoTXACs6jEUXSo/0
5dOUwH5TIop4vO8I3gvZGkpcBJVDmkXYLqARGT/F7+OQZ5wT3UnBFbn/VGiQr2AZ2ob+MwS8SLgLPwb
boB4QUcfMtJQuGVmu+wKEuq5m8BKjzQS0M/ErC8EXM0w3vL8UaPgBZIHx7w71vAgiTdfyGvQU/DAHTO
EsVFbCOCqFACzAJ8RAz2Eo/NpVOkUKxjSYFRCGvZIoRj5hUGfeDr6KV+Jk2Fq+nhojDpOek2JplSIufsAit
D0BSEbDNIYHqgQLNYTuQumuR2MZYpog9olsZyYQVtFwkTYlnTKPJTEXA8CKwWsfgvAk1z/HZSiPPmQ
FHCo+5he15aqM7msCkMB+mUB90+zCs7Cti5qq+jCYg/WDSgslNBgYN4GQRadPAGmdIYZIX52/I1084BPA
PxUMElCk9AkR5GMt1mE/l7KOThP4S53BSIZ3yF5/j4AAiQ1yiOkG83ocMm2OBJmWDFu5SRe6xigqdw2RzX
zzWMfLSkZUj86jdyUwYVnPBJ4GT+zsebeH2okyITBnFMxBdyLDiCIaz4BqaJ7HzC46p+cRmI1Vfuk8WzUvG
vcoLQNzDAE28Rdrry9eF7K0Wakb8pIDGjGUTxF052EvdUl28KXxfVFjfidUKQCo+Fq0l82GBBjJcglEF5QwoI
lDUQhBaeBpd2isFNQDZC47oJgVxQkqs42wTzPMNLlCUoxPKNi9dNqVSfhNGguhRPXG7Vjlh2qhSEpKHYSd
2U227YZKojRDGHaK1MYrlM49lwxb3QaXHyyH1ZabginOg01RfoAet7kq4L6JknaUzRsIwU1FqKC3ZWHLmi1r
yosVWYSvG22kwT/VUhMx5hVxCQIqhQqaOGVUVVtMi+R64CziSgZbHmLMIMKknA+kGrWg3a6JfgVfQlO
VgS49Vbr5xm00K2IszFySNPXUA8G67XAvZ8FClvYxIE43Jc+kbRZFYuPckvKg4n3Z/yP9H4EpeOncAR2GuA
i2BTUjms/Aa4IAHEYomP83JLhSwMLsMyTIPoHxSZ0tnpzFk8pFiMViDZI/UgDhhsZ3w6LKJFV4V0EEFiSwp
llXkQ4GW4VP0gHvajL9aTr1MRx4iVDwfruyCChS4O4PVU5WelM2P4iiGiCA/W+MVqiCV3/vCRN5ViUBXU
FnGVcOfSMZETQPYSL9ctAZzW+ozmcSTXkAS267CxwEtm6LWAvHgeoKhKKhJg7AQGhjgAksUBX4+CZa
4000RmwP1Nib8geg5viZUloPAb8JA8k6//jTB5De9NVQyDMV5XrnfdJWkmmv//QyiHtAtqD0GjhkyDXA/BQ
eBQLae7H2T8Ac/72ScqGsPdKNzIqRXsK/ykWNRg85ytaEUDjyRQwu1uURlgmewVq0FRBkVkUeAX/BV2UP
Q9Bwf0AUtWlDxF0SPc9qoJj25Y4iMJK/6aNhG4wUGHRpImlTujAjs3yWaD/RCvFxnofAfh6kKFNJUVE/Go
MWgpSC6pdM0KKgvo8hg3OAHEPpHwdZhvdHS6k9naKd1shI6zXaArixGD+gW4dyVvBEzIlNQTdyrBohZqH
MyrIugoloT2YYcMwlAxg7EGRm6h5DDnK1/MnvBvGEYCTRmgQ8CYrQqXII35RnK+GKMUZyRJKtA6D15
jlF9DjCK2mEEGyIWGXzY+kTOOlj/AZrVBXIs5vaeBXIrXhaKyFLe+akLhTXRY6nKZ08YlQ3lu/CmJtnHup
3tp5kOK7GR1Xfw1hja0LEK4cR3RDQyJ+Fy8+vyigY549JrIQ49K7FKOvdhdQuBRrNci5MEyacg9PGzDRSnh

ES6Lmwa5RZYwscaSIBQThOviJAciF6A8kFFRodOnJKxp/9HPMPEfGEh5FifaC0S8Q7eBQXbNGtoW/yvifly2
APLVhCZCk+55IYoOs3DEzgGZWvHW1kkYybkiFkQxweW5oUx/k/5ZHG4l9D4k9UgRzq2lTnbFLIvRBl9Ge/
MiipF+g5hSS2+4F4ABiQFRtF1jLIYkySLIHhVjFBT11zDIJGoEZ/83Yq2ls0gfpmewvk8WIKqiw/Z7+HQn8bB
C/tNzxc/ptPpGlTTEQ2KEkZWamOuE5Dn47sEk6haKAxLw01CGW2JtDlOxHP6Sq0kgiQyMd8HjyzOSAgHq
Oh9w8kwsRvCVtWRuykGW60ymjuPXCrfFUmYVOTUAWdAojol0qbk8pp370RrCWBUS5OkWvAmWX8zlA
/8ovTkPNuECQTeS/FxCo4kxL5y94R1g2EfEPqCPb/BMP7MCERBsAnJ4YdnvE/GVA5NgmQzjbUCxRPDLJ
oJwfy+viL4t1yxh5sODTCFCBMNHUM7N7a2Vw/9bBQXNk/triDglvNOBBuQxRYEUDi9SeKcwSOVDiPA8m
K7FO8cTWRFgFIpDfNk3JVOqfrjBGahi0DBu9HiZ0iiV4aI1ESot6RRAaRjgwtGqIOSeBIe1Q03yRn+9uaXsI7gj
OKEIc5E0vX5cV9S6LI9MaHVUaUT3Aa4sBYJvtjEefUI8KtYDWNhln372d3TQAOd1xcMwqUVFh7j8lfdKWig
GQe14MeoQt603ksPGQ2wyEq5bJbCXL5BmuFpKwaoiSaecPbSUiR9BNR5YCrEg8MFIFB1WZzDwkFRmzFUt
W2P6mGT0MdcV0jwrwFgGKCFEX9/U4ZOmN776gyoq2Q1lNSsdhjyzyyjNkcZwhTGnHGt5oHkDtquUzWryG
zgC9rsoRgqnUBSNI5d17AtF+I66pQzvw5NXPsITxHtJtxhqUPSOFYbCXF0mH+CDSXlxi6lttWQ2vEqYorzqO
Ta+u+ohHtgtk6FQl0VcMexT5mkQbIojJwpg1GH098lN5S3Jw2d8JwBtS9ycl9vCala4mEMPQZFaC8+R+KrkX
DKjTXaYevZe5Z36mHOZrJUeB6yrTN3bg1BCjJEYEdHlxF94U6/Om0RhDkmhcjp/ktufCsv9gEBLsx669XNxjq
YSOJa48uxgU1BiGmxOYD8WBtKtFv7+X6DSa4xHmhRPic0Cul4QyPN68b0ibpfRNR7sQT4GnGXTcSSlPGQ
rdQZZp+QjTJ9YYHxaRTc52CI2yCqbghQ0cAuZ+I3RzYry8iM8lZZSFbFffnMUlNNKhAMTxLKBIIO4TCJc+
bYo4U/aHWDuqNxrINJUjYATZzqp2P4i1l9hLWUmwvImJkweUNaPlBnLE04VZm8iDHQBmVZ40qecNsE7pM
QMS/D58vo3VS8PoynQF9L2SWzmtpQ6ToHxpyQNc/zGHo7xKMjeICmjeuAD1RY/SqhWWfey8hm6iCSHS/X
1FrcdZWmVWlUC8W3iviWRvBbR8HwbidGAfTGmycq3j2EOnGWrbSBewKuE6NgBSjs6UnsI58CbDaC8gEcX
SrzG2S88zq4nLg8SdTckSJsWgzeM08dKMcKiwPbticgcFyYBPKClkW8+B0jZCESflzLcGrbKkPJsGH5k3ROD8
oO31DdEv7398DmATbH9UIRLw3PMjtKP3cOwmL3hjZyP4PHt/uPv/4fq1GDGU64u5qbqkeVySHXeEAu+T6
hegFK61PzyPbQHd4YFO0guwkLDNIo+quohCvmQ4EMTKlWL5xHNIFOKtbFcZ1nEAINz4AnJAlkNAWQcjT
iMq4DkB28q6g9INLipz+BPQRiVOqPijKc5RFY3vhfnuVDxVOZxyb+gpxKVu8RAPlj4udpaQIoYnRVjfAaHXI
Ea1odttMluDrYyR34K+wqp7FuEsuCGlO2IHlGFL3BWjAsVL/s9orBwnRsSr+ERQA7Fq/EMYJ5vUVAMWik
qCL2QE2GHwTeWkYYinwFCfyj5Z7ktw+EJM6hTtcbhhTYxaxkl2prVBN/QJx9vbqzuzVS8oek5pGSlZAa5LTT
fiIIkvC42I1SVBrloWf2hxkMHv4T58SN/kOVssIJ6Wcii+iCiWpXiBXulukBHJrSZPWr6S4VysfVdEi98HGVahO
XW+ufkHt1eYnDDs2l1kSewoHqtiC2hQ3UDyrjvhxgesI09eQvY6y7odRf0wndBUBQGlJy1Ck1YewkSAuqFJ5l3T
GrWfJvs/Sjfe9Pp60bJnI3SM+yRDN4evdidEcOmaIj90DZreMKvYidk8iboJex/itbw/jws5CkCafhMxmfqDha4Jk
1mDuARmDKnWoCvCiyvW6LmLRE5bAKR8+2tZt8jPlFCp2g7f9yrEkc/QnwMAgsAyG2UZ/Se4dxo41PGBla4
O/iS9U2yC7BM0Q5yucV+Vn4hotBAvHKIJPOyviNZs8YdyF6dCC0C4VsCllB5U/xU7rEg9kaxGRaMAsUOXO
cnhlD6/fHC03Yn1W4TxbB/OrV1etKuqbZhypO12JTCBeWqL0WBRyouiAVfIfBR15BAVRXmHdTXFB9609nr
YdLrNsqcbRT31kjMhv+AKfGZeD4u0JmYD3/BOfI/8Z/io3ABc+RPkP34MflqlYgF+k9JFMipJL4A0tGw+PFf
i7/X2iz/nO83AbQoRr5s45NYG0BUKj5QDxZ/zeaJ/C7Wki2+Lj6KxevKRMiFHwNeVD+stNZguPzef1QeHm2p
nXQrP5YfHgzCH3EjQU0J9EqhuZH1P8S+MP+9CIwWpozJ2X48fYio9shXq61w289FrCz+d/SShgUt0g6MtFfff
epesDg1BN8FAmdwTL8OQSn1krqfCqu0vSfDe7z8D0H+J6iKwgIOaQ1kChvkA05YAVBpGzgrj+x++ov4bZihR
P+dWG3hPIAKoIo19i/4ElAOn81ZWhgMgm4yoL4xKBg106NCrmOgROz6vNPnZhycg83MavoobECnc7AmXl
sON/UlHlRv/K5SX06NS7v4VALd6iw+XYN9JITPWCNp+yXNCAt4im7Zzz1bp5/3CUf5kEc/BAHnoGecaIHX
J5BS4T1xxVU/hEPe0lDc9pHjizv5y0fV8E71Fd8Fy6w2NKfEn8xNtBpzneEFVWclzQuLVDFYUWViYEOcqIHX
J5BMZ2JqHJkeT9v+S5YJ+leTMmvZK27j1Bx7psgzPKpga7TtjusCOO+pNFpgTBuT59pGALPsCHwhps2IxOJ
09b9YZ0445c0PC28ZsziNcdDjJtIULtksFMWmy3xUb6aGetHT+rh0z3rkHkgI4STKTssNMRCS76QxAQaQ/whn
C+hPcRWdOzDjXXyB9+GQZYn8IvR3YuiPvwI5Hh+Hn4K/gi3J+pe6aDjoX/pHZ/aEXkmL+lNtECeCf+SPT

ItbBn1jVta++WvDXh1fXtmyP1W3mpbHtq8Qu2Lh9pqIx0RZvqS3kELgJk+a3g3MvEot08Xn442bR3UxCO4J/
Wt71CKjd43yTp4H3/yQWo7MvFUqkVPnj5MDWg2e0kD0wLNZgOEjHeGjYFasvrzPDUnM5FUb9ET1ukyMk
4d118e1zDCgN3vITcwyBDRRyYe8z6hZwNsLUDlDQZYyoIvaCchjagKTloarOLnhi9+S7di5Al9dWzyfoJ3HM7tI
84+rSuQmCYLGfXVhTQNgmkHLCO2E5ZzHvlrwtNTfXtGRJVmlNWGX0H15YHqYSNdEcU0XcyorzCm3Xsz
WvXQvmdPR5O2Dmnu8WXHvj19KN/NcxtlTh93iW3iqYO+A08flFNCrVUavKj8vC5SLbS9H4LVhttEmYm+
A1z+UhfdmuUvDbZzrHjf0YUF+Sr4Msky29xjh1Md4fIfCjVMEyaN+iqTmgbBNI3EqK9IotHLzOXrTnWEd7qY
dtA74jnprQ8wRoZUnmS7ERtmTHoz90Sya+ee7lFaeuI7dU33KrDAiC/qt+vK6hqHapI2hqu9ecN3ZfVQvNPBdk
1mKJgHQv+C2z+uK7CYduY6GuDQ1TYtGLF5ZNJnXfLXBK36nj0jrtbus3mF1BcJqfUmukKJafoNm0e/0eK1
mXuM1LVzTweUdk5prjimU8/6DuNXSbpJoNTi77KN6L8AH9vco4dznXn6YDWhmGnKIruvsqhpEExTRdh9V
RE6T3NMJMLbdYZ32ph24GvzHPgeDzJK1EGrjhDv3yfbXGD+ws9929xDy6d3c4AdRmGMVVgjpSVokLrD+l5
V9wSj6hlBXTpTpsE0/Qory8KF9lF09FvH8Dyh5xulc1uVbrZ0hS7TUhXtAUos2Kadx9g85zFP8ddfGYq37+yzYn
lxSQsY9orpze/8V4fpp1vtCmqm6ZptHl1zl9fsmKvYeHo3nw5kT/Zdc89q+3b26YNdKdWGgiXHxFOZ0514+uCc
UDJ+nWxZShZfQMiIpvfDwKMBN1Fkc7oTXF5T0wSa5TXHpnOsnH9MshwT5B1zj2w0feDyGQpUTBNl2X1F
WU2DYJqAxO4rIDl0MHMJTU0fWCeJY9qBuMNzIF6M7bdhQPVFHHOPbc915ukeo+VE4JGfy9pW4qlNRa2
arFLb9eKzD9B3uJsLP5+aTFw8rb/6d6NvtescN+242BnguNg17bjYHSCJ3jVNSenyKCl10898xD/RoYFRH59M
1yq+Iv+gyH/wy67obxrwOTw6meOX4pp7KnauM7x7AtM2zs4AG2fXNLGQ21cs1DQIpp24uzwn7s3Q65qrs2vTI
V4MMY13cnh4p49Q+NXPVsHi3cZP83UQ5665p5dne8PrM6ZBrjMA5DqmKb0cnqL0Ta5m4qFYy97wThzTNC
QOW228w1GGZe2rZC02ozkJLFxzRQ3du/d0rzpZIU9aYRVmSPmbsqSxRl4L0ysF4pq/HS/TJFZfNzpvcqAB0b/
wLo/tCjemsYjOAMVhXNPWaXcARbZrGlPg8tQ9aTk/f30rj75/z770SFNe1x7j1p56Q10XH9MoKYeHkmr1Es0V
hHXvHusOyjVNBuP2lcE0DYJp20i37zayaRBMIy7dwYjLBrQ2VyP1hP7xIoxpIhy3rwhHjHiSr4J0E/n7IF35WRr
4C38jAhbXROFF2+483WtOPMFEEWvb7gwxYJ6JR/1tuzPIgJl4ttm2O1xA/nUY+5FB5bSlvf1g/N08dzwTjzC
PDX+6H2BbJp4kHBv+9EH40Q/z3crPPROJrWbjnz4YwuyySWwxeFFjMfejKHxI/c0qnBMOiFD3U5BmPjxfN
0qRn+WqM/qxGZ0amPdwjyuE1/RUJKj+JHC59+CEqmGuIVrW4fxgKGAZ+SrZxnlwKm3v5FCI10mJo+Ap
YfzwkvzjdOfnFV/5mDw8nFxFqI+dE49MOzsAi/stpSJeEaFK/JAE2U5sOh88EwUOpzvBFWrJETeNjAGL+/n
IB38v71jyTGRzdeaz+oVnGlvr9WVrhbnfJzux1QmuLNQ4MyiUYf/rXl6pjyfXlWSxyDaB/5h5JhK0OvOfjhnC8C
oQXdmcsVuuLyaysDrzedcX07h6rzdXX05BI6lmjflcCDK9MgQ5mWGO4wIjPjaRZNdYz4sfpqVcen1TLunSBZyB
YxNPErT290cQ8rUrA5CT9Y3LYTHxWEFjPS+AmJYJ5fXNhKpOQBPPWbT2MwGIfWUAYk/G7SDExLMo
jfW8EGJafoLXNz+hOgVNJNa19jNByLWdUtqT89sYHPOx2UT7eECi3TRFsNdXEVwyCWOzqdTxEFTq+Oq
o1JPVlioDYzaXOh6QSzUtWdTrmyxamYNmc6njIbjU8bVxqbZak85hyMRYOrXBfF4MMS3nz+ub81dOwomJd
KrOfCYMmVwbnWp77diQidGE6mRAQtU0saHXV2tYYRMmhhOqkwEI1cnVEaptoxBjCdUG83kxxDQxqtdX
i1pZxk0kVHXmc0Uh10aojk/ebVgZGLP51MlwfOrYNOHyuK9wuTIHzeZTJ0PwqZNr41PHJ/OliuhsaiwVcmw9
L4CYpiwbMyrLpiZSIVr7+0MI+dq1IUhLdfvUWCqkwXxeDDFNXDbuKy4rV/GpiVSIznymIGR6dVRIO3n71F
gm5Nh6XgAxTVo2ZpSWTU1kQrT2MwUh18aEjNx25zFTY5mQY+t5IcQ0Ydm4r7CsOgVNZEK09jNByLUxIS
O3ZRRirLLs2HpeCDFNWDbuKyyrTkETlWVa+5kg5NqUZSP3vDoVBmZmNJs6G5BNNU1XNu6rK6tMwZnh
bOpsADZ1dm1sqn0+UReHfGY2mzobkE01TVk27l3FrqAjZ2azqbMh2NTZtbGpTktVyMxYOrXBfF4IMU1YNu
YTls1MpFN15nNByLXRqc7JGwgrA2MsndpgPiuETEwTlk34hGUzE+lUnflcEHJtdKpzXlhGA2MsndpgPi+Em
Fb0cMJX9HBmIp2qM58LQq6NTnXOK8tgyEd3RtOpB+bzQohp6tQJozp1dGc4oXrQgf4wIt3t2mCk3aHM6M5
YSrXBfF4YMU2gOmGsfji6M5FU1XeAC0aujlZtpzAb3RlLqzaYzwsjpslUJ4wy1dGdicSqvgNcMHJ11Go7ldnozlh
qtcF8XhgxTao6YZSqju5MJFf1HeCCkWujV22v5Snv6M5sgvXAfl4kMU2xOuErhTi6M5tiPbC/P44ob7syIGmheq
eRGRnLsjbZz4sjpslWJ3zlEEcjE1lWrf1cODK6NpbVbSlcHY2MpVmb7OfFEdOkqxM+6epoZCLNqrWfDUeujW
Ztva8ZGcuzNtnPiyOm6VcnfPrV0chEnlVrPxuOXBvP2iIVT46MsURrk/2sODI1TcQ65ROxjkYmEq1a+9lw5NqI

Vqf1vsZwnnU0HM86NU3JOuVTso5GhvOso0F41tHV8axt9zW24TyrPRzPOjVNzjrtK2etzEPbcJ7VHoRnta+OZ
21XsHlkG0uzNpjPiyKmqVmnnGpW20SaVd+B/jgi3e3aYKRlbo1tLMvaYD4vjJimZp1yqlltE1lWfQe4YOTqWN
bzhQJoYIwlWRvM54UR09SsU041q20iyarvABeMXBvJ6p6/C48GxliOtcF8XhgxTco6ZSy+OrJN5Fj1HeCCkavj
WFum6DnGUqwN5vPCiGlK1iljAdaRYyLFqu/A0z2jQrA6xvKITfbzThbT5JpTRrmmYyKPqLWfZ6oYy5U12c8
7VUxTJE4ZFYmOiVyZ1n6eqWIsH9RkP+tUmZkmupsxiu4cE/kgrf08U8VYzqPJft6pYpqubMaoK3NM5Dy09rN
MFdfYfX2T/bxTxTTp1IxROuWauK/X2s8zVQzf1rvDbetnpumDZnzXMY9cw7f1Lv+23jV8W+8Ot62fmaaBmf
XVwFRdzfBtvcu5rceDCdfYXX2D+bwTxTSVx4xT5eGauKvXd+DpnlE7nnWvTeUx8s7n0tHIGEt5NJjPiyOmy
TxmnDIP10TKQ98BLhy5NpnHpGVBd89YOqjBfF4YMU3mMeOUeXgm0kH6DjDBiHdtmXSjactUOs9YrqzBfF
4cMU0BM+urgKlNQxO5Mn0HuHDk2lLpVF7VWRgxlkdsMJ8XRkxTB836qoNqs9BEHlHfAS4YubZUumnLHB
jPbJLVG45kHd2ZJp0CixmBxHSa1RuCZvWujWb12m5rzGZZveFY1tGdacIysJgRSEznWb0heFbv2nhW73yNE
FIYjI0lWpvsZ4YS04R3YHE/KKloDMYmUq1a+/sDifK3K0MSu3UV1bGxXGuT/cxQYpowESzmgxIT2Vat/W
xQcm1sq926kOrYWL61yX5mKDFNuAkW80GJiYyr1n42KLk2xtVuUUtVDo2xnGuT/cxQYpq0FSzmgxITOVe
t/WxQcnWc6/k6iHJkjCVdm+xnRhLTxK1gMR+SmEi6au1nQ5KrI11bHgNPjOVcG8xnxhHT1K1gcT8cqR5+T
EzkXPUdeLpvVLzNWFaxwXzmyWKahBMsZpwsJrKK+g70X3alw13bqnu+cijFIxPDScXJkKSiaTJOsLgflFTi3
4nhpOJkEFJxcm2kojdpiySGc4qTATnFkXFCzhFjEbyJ4ZziZBBOcXJ1nGLbG6wnhnOKkwE5xZFxSs4RY43Ai
eGc4mQQTnFydZxiy7obU7M5xemAnOLIOBnnqK+Ms8oyTE3nFKdDpMxPr03HOW55ODE1m2+dDsi3jowTc
Y44r5+dms63TofgW6fXxreOz7MkNDDG0q0N5jMDiXESzhHnBbRTE+lWfQe4gOTa6FZ70jYkMZZubTCfGU
mMU3COOKuTTk2kW/Ud4EKSa6Nbx22PgKeG063TIelW4yScI0YJ59RwunU6CN06vTa6ddxWDD4zlm9tsp8
ZSYwTcY76ijgrM3FmIt+qtZ8LSWZXx7eeLy0oR8ZYwrXJfmYkMU7hOmK8p3dmIuGqtZ8NSa6OcG15BDwzm
3CdDUm4GidvHXGWKZ2ZTrjOhiBcZ9dGuE7O0yQ0MGbzrbMB+VbbOHWrzVmmdGY63zobgm+dXRvfare
tUzozlm9tMJ8ZSYxTt9qcdUpnJvKt+g5wIcm18a2T8xXBYGDsO2Pp1gbzmYHEOHmrzShvte9MpFv1HeABEu
FwVwYk45YZN/ad2XTrgf3MUGKcwNXmq1Jq35lNtx7Y3x9IlL9dGZJMzh8BE8QaTbcemM+MI8bpW21Gfat9
ZzjdetABrpDk2uhWu0U9ARoZo/nWA/OZkcQ4favNqG+17wznWw86wIUk18e3trs2274zmm89MJ8ZSYyTt9p9
5a21iWg433rQAS4kuTq+teW9UPbIWMK1yX5mKDFO32rz6VvtkYmEq9b+/kCi/O3akKTlBQz2yHDCdTQk4
WqcvtXm07faI8MJ19EghOvo6gjX80p5DNZGZhOuoyEJV+P0rTajvtUemU64joYgXEfXRrhOWt5UaY+MJVy
b7OeFEsc4havDV7/VHplIuGrtZwtJro1wbVGZRI6MsYRrk/3MSGKcwtXhq99qj0wkXLX2syHJtRGu03bJe7Zt
LN/aYD4zjhgncHU4Ba62iXyrvgP9kUQ63JUBid2yErRtG8u3NpjPjCTG6VsdxgKutm0i36rvABeSXBvfao9bJt3
YZhOu9oCEq2OcwtXhVLjaphOu9hCEq31thOv0vJqEBsZYvrXBfGYgMU7g6nAKXG0T+VZ9B7iA5Or41pY37
9m24XyrPSTfapzC1eEr4GrbhvOt9iB8q311fGtbJHGMJVyb7GdGEuMErg6jwNUxkXDV2s+FJM61Ea7TlkXlb
cdYwrXJfmYkMU7g6jAKXB0TCVet/WxIcm2E67RlUXnbMZZwbbKfGUmMk7g6fSWu1ZloIuGqtZ8NSa6OcD
1/ciNHxljGtcl+XiRxjVO4uowKV8dExlVrPxuSXBvjOm2bvucYzrg6AzKurnEKV5dR4eoYzrg6gzCuzrUxrrO2W
nnXcMbVHZBxdY3TuLp9Na6Vmegazri6gzCu7rUxrrO2uxvXcMbVHZBxdY3TuLqMNVxdwxlXdxDG1b02xnX
WdnfjGs64ugMyrq5xGle3r8a1OhMNZ1zdQRhX99oY11nbgmmu4YyrOyTjapzI1e0rcq3ORMMZV3cQxtW9NsZ
1dNdWmuYaTrm6Q1KuxolcXUaRq2s45eoyUa4VZ/MMZxW9IVlF43ScLqOO0zOcVfSYWMUyr8QzljdrMJ95q
hgnVHT7ChWraUyeibyZvgP9g1TpcFcWo05b3jPgGUubNZjPDCTG6RRdzlKcnom0mb4DXEBydbRZ272uZzh
t5g1Im3nGCRU9RqGiZzht5g1Cm3nXRpvZdlsG3jOcNvMGpM0845SKHqNS0TOcNvMGUSp616ZUtO22iVhjw
0nF8YCkomecVNFjlCqODScVx4NIFcfXJlW07fOXlsihMZZzbbKfGUqM0yp6jFrFsYmcq9Z+Nii5Ns7VttsmUIy
NZV2b7GeGEuPEih6jWHFsIuuqtZ8NSq6NdbXttjVrxobTruMhaVfj1Ioeo1pxbDjtOh6Edh1fHe3qtE3GGhtOu46
HpF2NUyt6jGrFseG063gQ2nV8dbSr0zYba2I47ToZknY1TsvpMWo5J4bTrpNBaNfJtdGus5Z3IE2MJV0bzGfGE
eOErh6n0HViIumq70B/JJEOd21A0lLoOjGWcm0wnxlIjBO6epxC14mJlKu+A1xAcm2U6+w840oDYyzh2mA+
L5CMjZO5jvvKXGvz0ETCVd8BLiC5NsJ1dNfyVsaJsXxrg/nMSGKcynXcV+Vam4gm8q36DnAhybXxraO7ltcy

To2lWxvMZ0YS40SuY84756cm0q36DjAhyfTa6NbR6Lw0jUbGbL51OiDfOjZO4zrmvHN+ajrfOh2Cb51eG986G
rXkSaZmE67TAQnXsXES1zHnnfNT0wnX6RCE6/TaCNfRqG3mzdRYyrXJfmYsMU7jOmbUuE5NpFy19vdHE
uVv1wYld22FaVNjOdcm+5mhxDiN65hR4zo1kXPV2v90z6g428xYWrHJfubJYpyKc8yo4pyZSCtq7edad2dXRy
venVdfyaExlldssp8ZSowTco4Zr1afmcgrau3nWXeNpc6a7GeeLMaJFceMt4fPTKTOtPazrbtXR53dtU0PnxlOnc0
GpM4mxskVJ4xVOWeGU2czJuqsZOBnxnJDDeYzTxXj9HgTTj3ezERuSN+B/uuudLhrW3Zb5D/DyDh3xhJn
DeYzI4lxerwJox7PuTORONN3gAdJhMNdHZK0U/Y6d8byZg3mMyOJcXq8CaMez7kzkTfTd4ALSa5Oj+e0LIX
t3JnNKh7Yz4wlxinyJnxFJ507s1nFA/uf7hlVZzObNzuwn3myGCc5m/BJzpw7s3mzA/t5JouxxFmT/cyTxThR1
YRPVOXcmUicae1nmSwjY7mhJvuZJ4txoqoJn6jKGZnIDWnt55ksxtIfTfYzTxbjZEMTPtmQMzKR/tDa33OyI
PUxMnZ/32A+81QxTjQ0Yaxw5oxM3N/rO/B036hRhaPrUw21K7rqjIwlPxrM50WSqXGaoSljiTNnZCL5oe8AF
5JcXb7dqF2JM2dkLDPUYD4zkhgnqZoySqqckYnMkL4DXEhydZKqUcvMXcc2nDezB+TNpsaJqqZ8N/k6tuG8
mT1EMqLwt2uDEuf89kYOjeGsoj0gqzg1TlU15bvJ17ENZxXtIW7yFf52bVDittzf2GZzrvaAnOvUOEnVlLHImW
Obzrna/KIq21hescl+5ulinKhqyiiqsk3kFbX2s62718crnk+LkENjLLHYZD8zlBgnOZsySs5sE4lFrf1sUHJ9xGLL0k
SOYzix6AxJLBonyJsyCvIcw4lFZxBi0bk6YnE0aQslhhOLzpDEonFyxSmjXNExnFh0BiEWnasjFkdtzygcY5nFJ
vuZocQ4OeeUrwac45jILGrtZ4OSq1Nz2i3PKBxjWdcG83mBZGacmnPGqeZ0TGRd9R3oDyXS4a4OSVqWtXK
MJV0bzGdGEuPUnDNONadjIumq7wAXklwd6Wq3LGvlGsu5NpjPjCTGaTlnnAXyXBM5V30HmJDEvTrO1W
5b1so1nHN1B+RcZ8aJOWeMYk7XcM7VHYRzda+Oc7Vb3jPpuIZzru6AnOvMODnnjLFCnms45+ryizldY2nFJ
vuZJ4txYs4Zo5jTNZFW1NrPtu5eH63Y8pIaxzWWV2yynxlKjBNzzhjFnK6JvKLWfjYouTpe0Tl/1klD4xlLLDb
Zzwwlxok5Z4xiTs9EYlFr/9M9oyQVPWOZswbzmaeKcWLFWV+xYpXD9kxkzvQdYJksxnJDDeYzTxbj5Hgzz
uqKnonckL4D/YNU6XDXFqPaLasresYSZw3msyKJfWeaHg8sZkQSE4kzfQe4kOTqiDO3pR7PM5Y3azCfGUlM
0+OBxYxIYiJvpu8AF5JcHW/mttTjjY2lzRrMZ0YS0/R4YDEfkoxNpM30HWBCkvHV6fHctnq8sbGsYpP9zFhi
mh4PLO6HJRUGe2wiq6i1vz+SKH+7Oihpq8cbG8u5NtnPDCWm6fHAYj4oMZFz1dr/dM+oOpuxtGKT/cyTx
TQ9HljMN1lMpBW19rOtu9dHK7atPTI2lldssp8ZSkzT44HFfFBiIq+otZ8NSq6OV/Ta6vEmxhKLTfYzQ4lpejyw
mA1KJiYSi1r7uaBkcnXEotc2S2BiOLE4GZJYNE2vCBbzQYnhxOJkEGJxcnXE4rh1VGI4sTgZklg0Tc1p3zEW
V5wYTixOBimuOLk6Mee4pQRrYizr2mA+L5CMjBNzjjjFnBMTWVd9B/pDiXS4a0MSry2SGEu6NpjPjCTGiT
lHnGLOiYmkq74DXEhyfaRrSzHn1FjOtcF8ZiQxTsw54hRzTk3kXPUdYEKS6fVxrufFnDQyxlKuDeYzI4lxUs5
RXylnbSKaSLnqO8CFJNdGudrTtrLwqeGU63RAynVknJZzxKjlnBpOuU4HoVynV0e5TtvKwqfGcq5N9jNDiXF
K1xGj0nVqIueqtZ8NSq6Pc20NJcaSrk32M0OJcUrXEaPSdWoi6aq1nw1Kro909VpCycxY1rXJfmYoMU7pOmJU
us5MZF219nNByezqWNfxtC2UGEu7NtnPDCXGKV1HjErXmYm0q9Z+Nii5Ntq1uE/6PJQYTrvOhqRdjVO6jh
iVrjPDadfZILTr7Opo11nLa8RnxrKuDebzAoltnNLV5lS6zkxkXfUd6A8l0uGuDUmm5zP5aGSMJV0bzGdGEuO
Urjan0nVmIumq78DTfaPwNvfOWFqxwXzmyWKcmNNmFHO6dybSivoO8Cy7wuGubtk9f0JBI2Msq9hgPjOSG
CfmtBnFnO6diayivgNcSHJ1rKK6bu0skhhLKjaYz4wkxkk57b5SztpENJFU1HeAC0mujlT02iKJ0aTigfnMSGKc
ktPuq+SsTUTDScWDDnAhydWRil5L0YR7Zyyr2GQ/M5YYJ+W0+aSc7p2JrKLW/qd7RsXZRsayik32M08W
48SKNp9Y0R2ZyCpq7e+/7Cp/u7J1t7it4TyUGEsrNtnPDCXGiRVtPrGiOzKRVtTaz7PuGsucNdnPPFmMk+
PZfHI8d2Qic6a1n2eyGEsONdnPO1kc4yRnTl/JWdXZTCSHtPb3nCxIDI2MZT8azGeeKsZpqhxGTZU7MpH90
Hfg6b5RI1JHV5fIOm5XPdC1jaWGGsxnRhLjBGcOp+DMNpEa0neACUnsa6OGRpPzRzI0MsYyQw3mMyOJc
YIzh1NwZpvIDOk7wIUk1yY4s1tIV2krbRvOm9kD8maOcZIzh696oGsbzpvZ/LyZbThvZg/JmxmnqnL46uO5tuG
8mT1EfTzhb1e27o7GrdddY2nFJvuZocQ4UZXDKKqyTaQVtfazrLuOsfvdJvuZJ4txSgiHUQnhmLjf1drPte4617b
fHY1blm1yHcP3u86Q+13jdCIOo07EMXy/6wxRtkn427VByaRd2SbXMZYMaDCfF0hc4zQ0LmPZJtcxkQzQd+
DpvlHxNmO3uw3mM08W41Q0LqeKxjFxu6vvQP91Vzrc1S2759MicGRcs1U07oAqGtc4FY3LqaJxTVfRuEOoa
NzrU9G0uxfcdY1lFRvMZ0YS41Q0LqeKxjWRVdR3gAtJro5VnLRU9rrGkooN5jMjiXEaGpezbJNrIqmo7wAXkl
wfqdjuXnDXNZtUdIckFY0TGLmcZZtc00lFd4iyTe61KYzs0fmYhE5uXGMp1yb7mbHEOIWRy6gwck2kXLX2P

90zKs7mGcsqNtnPPFmMK9vkMpZt8kxkFbX280wWY4mzJvuZJ4txcjyXUY7nmUicae3nmSzGckNN9jNPFuM
EZy6j4MwzkRvS2s8zWYylP5rs550snnGiKo+xMJFnIv2htZ9nshi+wfcG3OB7xomqvL6iqqqzGb7B99gvexsbu2V
pMJ95qhh31u9xnvWPTdyy6DvAMlmM3bI0mM88WYw7zvY4j7PHJm5Z9B1gmSzGblkazGeeLMad2HqcJ7ZjE
7cs+g6wTBZjtywN5jNPFuOOJL2+R5I1XzNxy6LvwNN9oyZvGF9bGog9Oi/eJvZgYviJ7WTAE1vPuBNbj/HE
dmL4ie1kkIt2JteWB2LftaymOjGbG5oMyQ0Zd5rt9T3Nrq7pE9O5oQk7NzQxmxuaDMkNGXea7fU9za75munc0I
SdG5qYzQ1NBuSGxsadZo85S4RMTOeGJuzc0MRsbmgyIDc0Nu40e8xZImRiOjc0YT/PnhrLfjSYzzxZjKuCMea
sgjE1kf3Qd4Blspi9wZ8OuMEfGyf+GHOKP6amb/Cn/IL1qbE7/Cb7maeLcfKPMeONIFMTd/ha+3kmi7E7/Cb
7mSeLcfKPMeONIFMTd/ha+1nCMLM3+NMhN/jGiT/GnOKPqekb/Cn7Bn9m9gZ/NuQG3zh1w7ivuqHqazP
TN/izIcpczq5P3tD2youZsfRHk/3MWGKcwGHMmK4/M5H+0Nrfc9mVzmY4+zEbkv0wTuAwZkzXnxnOfszY5
Q0zY8mPBvN5p8rEOHnDhFPeMDOR/NB3gCtGvbpihU7LSx1mZlNDswGpoYlx2o8Jp/ZjZjo1NBsiL2h2dXlB
zvmLlWFkvDujebMD85mRxDhhzIRRGOPdGc6bHXSAB0mEw10dkrRLC/LujKXNGsxnRhLjVEMTRtWQd2
cibabvABeSXNv1MLYzbokkxnKKDeYzI4lxgqoJYz0d785ETlHfAS4kubbrYWyn3UVT3sjs3c1oyN2NcaqACaMq
wBuZvrsZDbG7GV3d7sZtiyRm725GQ+5ujNMETBiLHngj03c3oyF2N6Or29247a6s80Zm725GQ+5ujBNMTBgr
Qngj03c3oyF2N6Or292450+BcdS9kbGCkib7ebFkapyiZMp3/YM3MlFQorX/6Z5RdTZjNRNN9jNPFuNEE1O+
6x+8kYmaCa39LJPFNpY4a7KfebIYpwuY9tUFVJzNNpE409rfP0ZV/nZtQarX8l5lzzaWOWuynxlKjBMGTPs
KA6pT0UTmTGs/G5RcHXPmtVM9e7bZzJk9IHM2NU4XMOXUBdimM2f2EMyZfXXMmXeeg5cgazhzZg/JnB
lXh2bKV4fGsw1nzmzmTCzlb9cGJePWUGI4r2gPySsaV6dn2rdOT3UqGs4r2sypWMrfrg5K2p7nOYazrs6QrKtx
esUp3x1NnmM46+oMwro6V8e6jlte9+Y5hrOuzpCsq3GCxSlfESPPMZx1dQZhXZ2rY13HLZXPjtmsqzMk62qcX
nHKqVd0TGddnSFYV+fqWFdVCukskhhLujaYz4skM+PUijPG+leeYyLpqu8AF5JcHek6Ob+9oZExlnNtMJ8Z
SYyTcs4Y6195jomcq74DXEhyfZzr+WrPODKusZRrg/nMSGKcznXGWf/KNZFy1XeACUnc66NcW1atcY1lXB
vMZ0YS42SuM876V66JjKu+A1xIcn2M66QlkpjNuLoDMq4z43SuM06dq2s64+oOwbi6V8e4js9X96VjLddYyrXJf
mYsMU7nOmPUubomUq5a+/sjifK3q4OS8+V95dAYy7k22c8MJcbpXGeMOlfXRM5Vaz8blFwd5zppq3P1jCVd
m+xnhhLjdK4zRp2rZyLpqrWfC0q8qyNdJ22rC3jGsq5N9jNDiXE61xmjztUzkXXV2s8GJVfHuk7aJvJ5xtKuTfY
zQ4lxStcZ31Wmnmci7aq1nw1Kro52nbbNvvEMp1294WhX5840qStYzAclhtOu3iC0q3d1tOv0vGZeDo3htKs3HO
3q3JmmdQWL+aDEcNrVG4R29a6Pdm15QePYWNa1wXxmIDFN6goW9wOSqipjbCLrqu9AfyiRDnd1SNJSND
82lnRtMJ8ZSUyTuoLFjEhiIumq7wAXklwd6Tpte34zNpx0HQ9Hujp3poldweJ+WFLZHowNJ13HTKRr1dkMpx
XHQ9KKpqk5wWK+yWI4rTgehFYcXx+teFKCVZ019OgXNTAn54y0V9/38/OlETZMU26Cxf1go2kYRqapzsD
ifsPw7mEbZ6skT8P4IUu2uTcxkQU50wveNXZkmqAILOafLHfGTZa7vpOl0RtM04SAxdyYYSLfcaYXvJhhG3f
cb/c97m+cLMYNw2iIYbCNO7G1OU5sV368CBa4KclXwWOwz7yJqfTG2b4w44dxR3N236O5RvwwbuKM+k6
cxmEwjuUZcbA8/kMaBIs8eUh2Yb4icmNiKuVzvjO8CDIybos/GmSLbxyQjgYBUuMOaEcsB7Rq1sVJHgX+p8
CbmCgfa9MVZvQw7hBu1PcQ7sttFsZBlvnZNtv6kTc1UTh2uhNP95F38SJLwvw+eAjjzH/ww9ibGkkcnuvH04fo
m3ARxqLZnR/m3tRErdCJHjx9WPAEI9qvknXgTU3kjfQdePqgfFwF6yDIxWh7UxOlIFr7ew1JEC+Spdhdp4m
/8KZGMgUnO9FrcPxlHqRrP195UxP1ECd68PRh+SGGgd4KDDdxV6ix/unD8W2y96N8701NTJ5pNr7HugPR
crL2piYG/M3GtxoM8U80+6CHTUP0fZL/KfAX+4/JV6skyYL4T0lVG6H6HCUP4dyPyg9E/1I/pibeff9b3aCW
Xas9BR8iP/vriRf4R7HLyQL6zZ+TbQq/aw45laHzZL0Rg5hV9CRVW3/z38s/+/zv7Ky9R6/vvnh1pV0fZV/+h
2q5/Lb66AMeYZ3y/e+COE/QgN+tN/l+iFdaPuLrMIpKec6pN3rsBsevcBXMH59jhmld8j9OLcPJYtEc2L8MFz
yy7/lcLsyQQPg3udFWRMKo8xD99/5D1IIuaGDpcWgKooB5eN5nFr0c/5MfRtCMtUxSS6x4QRr7eWDFySKw
/oLfubGQ73H+OsS8fVc88Xt4ovD//6+98+lx3Ma2+P59CmPWPYD5T6SyeEBPMEECJG8GM403i8EsPF1KV
SHVdo/tSpDF++5PklVdsovXLVZ0dQ+Z3gRIuW0f0dQR+ePhZev7vRbqy1ef1K8OzUPz/tj+urF/P8UAdruf7h
tWX3r+ium+dLoC4Pv6pcDlbuz2tx++Pteu2//1N/fd7w6nrvXyyu4P+7NnWf9/n3r71bbtZgA9i9q2v0IcBGD0w
CtKJYY1p3v769322P6JeRTR/Zxku5wkTRk7XBoTgPhxB70u/u3747tfdn9/32ybv2ybOJnB6KhXlIoPhnRyYy0

zGIosODIPhobbZrKVjm8zkpC9ffiwOxx/uL/Z3t/eHf+229zEQRlGR/284OX66/lNE2dpGK12Ran47W1Ab+/IQ
jrr7f1D82G3/7Xt3+0j7v2+OTbv9o/vf/q2uT8c42ASo2tNlS3Zz04+uPrr3ebQrNobAa/HvVAI0/cUMjycrFvc5Rx
enxt0SfS0lz9XP6V81zw8HLo5Zjtral863sUXIZD63quuZLne2M7jU3Ve5xWJn/bm+td/f98cTmUv1Hpp+LHElax
Gv0DrBE/vXfVvXvXv/moALf03nnhh+52r/ksv6Aun4kHwNZRDOJsFdbZIsE3O2caNnaunUdeA42ZnCr/4mIiP
dR+wOu5iKx/C/pX29Qp5xfK3XIr4ULgCfWBE9lGwPjCI5vGgzRPZFQ7xPEVegXzVNYjfoAG0B0bKMyxDR
b7dfWi+2/68ObQPZoW83jhBsWTvOq2cIXO4FwoRehzyysIExeJ+Ni6ngNLRnoQB9K/uCfTd7Xa3bw79c0khL
1S/4gqW63+f5kif1zdldvrZT3lDf9337Sij2R6G4naqkpmV8lzBxWy0fe+qe/Pq6d1fnSafwzdFg0wc8gZ1r0BoNag/R
SogydjTZWPnaFDXrgHDol4o/GJS7CY1fEBHzIB8atrXZhFLmH4F8uNU2Nj/0rl/qoFQo4Cx4iMQT0r8BfTEa5
C/SVHzarHKL6x98O37o+4jhe9+2WnkVU1aqHxvQl09j9WFWa43IWfOaKHyvQk1ZRara7fA8/GHU7GN413zp
93hoPFXdK8Jluxd5/HUu30T24MMFaHtNQL0OXyWek2wvKOhrobHThRYvHedziI7thd+ePz4427fb8/EXw9P
vYjleuEnYjNJ4hQ8NuWD3tBfum8+bO63h/883jdHbWX4GNMlrM4B2fDOPvzavfcpT3b6qtXjx14SmSqbWeSg
8RUsX6HGm2J1YmUc67yxc7Qr+gowvOpC3xejWsCohrev+veDeNTk78VfUUu9CPmhK2qMLnbMkQjNR132jp
38A/CkxI+BJV2B+A2qUWNhsTOFFola7z/u9u3z9c+Hj+3Td3PbaPwV3s+Jluxl52FSTGoW0YjR9wzyGsA00
fIOh7peHjv1SKSX9dukuv1Sp7Mi/r17PLZPr5vNcaPxl85ffznL9czRls0ksdN2b6Z85JurQm52zWG7O3ZvfvFeI7an
c/nrW13u9Bw+bPXp04bgWi9jmPr2H9ZPiLuPI3Z9Lnctw6W8At5p1ARW7GBBMcO83v6Z2ub0i4Ixz89I/mKh
4BbafWD7axx7L83WStNFGfwgxusvR37QjxpQ1EsHFKkGQs3caamSNcnOgJ8x+K0XJX8bo2b59NJZvlHx0h5Q
GeQl4+ti5XsVajpBL51OePFDISf1rouV71WoKT0tk9L76+5w7Ou8GPx1dUKrZJ86S/J+s3uMVDyX7l0vJcr2M3
xYTWiV9y7UFIKWSSF8+p2+v29O1akMfvDgc6KX62WfyE9U0hQkF3vjm8sP/XvXYr/cH+/614MMXPttSlfn
mKx7wx+HSpLt510tIfm6Lx6+9zXLAqhRLi1TEo1q43x84opwSa+4lPXFLyb5Rf+eVfcmAc+gPt7ir4R9TrT44M
ygRvTM0hE9qoFQF6yNzIJ1/E62+FmyKcLlb0fUPJkRq7/ybr853DU3b9s2OH5otkeLv7b5WdWS/ewsj4rJfl5K
ROl7yAh7omp5j0NdHTYyq8ORX6x7Mn29+9AOro+nNITFXw9Ov4zleuK4JuMUkRPLMk74qDef++Ltj/vd9u
mfC23rZL6U1ctCjcMHrD59whDYevrK66UaOcQOWl/BrgxqHMiIHbA5pcnzNTT6OpAc7ULlF0sTs7ThQyA9Le
H78Vfa0y9DfjCMGkIzS4fQqAZCzVMZmWov025+/AXlV1yH/M2KmsIyS6ew2l9vd7xr9h8fNr82+7vNYd9sbjYf
N7eNRV6jnCpbvqehroebpdfDr/xkyJGsqbLlexpqOsssnc6ifzKHvNA8VbZ4T7OoS8126aXmKz8Z8jrqVNnyPQ11z
d4uvWb/9v3ROOQF05cC5XsP6hq8XXoNnmogVOBtQfa/WtQVTrv0CifVQKjUywpsvTQOeXH3pUB5g0ZFgh
bkgHuLyqns0pyKaiBUvGJBKsdaVCpgl6YC/9jcH3+52xwd8oJ1XKSkUX9zv92MPwylEw26lu1D7cS5nTNvb3fN
4Zf9bnvrkGOE18Uu16f+vvl1OJ/QIa88UzKXa6j3m23/vWMlL1vpWubiL397/jOVuLjbHPpvaW4+MYxruYJuL
e/wsdn8dHDIa5GUTPExrkOFpW5pWDrq1shLi5RMUR+IDHPlfAB6uY6QKe8DqCjbLY2y+27d/U4V8mocoV
LIBU5COE1Ajxvi+c8+/mftA/FCmOQmp0Np+vu0Ql4pI3XK+wnq4oZbenHj+QZBXh8jVEr6SaQHLeAnie6A
jNRJnfLugLqy55Ze2Xvu7sjcj1Ap6Q6RpU88d0Dmb6ROeXdAXdZ2Sy9rP0+xqzzYZAXDJitWNlnHDUJ76oWg
0yhGlQfNrMBoJmrewy2d9xjdCHnQzAqGZlasNJPfOfLgnxUY/0TN+rilsz7PN4KHB6ARmZLO4VkRKLtzeGT
UScmUdw7UEJxbOgT3aXLusyCdHoV0el7SSSyFjCpynv9dEX83xN8J+7HE51vi8/XzGHkiXvGZwFcPBl9RQ6l
u6VDq6MkNT18jMkWHOrz8dZIVjIYEyKCVkilvBKjha7d0+HrUr/PgrB6Gs3pWzppsBHlgU4+FTWPRHQgjq
ERCoN3vFODZx0uVQjZwEsLqAtW4JX4PU5uAjGJInfJGhpo6q0RSZ/0PFeBhTESm5IgmsOIYT3lZ5agXyHd
MyqM8jzoCMi+hZMp7CmpWrRLLqgV4WvJSpeTgiJeVEBn4UULu3ICIvytFhendpHWk8agAGceQOuWdBjX3
Vonk3vpbBx7HvFQp6TS8MGZGp0k0FGSsQ+qUNxTUOFwlEofr7xD4NNxLlZKGwpqFYx+6KEeQmleMaZBj
daROeQtCzdVVIrm67p6qs0DLNQparnnRMrVR2FE4ht5avE60lDoTyFuDQV7UwF0lErjrf6g6D8hbw0DemjdzV
0+xgmfkWedBZmswMosaZKvkgmw1PJqNyBQ1Al44m2oEyOSUkilvBKhBtkouyFbDk9OITFEj4GWnqUaATD
wpmeJGENuABWEEXq6aYQ1PPCMyRY2Al3kSmTKfahDIPJKSKW8QqGUOvViZQ7XOgkdeyBQyiEEJp0G
Y1AqFap0JR7wQKm8GqGlRL1ajUK3hQWJEpqgZsIJEQ1Qi089lISa7BDJjpIXKuwRq/tOL5T/VGp4yRmSKu
gQrZZzTJZABJC1U3iVQs5teLLup1vAIMiJT1CVYEaQxyWaADCFpofJmgJq79HJlCNU6Dw55oVPIDp6ksPo

Bsa/MEGFKaueaJ/59oEYlPvFEF7XOg3Ve6JS3IdTspZeraagUPO2M6RS1IcXLOyfNUUZ3mULGnaROeTdAj
U16udikUvC4M6ZT1g14gWeyGyBjTVKnvBugZie9XHZSKXisGdMp6wa8YDOxwoVSyPiS1CnvBqgBSi8XoFQ
KHl/GdMq6AS/ADKlugMwvSZ3ibhAr5gbhBkEuRalUJvhS4eBLxYsvk90gE4qosChiQI1MBpHI5Klr60woosahiJ
qXIhK7si2xCGEnLYaO7kqdCXXUWNQxVkwRwz3kMpYaHjpGZAp5x6CE1ToSq/w6Yr3TERYUiHXTkFoFS
2lk1kkLlTch1AhnkItwanjWGZEpakK8pDMfE0JGrLRQeRNCTYgGuYSohkesEZmiJsQKWKnzCxxhTiE5UaqR
iSwtVN48UBOlQaySp9LwRDYiU9Q8WHksZR6WIjOEqVAlO2c0IWQQTAuVNyHUPGkQq+WpDDwIjsiUNC
HDioF/G+4d33sGmffSQuVNAjVmGgRjpgae+MZ0CtnEkxRWn0g8V1IZZPRK6pR3A9SYaRCMmRp49BrTKe
sGrPA13Q2QGSipU94NUGOmQTBmauAZaEynrBvwUtBkN0CGmqROcTeIHewA4Qa1YMzUwEPNmE5ZN+
DFmslugEwXSZ3yboAaM60FY6YWni7GdIq6geXli6nbUy0yRiR1yrsBamy0ljvIXdlMKKLFoYiWlyImu0EmFNF
iUcQaNb9Zi+Q3h66dCUW0OBTR8lLEZDfIhCJaLIoYO7EJww3kgpQWHiJGZAp5waCE1Qqo84gr6jxiTR03qo
ngtjbURxkiiKXTC4BaZLJJC5W3KNS4Zi0X17TwZDMiU9SieLkmVeWTcI9A/d3E/y5udfEXqP00uko9EF5ZZN
BLC5U3R9QYaS0XI3XwoDciU9IcHS/mLWT85pDpMy1U3qJQQ6y1SIj1dMfB0+eITFGL4mXPyRt3HTJ8poX
KmwFqhrUWybCe+jY8fI7IFDUDXvScbgbI7JkWKm8GqBHWWiTCeurbecBnBwOfHS98JjbckhtrCVbiiClNau
kRN+lk67N7Phfs7LCwc/RkYgh36pSJ2VMe4NnBgGfHC57T6wGk2kcuYNZhgVm1Rs3gdsoE7OOUGqng2WxM
p5CBPEnhdBCXen5chYxBSZ0AfoCawu2UyfkBPAiN6ZT1A1YU6qgFE6oaiLbk8rBNtRZkqErqBLAW1Ehvp0z
OWuCxakynrLWwgtX0oQYyVyV1AvgBaqi3UybnB/BkNaZT1g9Y2aqblBIb32fIKJPUCeAHqAnaTpmcH8CjzJ
hOWT9ghZnpfoDMJkmdAH6AGhrtlAn4QQ/qPTyZjMgUcoNBCasZJOczPTKYpIUC2AFqQLNTJmYH8GAy
IlPUDnix5KTKQWd3GTJMpIUC2AFqRLNTJmAHp6Gvz4Qmehya6HlpYmqFAJ8JTfRoNBE1pdkpk/ODTGi
ix6GJnpcmJvtBJjTRg9FEBZuLVIK1Rn0mNNHj0ETPSxOT/SATmujBaKKCDToqkaBjPxsOedDEAEMTAyt
NrJJzzyEXmhjAaKKCzTkquVPqQx40McDQxMBKE6nKE9WkhNLZ3ZcLZQxglFHBZhaV3DnyAR4yRmSK2g
QrYnzFqAGZMdJCAewANrKo5AqRBnjGGJEpageshPEVowNkxEgLBbAD2MSiEkwshkwYY8BhjLEzM2d0hN
TEYsiEMQY0xgibWFQiicVT567hIWNMp6gfxM7JE/SDGpkykjoB/AA2sqgET0av4SljTKesH/ByxmQ/QMaJp
E4AP4DNLCq5upJ1HjSxhqGJscNwZjQDok6CJ0rDjbfpXLxAVH1SVH1sRVXqVxVVanu0h/j8BUsViKgmlXsY
U4c6F1pao9FS2EimkqucWedBS2sYWho7O4Lf7l7jE7lg1BoMo2rYqKaWK2FZw1PUiExRn+BlqIRPVEQJy9f4B
zJ1pYUC+AdstFOLRTv1Gp66RmQK+oeOFVKe0T+IGUxFzIUqouK29qlbTPUamd7SQgF8BTYjquVqYep1H
vj2QqeQszxJKchanvmqXufBgS90AhgLbKpUi6VK9ToLDnwhU3TAwsuBQ/I4IxNOeiEUwA5gU6VaLFWq11lw
0guZonbAy0nT7SATHHohFMAOYFOlWuwoeb3OAodeyBS1A14cmnrAl15nQjcvhALYAWyoVMuFSrWCx5sx
nUKG8CSF0xH8pF1oo0m5QsaSpE4AP4ANlWq5UKlWmVBJhUMlYyUQZvWDN9G/Ewf0jM53mmogmdBHh
UYfYVOoWiyFqlUe9FHB0MfYVugZ3SN1E6tWudBHhUYfYVOaWq5wplbw+DGmU3Y8wQogqXGDJwNYxP
KnJtc/w6Ri/uMnOzLiJHXKW46BDXwaudqcWsEjzphOWcthhZw+eUaCzDhJnQB+ABvgNHIBTg1POCMyh
dxgUMJqBuRGkeSpikYmn7RQAJ+ADWQasaKdWsOTz4hMUZ/g5Z6pJ4JpjcwxaaEAdgAbozRyMUqdB8jUM
CAzlr6b0Q6obfPXtrSnGkgu6FODoU8DG7w0csFLDU8+IzJFDYSXeybv99LIVJIWCmAHsMFLI1fOU+tMsKT
GwZKxFfYZHYFY2AipuFJngis1Gq6ETWQawUSmgeeVMZ2iPhFbBwP0CYPMK0mdAD4Bm9Q0gklNA88rYz
plfYKXWM7mE8ggk9QJ4BOwgUwjd5S5NvAgM6ZT1id4UaZP9QNkLknqBPAD2ESmEUxkGnguGdMp6we8Z
DLZD5DBJKlT3g8sbFzSCsYlTSZc0uBwydhAU9IPMuGPBow/Wti4pBWJS546t82EP1oc/hh7sMzoB0T9f+2Ira
HapW7AsJmQSQtGJi1skNIKVra0mZBJi0MmYx2J30Fq6mSRNbEZTCnqZBFFnRMyo0llgkUtGBa1sPFOKxL
vHO64TLCoxcGilheLLjDMyQSkWjCQGvvhQRxEJN853A6ZgFSLA1ItL0ilhjnUOWmBGrSMHpnTvSj+QkgtB
m4zobsWje7Cpk6tYOrUZkJ3LQ7dtbx0d1LFz/F9lgndtWh0FzZdagXTpS4Tuutw6K7jpbupfuAyYbUOjdXCpkit
SIq033Pl4FFtRKaQGwxKOM0gENMLaqISKE5rqHmKpw56DsnbZR0yj6WFAjgRbE7VyhUOdfA8NiJT1IlYaS
zpRITj1FQ54kWcCJnr0kIBnAg2IWsFE7IuE7DrcMCuYwW7gbIKk7q1xmUCVx0YXI3NgTGMwglGZ10mcNX
hwFXHCldnNIpMqKsDo64ONlPrBDO1VSbUtcKhrhUrdZ3PKKpMcGwFhmNjIA3EKASjsxU8j43plDUKXiKb

Gt+okKkoqRPAD2BTqk4wpVrBU9GYTlk/4OWiyX6AzCZJnQB+AJs5dYKZ0yoTNFnhoMmKF00m+0EmB
LJCI5Cw8U4nGO+sMiGQFQ6BrHgJZLIfZAIaKzTQCBvvdILxTp8JaPQ4oNHzgkZqi62moluWSlJYahuLIw5iV
I76Dk/kyRR5qjR1bJOiYhwqkAczUCdNknuIDXUE5XNdvYlu6zOhtR6N1sKGZ51ceNbDw9qITCGvHZRwWm
29nmIG4ziWR2a1tFAAO4BNsDq5BKuHZ7URmaJ2wEpqayJ4Wk9a4T27+5ARLi0UwCZg46VOJF566vXwCDc
iU9QmWAFuTU2F1tR0S1FzJE29w1JVkyw5eSK+Q9vkU3I9MnCmhcq7VyyBhOFelUjm9XQzwgPniExR92LFz
XW6HSDzZloogB3AJlsrkWRr37sDPG+OyJS0g8BKm2vqlNw1gYjHuwjPX6gmodXxDRuQ2SotFMBZYKOwlU
gU9nSj5AFXAwxcDbxwVdRZcuG0AYzTVrCh2kokVHu6UfLgtAGG0wZeTivqLLmg3QCGdmMpaxBnEYznBn
i2G9Mp5C1PUljNpZriCKPgRUCmpaROAD+AjedWgvHcAE9LYzpl/YCXlxJLNDUx1ljghIzxMVQXL5BJwNT
C9wEZ+pI6AVwNNmRcCYaMa3joG9Mp6mo1L/ZNHeXUyKiW1AngB7Ax2EokBjt0bnhUG9Mp6we8sJbaEEC
PWtIHJ6ljkBoZ4pI6ATwHNmtbiWRthxsIHuLGdMp6Di/GveI5iUaBzGRJnQBGAZu2rQSLudaZINkaB8nWvE
hWFKkkj1oy4cE1GA+O7arFMCMvF56t4XFwRKaQFQ1KWJ1o0shkvApbI3NUWiiAHcCGZ71YeNas4TlqRK
agHbRKoOzArJExKi0UwA5gE69eLPFq1vAYNSJT1A54IWq6HSATTloogB3AxlS9XO1Xs84DcV7oFDKEJymc
jqDWFIgwFG8w5LFY1HnhhqxMT9VTMlROtqIKLflJlVKe6YJZ54FkL3QCGBtsStbLpWTNOg8ke6FT1thYke
zv2NjywLsXOgGMDTbu6+XivmYNz3djOmWNjZXw/o6NDZlUkzoBjA028evlEr9GwZPqmE5RY1OsrPr3a2wK
mbmTOgGMDTa67OWiy0bBM/eYTlljY6Xuv2NjQ149IHUCGBtsPtqL1SI2Cn7tICJTyNYGJbyullqnzyhk5E4L
BfAD2Bi0Fys6bBQ8co/IFPUDZuCe7gfIpJoWKu8HsYqLGH4QxJLIRsGT6ohMUT9g5tTpfoAMeGmhAH4AG0
UOIlHk06xeZ0J4NQ7h1cyEd9I5JaOJuc6EjGowMhornApiCCJh5KF3Z0JGNQ4Z1cxkNNkQMiGKGowoBtg4ch
Crmmt0HkRRwxBFzUwUqTNRk08IMjoX1KjBUGOsMDKIUQjGezU8a4zplB058NJGNckSxk9kZNhI6gQwBNh
YbBCMxWp42BjTKWsIvLhRUecOKqoYv0osMWk0Mp8kdQJYCGwANQgGUE0meNLg4EnDiydfZSHxGYtL
HZ6YTEinQSOdsBnQIJgBNZmQToNDOg0v6VxgeGIyYaMGjY3Cpi2DXDVaY+DhaEynrIXw4tElLAQZm5I6
ASwENqAZ5AKaBh6aRmQKGcighNc/qCq1iqpSq4mNK9oT+1O0n1SMdrwAYpC5LC1U3nNi569geE4tFwI18F
w2llPUc5ipLKbnIINcWiiA58AGTWu5mrcWHuRGZEp6jmXGuJCeY5EBLy0UwHNgs6y1YJbVZkJ4LQ7htbyE
V1Ob+TW1mV8nntxhbCaE14IR3ho2/VoLFuO1mRBei0N4LS/hfZWFEC8kHlFmbCbo14Kh39gRdCDeIhiYtfD
sN6ZT1lt46e8SwxNklEvqBLAQ2IhtLRixtfAoN6ZT1kJ4YS5pIRVlIc8l2adaCDKZJXUCWAhsxLYWjNg6eDIb0
ylqIY6XzerUDb8OGZuSOgEMATYXW4vkYvuFBwcPTSMyhexgUMLrBpOGB+PFCYdMQGmhAH4AG3Kt5
UqKOngCGpEp6gfM/DPdD5CpJS0UwA9gE6u1XGLVwVPLiExRP+Bllib5vFKHjCBpoeJ+oGPnUEP4QadMz
A/gEWREpqgf8ALIV/gBMk+khQL4AWrSU6/lkp4VPE+MyJT0g4qXJqb7QYWME2mhAH6AmsLUa8EUZgU
PFGM6hRzhSQqrJVhqjdKmphkqZNRI6gRwCtSwZadMzingUWNMp6xT8MJGm7oUWSGzRlIngCGgJiQ7ZX
KGAM8aYzplDYGXNtrUahkVMmwkdQIYAmresVMmZwjwsDGmU9YQeHGjJar7KetTnQIZQ5I6AZwCNdbY
KRNzCg+PIWM6RZ3C84JI0ikchSMCdSzzmjp9ObniuUdmnaROANNBjU52yuRMJxPU6XFQp2dGncQB7sqG
VKfIBHV6NNSJGqrslMk5RSao0+OgTs+MOomKOOllyn0mDNSjMVDUuGWnTMAp+nSAh0egEZlCPjEo4b
WJ5DiFRyagtFB5P1CwcUslF7f08AQ0IlPUD5j5Z7ofIHNOWiiAH8DGLZVc3DLAc86ITEk/CMyUM9kPAjKCp
IUC+AFs3FKJxC1P3RseQUZkivoBL4B062Q/QAaNtFAAP4ANVSrBUGXIhDQGHNIYO997TktIBYohE6AY
wICigg1VKsFQZYAnijGdsobAyxRdaso6ICNFUieAIcCGKpVgqDLAI8WYTllD4IWK6YaAzBRJnQCGAJudVI
LZyRqeKcZ0ihpC7KC5OQ2BKmFfpe7YrJFpI6kTwClgA49KMPBYw9PGmE5Zp2DmjcmGgIwbSZ0AhgCba1S
CucY6E9pY49DG2OEoooaQCW2s0WgjbHxRycUXa3jYGJEpZAeDEl43SK4eWyOzRlqovB9o2Piilosv1vCsMSJ
T1A+YSaMdN8Z47yXxwmjXzGQHQYaTtFAAB4ENPGqxwKNdw8PJiExBB7GxqsVzOohL9AO7RkaQtFAA
P4ANPGqxwKNdwyPIiExRP2AGkOl+gEwgaaEAfgAbeNQigcdT94YnkBGZon7AzB8nVYw7u82QASQtFMAP
YPOOWiTveOreWRDIC5mifsBMINP9IBMCeSEUwA9g445aLu5o1/AIMqZTyBGepPBaQmKpSLtGJoqkTgBD
gI07arm4o1XwRDGmU9QQYqU55jQEohaTConlp61CZo2kTgCngI07arm4o1XwrDGmU9YpmGnjFaeIvjBf7Vir
kLklqRPAW2CTk1ouOWkVPLeM6ZT1FmZyOamUy/hGQwaXpE4AQ4BNTmqR5OTQu+HBZUynrCEwo8tk

Q0Aml6ROeUMwsNFJIxadtAqeW0ZkCtnBoITVDapJ84Xx+oBCxpa0UAA/gA1CGrkgpIbHlhGZkn4QC+SL+
oFGhpO0UAA/gA1CGrkgpIaHkxGZon7AiyZf4QfIQJEWCuAHsEFII1f50epMiKLGIYqxBN2clpBY18nqTIiiBiO
KBjYJaeQqP1qdCVHUOEQxlpiZ1xDeRF/wicfTWZ0JatRoqBE2I2kEM5IanjXGdMo6BTNtTB46IMNGUieAIc
BmJI1gRtLAw4WYTlFDiEGqOQ2BKgkZUnNMBhk7kDoBnAI2x2QEc0wmE+pgcKhDbLa6kFNEX9Bh0h7u8
a2ZCacwaJwCNvlkxGrGWQOPKSIyhQxkUMLrH8kVHQwyjKCFyvuBhQ0+Wbngk4GHERGZon7AjCKoPRc
VsbVC+dRD8KxBphe0UAAHgY1KWbmolM0jKmVholKx59BCDpJoFDaXDJUFy1BZ2AyVlctQWXjMGZEpa
hTMkHNGo0CmnLRQAKOADVdZuSpzFp5yRmSKGgUz41xgTmKRISctFMBBYNNYVq4unc2DcloYyml5Kec
r/CAXymnRKCds5soKZq4sPOaM6RRyhCcpvJZArI8qT8Q2tUpNaVlkzknqBLAQ2JSWFUxpOXjOGdMpaiGO
l3Res5A0p3DIoJPUCeAUsJXsrGAlOwcPOmM6ZZ2CF3XO6BTIpJPUCeAUsHlOK5jndPCkM6ZT1il4Waen8px
+0uGe4zsQmWiSOgGcAja2aQUL1jl4ohnTKesUzEwzdRepQ0aapE55Q4jNIjEMwYnkNofenQnRdDhE0zETzW
RDyIRPOjA+6WBjmE4uhlnBQ4eITCE7GJSwukGYRBbGK4kVMlqghQL4AWyIysmFqCp4tBCRKeoHvGAh
2HFjjM/MmDRsOLv/kMkCLRTAKGCzUk4uK1XBk4WITFGj4OUKcxoFMnGghQIYBWyIyomEqE79Hp44R
GSKGgUvbwiTViTObjNk4EALBfAD2ESUE0xE+UwSUR4nEeV5E1HJtWV8JsEnDxZ8crDBJycSfOqfdz4PBO
lhEKRnRpDJ+zh9LgjSoyFI2HiTE4k3nbp3HgjSwyBIz4wg0/0gF9Lo0UgjbIjJydWe83mQRg9DGj0zaUz3g1yAog
cDihVshqmSqz3n8wCKHgYoel6gWCfv0va5AEUPBhQr2AhTJRdhCvA8MSJT0g8CL01M94OAjBNpoQB+AFs
wrpIrGBfy4IkBhicGXp74Cj/IhScGMJ5YwUYaK8FDNwM8UIzpFHKEJym8luCnWMJoIS8gE0VSJ4AhwEYX
K8FDNwM8UYzplDUEXqaYbgjISJHUCWAIsBHFSi6iGPIgigGGKAZWoqjXyRHFkAtRDGhEETaiWIlEFPvu
XedBFGsYolizEsVXbGGocyGKNRpRhE0oVoKl2Wp4pBjTKeQIT1JYLSG5qmuNzBRJnQCGABtRrAQrsNW
ZIMUaBynWrEjxFYaQCVKs0ZAibEaxksso1vBEMSJTyA4GJaxuoKlq8Joo1Kh1MnOokREkLVTeQWK72TAc
xMulGus8GGQNwyBrXga5iIPkQi1rMGrpYXOQXiwH6dZZUMsLmYIO0ioRc5A0o3DrTHDmhVAAo4ANSHqx
gKRbw9PMiExRo+BlmckDB7dGhpm0UAA/gA1IerGaj24NDzMjMkX9gBdlajdujPELFfGCWVMvECfYaJM+
BkHmpbRQAM+BzWB6sfKRTuUxWVEwkxXFO1kxqZu6ncplTqLQ5iSwEQsvVgTKqTzmJApmTqJ45ySv8IN
c5iQKbU4Cm7DwYkWgnMpjTqJg5iSKd07yCj/IZb6g0OYLsAELL3eSnVPwCYuYTiFHeJLCagmWWt+w1Aq
pTTwM0ynkiAWpU95CYhU+MCwkyJ195xR8xCKmU9ZCeEMWtIUkOwVylILUCeAUsEmKIJKkOHV7DU8n
YzpFnULz8snnIxInGoJGxpOkTgBDgE1MBJHExNC74fFkTKesIfACynRDQOaTpE4AQ4CNTAS5yITOA09qG
DypefGkSz021+lc8KQGw5Ox0mAgfiBXUsrpTPCkxsGTmhdPjs5aunghUC9MWuMYP6ozwZMaDU/CFqEKIk
WohvshEzypcfCk5sWTS1hIJtxSo3FL2LpVQe5oTWcy4ZYGh1saXm5ZTSp+PbrRTCbc0qBxS9hUZZArXOVM
JtzS4HBLw8st0w0hE25p0LglbKwyyMUqTR7c0sBwS8PLLatJqxhjHGhy4ZYGjVvCxiqDWN0qZ+CxZUSmqB/
wQstX+AEyg6SFyvtBrGYxhh/UYlWonIFnkBGZon7ASyCr5HVNgwwUaaEAfgCbhKzlakpZeKAYkSnpB5YZJ
yaXbbDIPJEWCuAHsEHIWq50lIXniRGZon7ATBPT/QAZJ9JCAfwANgdZy+UgbR480cLwRMvME9P9IBeea
MF4Yuw8AxA/EMxBWnigGNMp5AhPUngtgaomV1HV5KrEwzidRWaQpE4AC4HNQdaCOUgLzyBjOmUthJ
lCulRDQIaQpE4AQ4BNNdaCqUYHDyFjOkUNwfFiSJ+6+dIhU0hSJ4AhwKYaa8FUo4OnkDGdsobAyyHTDQ
EZQ5I6AQwBNtVYyx3H6Rw8hozplDUEXhDpq1RDQOaQpE4AQ4CNNdaC1SJdJhjS4WBIx4sh0w0hE6josKC
iiZ1qBmEInTI5Q8gEKjocqOh4oaJPXWVwmUBFhwUVzRo12NgpEzCEfh2+gmeKEZlCdjAo4XUDqqJCSN4R
USGzRloogFGgJh47ZWJGAc8aIzJFjYKXNAbqqLtXGAUyg6SFAhgFahSyUyZgFKfxcpUJhKxwIGTFCyHDp
DTkaOheZQIhKywIaWIHooIYgmAWssoEQlY4ELLihZDphpAJhKzQICRqsrFTtqwh3B9+aLbH3f4fm7Zztv9Uo
F1+vN9uRuov22W3/bnZHzbdrfNud3vb/jXeQqfrmL99/rbb/XTf5N8+p+uYu33cXze3zZODJbfOf3O3zsdW3de7
x+2x2RPNMj65eEqTfNd+1u3TpyXaDmo6olO2tO0QTYS6XtwpW7aJ3t4+bg93u/7fHXaPR+eRyeFn1AI881H
Dy50y6Z6FjJo+oxagZ6GmYDtly/asbsx/115jc9NPmI53zU/Nrwfn0cHFZzXL9zIFG5xQSwcn1Dr3Qaeef9DZdeP
N7b5pbo67290v98e7E7Pw6Izg86IBbj7YkIJaPqTQ/kBPv9l2d3xoNj83ziOnX6ZIBuhjsOvbaun17T89Hu63zeGwO
TweHjcPLiDHYa6LBehXsKsfaunVj7fbm8Pu/vjv5vZ+e9jcbu63LkBPqj+nF6B3wS62q6UX27+9v2n/xf32l8390Q

XkYM4VpQA9CnZxRi29OPNNN814+PVu96FxAZnR0EIB+hMs+FNLg793d82HpunWsVxAjgORO
uV7k4adCeqlZ4Ltr9Rsb3Y/Hu+a/W5z4wI05bsqFqBfwc7+9NKzv/an2vx4bPYfNsc7F5BTSleUyvcoBbssoZZelvjLtrvtH9vZEzIMJVQC9CTY3IJaOrfw/e7XzcPxVxeQN2zGRcr3Iw27hKWXXsL6poPRuw8uIHPzuEj5fqRgQ0Jq6ZDQKfT4t91D8839w0N0MfSuef/T859Hml/RBvv2i8gmGAKYTw1wRfXbh3bQtN0cm9X/7G6a1dd3u0OzXf2426/+2a0I6jerfsnG/Iv5cq51/q5NT8KmXNF3h1WnfHVoHpr3x7avTrsY0ds7coXnnbaXP3ePPcVQMXrsEImd9vv2v2JZP/BJ99y/8JW7+4fmw27/69e77ft9c2ze7R/f//Rtc3849kLeNQ8Ph65F22Fw+9Lxrn6zuvqG7++bw2lbp1pzW8VmuKj7n5s+fEK1OeslTuuopw9sn5ZPn7nqP3TVf+pXQz/ulZw8q9Wy6sVcdO5lfyz2OwXqFzy/DxO/ce4bdmqf6S5lddzFnnRf+gpEXxl/wOK2/u6u+Xb3oflu+/Pm0G9Gubn57na72zeHXptyT1cf+Yfft1fQbA/DRjtVgdn5vJeWaOPtZ666C3VvOP2Tu7vJcDlNmo83m4eH+dr/5eHf/vt/U1nw9qq9H/UoPm8PxqRpJvE0VXzvJbBxhaqfZ42bP7SSzHYKpnWYfIMcPuyigpc4uZ/a2CkW51NnlzN1WMqFtppaaHQ2O77+iWurscua//8p6+gXG558uy9YZXd3I7FNiaqn5efKopYp6/BnGp5+RqZPD1VKzY4JRSxX1+DOMTz9blE9ZRp+yRfmU5aQJTqb8Etcwwc2exB23VVlNxdhSMjWYuFpq9hzviFIV1VKesaV0VdbtV7Hef0V1q7PLmb+tiiLFZ5czP6sqqqkYWyp2lmS+LVUxrvv5olrKc66QCpX44lojVZxO5coixY6RFCtXFFg4u5z5qXpRbXV2ObO3VVFkb/7tAaNnYFEtxbkCaIqydcO5/ufKmgM6xjmgKaqpDGdLFTUEnX/jwcjTi2opz9hSZYU6WDMdvqiFrbPLmd2pisq/zL+pZrRaWtT9ZxnvP1tUqmP+zR/PLeWKevo5xqefK8qnHKNPhaJG6YFxlB6KuvsC591XFHlxjOQlFPXsC4zPPluUo1vOkWdRd59lvPvKWqLhXKGxRcWELGNKyBY1nrKM4ylb1HjKMo6nVFWUUZ1dzuw0r7BAMWuiuLBIMWemWJe1oU1z7mjTZW1p05x72nRZm9o05662shZqONdpyiqpwFlRQZe1AVBz7gDUVVGLWmeXMztbKMrWHeeqVlEDds69kq4oV3esrl6WU3Guv+uyFuA15wq8tkVtrNGctQfL2izCuVekrFAxZ6a4LBDKyUGrosYKFeNYoaxJDeecpipqoFBxkqqi5jSecU6j1kU9/M4uZ/62KioEc3Y5s7dVWWtbinNtS5XFQBUnA1VlVcxRrBVz1mXNlteMs2VdVnk9zVpfr6xCMJqzEkxVVBq0YkyDlmXsnL5eViE0zjpoZZVB462CVtTtpznnzFVR08CKcRboi5rYeMZ5jS+KgnrOyl7roprq7HLmr+xVFDLWnDvcfFFN5TlX4cta3NKcq1tlHUTGeg5ZWdsBNWvFxrLijZoz31gXdQfWnGs266Jg1dnlzF+3uCi3Oruc+duqqPHC2eXM7lZFsb2ac9W0rE02inWXTSiL7gVGuldWMWzOWtihqOFC4BwtlLV7WbHuXi7r8AzNeXqGDmW1VWBsq7oobFwzUuOyOhVnn9Jlle7XnLX7yxqCso5AiyJWgTVlXNQQVHGex6LK2pOrOPfkqrLKyCnOOnKqrLLYirMutiqrNK/irM2ryio3pDjrDamy4kOKNT9UVtBDcSY9VFksRrGeZFrWBEdxznB0WSvNmnOlWZe1eqo5V091WYfeac5T73RZh0lpztOk6qKWb2rG1Zu6KLOqOcfsqqwxu2LlMWWNQznrfqmyjp5UnGdP1kUN2WvWOjFlUb41515KV5RbnV3O/HtJyhqFcu6mrIu6BWtOzl5WNQ/FWc1DlVV/VnHWn62LwlY15+rNuqgp89nlzJ8OLcutOM9rUWUlrhRn4kqVdbaN4jzbRpuyxuyGNfVY1LT57HLmb6uiBu1nlzP/XLCo4ZXmrJamyyqtozlr66h1WeOrNeuqRFHPwbPLmb+tinoOnl3O/G1V1Mr82eXMz4+L8ivNedKUUkXx47PLmb+tihpfnV3O/DtLihpfnV3O/GPRopiM5kwf67LSx5o1fayLeg6eXc78bVXUPXh2OfO3VVH34NnlzH/eRln9ivN8LqXLmjtrzrmzKWssalh37hbFkM8uZ/4dlmWNGVjnzrasubPlnDvbsvzKcvpVWUcPK86zh1VZlXwVZyVfVdYBqIrzBFRVVgZZcWaQVVkFrxRrxauyzkDVrGegurLWBx3n+qAra33QsVbcKeoePLuc+b29rH4VOPtVWee6KM5zXVRZB7sozpNdVFl7vBTnHi9VVgZScWYgVVkZSMWZgdRlVRvQrNUGyipsr1gr25dVGkVx1kZRZW3gVZw7eHVZeQbNmWfQZeUZNGeeQZe1Rq851+h1WWv0mnONXpdVBVlzVkHWZfErzcmvdFkVozVnxWhdFTUWPbuc+duqrDED51qq9kUx5LPLmb+tynoO+t/yHGz/+6/un7Ty3t81Nz80N/eb724O7b/75+nvD7v3vcDRn46b29H/Hdr3fdj8b3sh3WW0n99/5R82jzf3zfZ06bfNtm3Jhz/81//91

/8DdEWf3bi9EQA=

Bibliography

[1] Espen J Aarseth. *Cybertext: perspectives on ergodic literature*. The Johns Hopkins University Press, 1997.

[2] G. E. M. Anscombe. *Intention*. Harvard University Press, 1957.

[3] Mieke Bal. *Narratology: Introduction to the Theory of Narrative*. en. Google-Books-ID: jPj4Bq0H4JoC. University of Toronto Press, 1985. ISBN: 978-0-8020-9631-9.

[4] Joseph Bates. "Virtual Reality, Art, and Entertainment". In: *PRESENCE: Teleoperators and Virtual Environments*. MIT Press, 1992, pp. 133–138.

[5] Roy F. Baumeister and Kathleen D. Vohs. *Encyclopedia of social psychology*. Vol. 1. Sage, 2007.

[6] Kent Beck. "Extreme programming: A humanistic discipline of software development". en. In: *Fundamental Approaches to Software Engineering*. Lecture Notes in Computer Science. Springer, Berlin, Heidelberg, Mar. 1998, pp. 1–6. ISBN: 978-3-540-64303-6 978-3-540-69723-7. DOI: 10.1007/BFb0053579. URL: https://link.springer.com/chapter/10.1007/BFb0053579 (visited on 07/05/2018).

[7] Mark Bernstein. "Card Shark and Thespis: Exotic Tools for Hypertext Narrative". In: *Proceedings of the 12th ACM Conference on Hypertext and Hypermedia*. HYPERTEXT '01. New York, NY, USA: ACM, 2001, pp. 41–50. ISBN: 1-58113-420-7. DOI: 10.1145/504216.504233. URL: http://doi.acm.org/10.1145/504216.504233.

[8] Mark Bernstein. "Patterns of Hypertext". In: *Proceedings of the Ninth ACM Conference on Hypertext and Hypermedia : Links, Objects, Time and Space—structure in Hypermedia Systems: Links, Objects, Time and Space—structure in Hypermedia Systems*. HYPERTEXT '98. New York, NY, USA: ACM, 1998, pp. 21–29. ISBN: 978-0-89791-972-2. DOI: 10.1145/276627.276630. URL: http://doi.acm.org/10.1145/276627.276630 (visited on 05/09/2018).

[9] Mark Bernstein. "Storyspace 1". In: *Proceedings of the Thirteenth ACM Conference on Hypertext and Hypermedia*. HYPERTEXT '02. New York, NY, USA: ACM, 2002, pp. 172–181. ISBN: 978-1-58113-477-3. DOI: 10.1145/513338.513383. URL: http://doi.acm.org/10.1145/513338.513383 (visited on 05/09/2018).

[10] Amy Bruckman. "The combinatorics of storytelling: Mystery train interactive". In: *Unpublished manuscript* (1990).

[11] M. Cavazza, F. Charles, and S. J. Mead. "Character-based interactive storytelling". In: *IEEE Intelligent Systems* 17.4 (July 2002), pp. 17–24. ISSN: 1541-1672. DOI: 10.1109/MIS.2002.1024747.

[12] Seymour Benjamin Chatman. *Story and discourse: Narrative structure in fiction and film*. Cornell University Press, 1980.

[13] Angelo E. M. Ciarlini et al. "A Logic-based Tool for Interactive Generation and Dramatization of Stories". In: *Proceedings of the 2005 ACM SIGCHI International Conference on Advances in Computer Entertainment Technology*. ACE '05. New York, NY, USA: ACM, 2005, pp. 133–140. ISBN: 978-1-59593-110-8. DOI: 10.1145/1178477.1178495. URL: http://doi.acm.org/10.1145/1178477.1178495 (visited on 03/20/2017).

[14] Daniel Cook. *What I've learned about designing multiplayer games so far*. URL: http://www.gamasutra.com/blogs/DanielCook/20140104/208021/What_Ive_learned_about_designing_multiplayer_games_so_far.php (visited on 06/16/2017).

[15] Nigel Cross. "Design research: A disciplined conversation". In: *Design issues* 15.2 (1999), pp. 5–10.

[16] Gergely Csibra et al. "Goal attribution without agency cues: the perception of 'pure reason' in infancy". en. In: *Cognition* 72.3 (Oct. 1999), pp. 237–267. ISSN: 0010-0277. DOI: 10.1016/S0010-0277(99)00039-6. URL: http://www.sciencedirect.com/science/article/pii/S0010027799000396 (visited on 10/09/2020).

[17] Donald Davidson. "Actions, Reasons, and Causes". In: *The Journal of Philosophy* 60.23 (1963), pp. 685–700. ISSN: 0022-362X. DOI: 10.2307/2023177. URL: https://www.jstor.org/stable/2023177 (visited on 10/09/2020).

[18] Yvonne AW De Kort, Wijnand A. IJsselsteijn, and Karolien Poels. "Digital games as social presence technology: Development of the Social Presence in Gaming Questionnaire (SPGQ)". In: *Proceedings of PRESENCE* 195203 (2007), pp. 1–9.

[19] Daniel Clement Dennett. *The Intentional Stance*. en. MIT Press, 1989. ISBN: 978-0-262-54053-7.

[20] Paul Dourish and Victoria Bellotti. "Awareness and coordination in shared workspaces". In: *Proceedings of the 1992 ACM conference on Computer-supported cooperative work*. ACM, 1992, pp. 107–114. URL: http://dl.acm.org/citation.cfm?id=143468 (visited on 11/23/2016).

[21] Nicolas Ducheneaut and Robert J. Moore. "The Social Side of Gaming: A Study of Interaction Patterns in a Massively Multiplayer Online Game". In: *Proceedings of the 2004 ACM Conference on Computer Supported Cooperative Work*. CSCW '04. New York, NY, USA: ACM, 2004, pp. 360–369. ISBN: 978-1-58113-810-8. DOI: 10.1145/1031607.1031667. URL: http://doi.acm.org/10.1145/1031607.1031667 (visited on 11/16/2016).

[22] Mustafa Emirbayer and Ann Mische. "What Is Agency?" In: *American Journal of Sociology* 103.4 (Jan. 1998), pp. 962–1023. ISSN: 0002-9602. DOI: 10.1086/231294. URL: https://www.journals.uchicago.edu/doi/10.1086/231294 (visited on 10/09/2020).

[23] Chris Fairclough and Pádraig Cunningham. *A multiplayer case based story engine*. Tech. rep. Trinity College Dublin, Department of Computer Science, 2003. URL: http://www.cs.tcd.ie/publications/tech-reports/reports.03/TCD-CS-2003-43.pdf (visited on 06/05/2017).

[24] Matthew William Fendt et al. "Achieving the Illusion of Agency". en. In: *Interactive Storytelling*. Springer, Berlin, Heidelberg, Nov. 2012, pp. 114–125. DOI: 10.1007/978-3-642-34851-8_11. URL: https://link.springer.com/chapter/10.1007/978-3-642-34851-8_11 (visited on 06/12/2017).

[25] Luis Flores and David Thue. "Level of detail event generation". In: *International Conference on Interactive Digital Storytelling*. Springer, 2017, pp. 75–86.

[26] Gajadhar, B.J. et al. "Understanding player experience in social digital games : the role of social presence". en. PhD thesis. Technische Universiteit Eindhoven, 2012. URL: https://research.tue.nl/nl/publications/understanding-player-experience-in-social-digital-games--the-role-of-social-presence(503b83bf-8440-4f23-a06d-2df447801a5e).html (visited on 10/30/2020).

[27] Brian Gajadhar, Yvonne de Kort, and Wijnand IJsselsteijn. "Influence of social setting on player experience of digital games". In: *CHI '08 Extended Abstracts on Human Factors in Computing Systems*. CHI EA '08. New York, NY, USA: Association for Computing Machinery, Apr. 2008, pp. 3099–3104. ISBN: 978-1-60558-012-8. DOI: 10.1145/1358628.1358814. URL: https://doi.org/10.1145/1358628.1358814 (visited on 10/29/2020).

[28] Shaun Gallagher. "Philosophical conceptions of the self: implications for cognitive science". en. In: *Trends in Cognitive Sciences* 4.1 (Jan. 2000), pp. 14–21. ISSN: 1364-6613. DOI: 10.1016/S1364-6613(99)01417-5. URL: http://www.sciencedirect.com/science/article/pii/S1364661399014175 (visited on 10/09/2020).

[29] D. Randy Garrison, Terry Anderson, and Walter Archer. "Critical inquiry in a text-based environment: Computer conferencing in higher education". In: *The internet and higher education* 2.2-3 (1999), pp. 87–105.

[30] William Gaver. "What should we expect from research through design?" In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. CHI '12. New York, NY, USA: Association for Computing Machinery, May 2012, pp. 937–946. ISBN: 978-1-4503-1015-4. DOI: 10.1145/2207676.2208538. URL: https://doi.org/10.1145/2207676.2208538 (visited on 10/17/2020).

[31] Gérard Genette. *Narrative discourse: An essay in method*. Cornell University Press, 1983. URL: https://books.google.co.uk/books?hl=en&lr=&id=yEPuQg7SOxIC&oi=fnd&pg=PA7&dq=G+Genette+Narrative+Discourse&ots=52POqLDHTS&sig=cR6H_67DG4VBt7hCmi-mJur_wj4 (visited on 06/22/2017).

[32] György Gergely et al. "Taking the intentional stance at 12 months of age". en. In: *Cognition* 56.2 (Aug. 1995), pp. 165–193. ISSN: 0010-0277. DOI: 10.1016/0010-0277(95)00661-H. URL: http://www.sciencedirect.com/science/article/pii/001002779500661H (visited on 10/09/2020).

[33] Pablo Gervas. "Propp's morphology of the folk tale as a grammar for generation". In: *OpenAccess Series in Informatics* 32 (Jan. 2013), pp. 106–122. DOI: 10.4230/OASIcs.CMN.2013.106.

[34] Pablo Gervás and Federico Peinado. "Transferring game mastering laws to interactive digital storytelling". In: *International Conference on Technologies for Interactive Digital Storytelling and Entertainment*. Springer, 2004, pp. 48–54. URL: http://link.springer.com/chapter/10.1007/978-3-540-27797-2_7 (visited on 11/23/2016).

[35] ALVIN I. GOLDMAN. *Theory of Human Action*. Princeton University Press, 1970. DOI: 10.2307/j.ctt13x158k. URL: https://www.jstor.org/stable/j.ctt13x158k (visited on 10/09/2020).

[36] Charlotte N. Gunawardena. "Social Presence Theory and Implications for Interaction and Collaborative Learning in Computer Conferences". en. In: *International Journal of Educational Telecommunications* 1.2 (1995), pp. 147–166. ISSN: 1077-9124. URL: https://www.learntechlib.org/primary/p/15156/ (visited on 09/28/2020).

[37] Charlotte N. Gunawardena and Frank J. Zittle. "Social presence as a predictor of satisfaction within a computer-mediated conferencing environment". In: *American Journal of Distance Education* 11.3 (Jan. 1997), pp. 8–26. ISSN: 0892-3647. DOI: 10.1080/08923649709526970. URL: https://doi.org/10.1080/08923649709526970 (visited on 09/28/2020).

[38] Carl Gutwin and Saul Greenberg. "A Descriptive Framework of Workspace Awareness for Real-Time Groupware". en. In: *Computer Supported Cooperative Work (CSCW)* 11.3 (Sept. 2002), pp. 411–446. ISSN: 1573-7551. DOI: 10.1023/A:1021271517844. URL: https://doi.org/10.1023/A:1021271517844 (visited on 10/30/2020).

[39] Charlie Hargood, Mark J Weal, and David E Millard. "Patterns of Sculptural Hypertext in Location Based Narratives". In: *Proceedings of the 27th ACM Conference on Hypertext and Social Media* (2016), pp. 61–70.

[40] Charlie Hargood, Mark Weal, and David Millard. "The storyplaces platform: Building a web-based locative hypertext system". en. In: *Proceedings of ACM Hypertext 2018*. ACM, Apr. 2018. URL: https://eprints.soton.ac.uk/421122/ (visited on 05/30/2018).

[41] D. Fox Harrell and Jichen Zhu. "Agency Play: Dimensions of Agency for Interactive Narrative Design." In: *AAAI spring symposium: Intelligent narrative technologies II*. 2009, pp. 44–52.

[42] Sharon Hays. "Structure and Agency and the Sticky Problem of Culture". In: *Sociological Theory* 12.1 (1994), pp. 57–72. ISSN: 0735-2751. DOI: 10.2307/202035. URL: https://www.jstor.org/stable/202035 (visited on 10/09/2020).

[43] Maurice Herlihy. "Wait-free Synchronization". In: *ACM Trans. Program. Lang. Syst.* 13.1 (Jan. 1991), pp. 124–149. ISSN: 0164-0925. DOI: 10.1145/114005.102808. URL: http://doi.acm.org/10.1145/114005.102808 (visited on 06/05/2018).

[44] Matthew Hudson and Paul Cairns. "Measuring social presence in team-based digital games". In: *Interacting with Presence: HCI and the Sense of Presence in Computer-mediated Environments* 83 (2014).

[45] Robin Hunicke, M. Leblanc, and Robert Zubek. *MDA : A Formal Approach to Game Design and Game Research*. en. 2004. URL: /paper/MDA-%3A-A-Formal-Approach-to-Game-Design-and-Game-Hunicke-Leblanc/2b134e5c46eec50f69c702c0b4aa29687d5d8fba (visited on 10/29/2020).

[46] *Inform 7*. en. URL: http://localhost:4000/ (visited on 10/16/2020).

[47] Kurt Jensen. *Coloured Petri Nets: Basic Concepts, Analysis Methods and Practical Use. Volume 1*. en. 2nd ed. Monographs in Theoretical Computer Science. An EATCS Series. Berlin Heidelberg: Springer-Verlag, 1996. ISBN: 978-3-540-60943-8. URL: //www.springer.com/gb/book/9783540609438 (visited on 05/16/2018).

[48] Michael Joyce. “Storyspace as a hypertext system for writers and readers of varying ability”. In: *Proceedings of the third annual ACM conference on Hypertext*. ACM, 1991, pp. 381–387.

[49] Sheldon Klein et al. “A program for generating reports on the status and history of stochastically modifiable semantic models of arbitrary universes”. In: *University of Wisconsin Tech. Rep. TR142* (1971).

[50] Hartmut Koenitz. “Towards a Theoretical Framework for Interactive Digital Narrative”. In: vol. 6432. Nov. 2010, pp. 176–185. DOI: 10.1007/978-3-642-16638-9_22.

[51] Alan M. Leslie. “A theory of agency”. In: *Causal cognition: A multidisciplinary debate*. Symposia of the Fyssen Foundation. New York, NY, US: Clarendon Press/Oxford University Press, 1995, pp. 121–149. ISBN: 978-0-19-852314-7.

[52] Patrick R. Lowenthal. “Social presence”. In: *Encyclopedia of Distance Learning, Second Edition*. IGI Global, 2009, pp. 1900–1906.

[53] Tony Manninen. “Interaction forms in multiplayer desktop virtual reality games”. In: *VRIC2002 Conference*. Vol. 223. 2002, p. 232. (Visited on 04/03/2017).

[54] Stacey Mason. “On Games and Links: Extending the Vocabulary of Agency and Immersion in Interactive Narratives”. en. In: *Interactive Storytelling*. Lecture Notes in Computer Science. Springer, Cham, Nov. 2013, pp. 25–34. ISBN: 978-3-319-02755-5 978-3-319-02756-2. DOI: 10.1007/978-3-319-02756-2_3. URL: https://link.springer.com/chapter/10.1007/978-3-319-02756-2_3 (visited on 05/03/2018).

[55] Michael Mateas and Andrew Stern. “Facade: An experiment in building a fully-realized interactive drama”. In: *Game developers conference*. Vol. 2. 2003. URL: http://www.cc.gatech.edu/fac/Charles.Isbell/classes/reading/papers/MateasSternGDC03.pdf (visited on 03/23/2017).

[56] James R. Meehan. “TALE-SPIN, An Interactive Program that Writes Stories.” In: *Ijcai*. Vol. 77. 1977, pp. 91–98. URL: https://www.ijcai.org/Proceedings/77-1/Papers/013.pdf (visited on 04/03/2017).

[57] Alfred Mele. *Motivation and Agency*. Jan. 2003. DOI: 10.1093/019515617X.001.0001.

[58] David E. Millard et al. “Canyons, deltas and plains”. In: *Proceedings of the 24th ACM Conference on Hypertext and Social Media - HT ’13* (2013), pp. 109–118. DOI: 10.1145/2481492.2481504. URL: http://dl.acm.org/citation.cfm?id=2481492.2481504.

[59] David E. Millard et al. “The StoryPlaces Authoring Tool: Pattern Centric Authoring”. In: Funchal, Madeira, 2017.

[60] David Millard and Charlie Hargood. "Tiree tales: a co-operative inquiry into the poetics of location-based narratives". en. In: July 2017. DOI: https://eprints.soton.ac.uk/408310/1/HT17.pdf. URL: https://eprints.soton.ac.uk/408310/ (visited on 06/14/2018).

[61] Markus Montola. "The positive negative experience in extreme role-playing". In: *The Foundation Stone of Nordic Larp (2010)* 153 (2010).

[62] Janet Horowitz Murray. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. en. Google-Books-ID: bzmSLtnMZJsC. Simon and Schuster, 1997. ISBN: 978-0-684-82723-0.

[63] Janet Horowitz Murray and Janet H. Murray. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. en. Google-Books-ID: QK4yDwAAQBAJ. MIT Press, Apr. 2017. ISBN: 978-0-262-53348-5.

[64] Friedrich Nietzsche. *Beyond Good & Evil: Prelude to a Philosophy of the Future*. en. Google-Books-ID: Rv8N7Y3XWkcC. Knopf Doubleday Publishing Group, Mar. 2010. ISBN: 978-0-307-43295-7.

[65] N. Nova. *Awareness Tools : Lessons from Quake-Like*. en. 2001. URL: /paper/Awareness-Tools-%3A-Lessons-from-Quake-Like-Nova/932ab5fc2467ead8b859133608935b28f4f78315 (visited on 10/30/2020).

[66] Heather Packer et al. "Developing a Writer's Toolkit for interactive locative storytelling". en. In: *Proceedings of the International Conference on Interactive Digital Storytelling*. Vol. 10690. Springer, Nov. 2017, pp. 63–74. DOI: Packer, Heather, Hargood, Charlie, Howard, Yvonne, Papadopoulos, PetrosandMillard, David(2017) DevelopingaWritersToolkitforinteractivelocativestorytelling. InProceedingsoftheInternationalConferenceonInteractiveDigitalStorytelling. vol. 10690, Springer. pp. 63-74. (doi: 10.1007/978-3-319-71027-3_6<http://dx.doi.org/10.1007/978-3-319-71027-3_6>).. URL: https://eprints.soton.ac.uk/414262/ (visited on 08/15/2018).

[67] Nathan Partlan et al. "Exploratory Automated Analysis of Structural Features of Interactive Narrative". In: *Proceedings of the 14th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment*. Edmonton, AB, Canada, 2018.

[68] Vladimir IAkovlevich Propp. *Morphology of the Folktale*. Vol. 9. University of Texas Press, 1968.

[69] Christian Reuter et al. "Game design patterns for collaborative player interactions". In: *Proceedings of DiGRA*. 2014. URL: ftp://www.kom.e-technik.tu-darmstadt.de/papers/RWGS14-1.pdf (visited on 01/20/2017).

[70] Matthieu Ricard. *The Art of Happiness: A Guide to Developing Life's Most Important Skill*. en. Google-Books-ID: ZkqGZwEACAAJ. Atlantic, 2011. ISBN: 978-0-85789-273-7.

[71] Mark O. Riedl and Robert Michael Young. "From linear story generation to branching story graphs". In: *IEEE Computer Graphics and Applications* 26.3 (2006), pp. 23–31.

[72] Mark O. Riedl and Robert Michael Young. "Narrative planning: Balancing plot and character". In: *Journal of Artificial Intelligence Research* 39 (2010), pp. 217–268.

[73] Mark Owen Riedl and Vadim Bulitko. "Interactive Narrative: An Intelligent Systems Approach". en. In: *AI Magazine* 34.1 (Dec. 2012), p. 67. ISSN: 0738-4602. URL: https://www.aaai.org/ojs/index.php/aimagazine/article/view/2449 (visited on 05/22/2017).

[74] Mark Riedl and Andrew Stern. "Believable agents and intelligent story adaptation for interactive storytelling". In: *Technologies for Interactive Digital Storytelling and Entertainment* (2006), pp. 1–12. URL: http://link.springer.com/content/pdf/10.1007/11944577.pdf#page=11 (visited on 09/29/2017).

[75] Mark Riedl et al. "Robust and Authorable Multiplayer Storytelling Experiences." In: *AIIDE*. 2011.

[76] José Bernardo Rocha, Samuel Mascarenhas, and Rui Prada. "Game mechanics for cooperative games". In: *ZON Digital Games 2008* (2008), pp. 72–80. URL: http://revistacomsoc.pt/index.php/zondgames08/article/view/343 (visited on 01/20/2017).

[77] Tracy Callaway Russo and Spencer Benson. "Learning with invisible others: Perceptions of online presence and their relationship to cognitive and affective learning". In: JSTOR, 2005.

[78] James Ryan. "Grimes' Fairy Tales: A 1960s Story Generator". en. In: *Interactive Storytelling*. Lecture Notes in Computer Science. Springer, Cham, Nov. 2017, pp. 89–103. ISBN: 978-3-319-71026-6 978-3-319-71027-3. DOI: 10.1007/978-3-319-71027-3_8. URL: https://link.springer.com/chapter/10.1007/978-3-319-71027-3_8 (visited on 04/09/2018).

[79] Magy Seif El-Nasr et al. "Understanding and Evaluating Cooperative Games". In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. CHI '10. New York, NY, USA: ACM, 2010, pp. 253–262. ISBN: 978-1-60558-929-9. DOI: 10.1145/1753326.1753363. URL: http://doi.acm.org/10.1145/1753326.1753363 (visited on 01/20/2017).

[80] Manu Sharma et al. "Drama Management and Player Modeling for Interactive Fiction Games." In: *Computational Intelligence* 26 (May 2010), pp. 183–211. DOI: 10.1111/j.1467-8640.2010.00355.x.

[81] Emily Short. *Beyond Branching: Quality-Based, Salience-Based, and Waypoint Narrative Structures*. en. Apr. 2016. URL: https://emshort.blog/2016/04/12/beyond-branching-quality-based-and-salience-based-narrative-structures/ (visited on 07/25/2018).

[82] John Short, Ederyn Williams, and Bruce Christie. *The social psychology of telecommunications*. English. OCLC: 2585964. London; New York: Wiley, 1976. ISBN: 978-0-471-01581-9.

[83] Callum Spawforth. *Interactions and analysis for multiplayer interaction framework*. DOI: 10.5258/SOTON/D1970.

[84] Callum Spawforth. *Interview Transcripts from "Honour Among Thieves" experiential analysis*. DOI: 10.5258/SOTON/D1971.

[85] Callum Spawforth, Nicholas Gibbins, and David Millard. "StoryMINE: A System for Multiplayer Interactive Narrative Experiences". en. In: Dec. 2018. URL: https://eprints.soton.ac.uk/424131/ (visited on 10/15/2018).

[86] Callum Spawforth, Nicholas Gibbins, and David Millard. *Uncommon patterns - Authoring with story specific structures*. Dublin, Ireland, 2018.

[87] Callum Spawforth, Brian de Lint, and Amanda Moss. *"Honour Between Thieves" - Multiplayer StoryMINE Narrative dataset*. DOI: 10.5258/SOTON/D1972.

[88] Callum Spawforth and David E Millard. "A framework for multi-participant narratives based on multiplayer game interactions". In: *Interactive Storytelling: 10th International Conference, ICIDS 2017, Madeira, Portugal, November 14-17, 2017. Proceedings*. Sept. 2017.

[89] Callum Spawforth and David E. Millard. "Multiplayer Games as a Template for Multiplayer Narratives: A Case Study with Dark Souls". In: *Proceedings of the 27th ACM Conference on Hypertext and Social Media*. 2017.

[90] Andrew Stern. "Embracing the combinatorial explosion: A brief prescription for interactive story R&D". In: *Joint International Conference on Interactive Digital Storytelling*. Springer, 2008, pp. 1–5.

[91] *Storyspace: Storyspace*. URL: http://www.eastgate.com/storyspace/index.html (visited on 10/16/2020).

[92] Tiffany Y. Tang et al. "A study of interaction patterns and awareness design elements in a massively multiplayer online game". In: *International journal of computer games technology* 2008 (2008). URL: http://www.hindawi.com/journals/ijcgt/2008/619108/abs/ (visited on 11/23/2016).

[93] Thatgamecompany and Santa Monica Studio. *Journey*. Playstation 3. 2012.

[94] *The Walking Dead Season One Plot Graph*. URL: http://venturebeat.com/2013/03/31/the-walking-dead-season-one-plot-graph/ (visited on 03/23/2017).

[95] Chih-Hsiung Tu. “On-line learning migration: from social learning theory to social presence theory in a CMC environment”. en. In: *Journal of Network and Computer Applications* 23.1 (Jan. 2000), pp. 27–37. ISSN: 1084-8045. DOI: 10.1006/jnca.1999.0099. URL: http://www.sciencedirect.com/science/article/pii/S1084804599900991 (visited on 09/28/2020).

[96] *Twine / An open-source tool for telling interactive, nonlinear stories.* URL: http://twinery.org/ (visited on 10/16/2020).

[97] Joseph B. Walther. “Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction”. In: *Communication research* 23.1 (1996), pp. 3–43.

[98] Hannah Wood. “Dynamic Syuzhets: Writing and Design Methods for Playable Stories”. In: Nov. 2017, pp. 24–37. ISBN: 978-3-319-71026-6. DOI: 10.1007/978-3-319-71027-3_3.

[99] José Pablo Zagal, Miguel Nussbaum, and Ricardo Rosas. “A model to support the design of multiplayer games”. In: *Presence: Teleoperators and Virtual Environments* 9.5 (2000), pp. 448–462. URL: http://www.mitpressjournals.org/doi/abs/10.1162/105474600566943 (visited on 11/16/2016).

[100] John Zimmerman, Jodi Forlizzi, and Shelley Evenson. “Research through design as a method for interaction design research in HCI”. In: *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 2007, pp. 493–502.

[101] John Zimmerman, Erik Stolterman, and Jodi Forlizzi. “An Analysis and Critique of Research Through Design: Towards a Formalization of a Research Approach”. In: *Proceedings of the 8th ACM Conference on Designing Interactive Systems*. DIS ’10. New York, NY, USA: ACM, 2010, pp. 310–319. ISBN: 978-1-4503-0103-9. DOI: 10.1145/1858171.1858228. URL: http://doi.acm.org/10.1145/1858171.1858228 (visited on 07/03/2018).