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Facultad de Matemática y Computación



Diseño e Implementación de una Arquitectura de Simulación Multi-Agente basados en LLM para la Generación de Narrativas Emergentes

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Opinión del tutor

Como tutor del trabajo de diploma titulado “Diseño e Implementación de una Arquitectura de Simulación Multi-Agente basados en LLM para la Generación de Narrativas Emergentes”, elaborado por Franco Hernández Piloto, deseo expresar mi valoración sobre el proceso y los resultados alcanzados.

La tesis de Franco se inscribe en una línea de investigación consolidada en la Facultad de Matemática y Computación, centrada en el estudio del razonamiento de los Modelos de Lenguaje de Gran Escala (LLM) y sus capacidades para mantener coherencia y consistencia en tareas de largo formato. En este contexto, el trabajo de Franco aborda uno de los retos más actuales y complejos de la inteligencia artificial: la generación de narrativas extensas y creíbles mediante agentes autónomos impulsados por LLM, explorando especialmente el equilibrio entre la autonomía de los personajes y la dirección narrativa en entornos simulados.

El aporte fundamental de la tesis radica en el diseño conceptual y la implementación de un prototipo funcional de arquitectura multi-agente, donde cada agente cuenta con módulos avanzados de memoria y razonamiento, y donde un componente “Director” ejerce una influencia narrativa indirecta a través de la manipulación ambiental. Este enfoque permite investigar de manera original cómo la coherencia longitudinal, la consistencia de los personajes y la emergencia de tramas complejas pueden lograrse de forma orgánica, superando algunas de las limitaciones reconocidas de los LLM monolíticos en la gestión de contextos amplios y la generación de historias de largo alcance.

Quisiera destacar especialmente el trabajo independiente de Franco a lo largo de todo el proceso investigativo. Desde la revisión exhaustiva del estado del arte hasta la configuración experimental y la evaluación crítica de los resultados, Franco demostró una notable capacidad para identificar problemáticas relevantes, proponer soluciones viables y llevarlas a la práctica con rigor y autonomía. El desarrollo del prototipo, así como la estructuración modular y parametrizable del sistema, son reflejo de su iniciativa y perseverancia.

Asimismo, merece una mención especial la creatividad evidenciada en el método de evaluación empleado. Franco diseñó y aplicó una metodología comparativa cualitativa entre las narrativas generadas por su sistema multi-agente y las obtenidas

mediante un LLM monolítico, utilizando criterios claros y pertinentes como coherencia, credibilidad de los personajes, originalidad de la trama y calidad de la prosa. Este enfoque permitió no solo validar empíricamente las hipótesis de la investigación, sino también ofrecer un análisis profundo sobre los **trade-offs** inherentes a cada aproximación, aportando así conocimiento valioso a la comunidad académica.

En síntesis, considero que la tesis de Franco representa una contribución significativa dentro del campo de la inteligencia artificial y la generación automática de narrativas, tanto por la solidez de su fundamentación teórica como por la originalidad de su propuesta experimental. El trabajo evidencia madurez intelectual, capacidad de análisis crítico y un compromiso sostenido con la investigación independiente.

Por todo lo anterior, recomiendo la aprobación de este trabajo y felicito a Franco Hernández Piloto por el logro alcanzado y la calidad de su desempeño académico.

Resumen

Los Modelos de Lenguaje de Gran Escala (LLM) han revolucionado la inteligencia artificial por su asombrosa capacidad de comprensión y generación de lenguaje natural. No obstante, su aplicación directa en la generación de narrativas extensas y mundos virtuales poblados por personajes autónomos presenta desafíos significativos. Estos incluyen la coherencia a largo plazo, la consistencia de los personajes, la gestión de contextos amplios y la limitación en la proactividad de los agentes, problemas que restringen su eficacia en dominios que exigen un desarrollo narrativo sostenido.

La presente investigación propone una arquitectura de simulación multi-agente basada en LLM diseñada para mitigar estas limitaciones. Se centra en la integración de agentes LLM autónomos equipados con módulos de memoria avanzados que interactúan en un entorno dinámico y modificable. Un elemento central de esta propuesta es un “Director” narrativo que ejerce control indirecto sobre la trama mediante la manipulación sutil de elementos del entorno y la introducción de eventos contextuales, en lugar de dirigir directamente a los agentes.

El objetivo de este trabajo es diseñar conceptualmente, implementar un prototipo y explorar esta arquitectura, evaluando la viabilidad de generar narrativas emergentes que demuestren un grado significativo de coherencia longitudinal, consistencia de personajes y capacidad de desarrollo argumental. Este enfoque busca equilibrar la autonomía de los agentes con una dirección narrativa sistémica, no solo expandiendo las capacidades de los LLM en la creación de contenido a gran escala, sino también proporcionando un banco de pruebas para la cognición artificial en entornos complejos.

Abstract

Large Language Models (LLMs) have revolutionized artificial intelligence due to their astonishing ability to understand and generate natural language. However, their direct application in generating extensive narratives and virtual worlds populated by autonomous characters presents significant challenges. These include long-term coherence, character consistency, broad context management, and limited agent proactivity, issues that restrict their effectiveness in domains requiring sustained narrative development.

The present research proposes a multi-agent simulation architecture based on LLMs designed to mitigate these limitations. It focuses on the integration of autonomous LLM agents equipped with advanced memory modules that interact within a dynamic and modifiable environment. A central element of this proposal is a narrative “Director” that exercises indirect control over the plot by subtly manipulating environmental elements and introducing contextual events, rather than directly controlling the agents.

The objective of this work is to conceptually design, implement a prototype, and explore this architecture, evaluating the feasibility of generating emergent narratives that demonstrate a significant degree of longitudinal coherence, character consistency, and plot development capability. This approach seeks to balance agent autonomy with systemic narrative direction, not only expanding the capabilities of LLMs in large-scale content creation but also providing a testbed for artificial cognition in complex environments.

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Introducción

Los Modelos de Lenguaje de Gran Escala (LLM) representan, sin duda alguna, una de las innovaciones tecnológicas de mayor impacto y potencial transformador de la última década. Su irrupción ha redefinido las fronteras de la inteligencia artificial, demostrando capacidades asombrosas en la comprensión y generación del lenguaje natural. Estos modelos han sido empleados con éxito en una multitud de campos para la realización de diversas tareas, entre las que destacan: la generación de contenido creativo y técnico, donde modelos como **GPT-4** (OpenAI 2023) exhiben una fluidez y creatividad notables; la traducción automática y la síntesis de información compleja, facilitando la comunicación y el acceso al conocimiento global; y el desarrollo de asistentes virtuales, capaces de mantener conversaciones coherentes y ofrecer respuestas útiles a las consultas de los usuarios. Su versatilidad también se extiende a la generación de código, el análisis de sentimiento, y la potenciación de sistemas de recomendación, entre otras muchas aplicaciones (Brown y col. 2020).

Dentro de este amplio espectro, una de las facetas más intrigantes y prometedoras de los LLM es su potencial para la creación y el desarrollo de narrativas interactivas y mundos virtuales poblados por personajes autónomos (Park y col. 2023; Ran y col. 2025). La capacidad de los LLM para generar diálogo, describir escenas e incluso razonar sobre situaciones abre la puerta a experiencias narrativas más dinámicas, personalizadas y emergentes que las que ofrecen los sistemas tradicionales.

0.1. Antecedentes

El Grupo de Inteligencia Artificial de la Facultad de Matemática y Computación acumula varios años de experiencia en el procesamiento del lenguaje natural y el desarrollo de modelos de lenguaje. Con la irrupción de los grandes modelos de lenguaje (LLMs), se han actualizado líneas de investigación asociadas al análisis de las capacidades y limitaciones inherentes a estos modelos. Este análisis abarca el estudio de aspectos cruciales como el razonamiento, la coherencia y otras habilidades cognitivas que estos modelos pueden (o no) exhibir.

Dentro de esta renovada línea de investigación, se han gestado diversas tesis y

proyectos centrados en la evaluación de modelos de lenguaje y estrategias de interacción en distintos entornos virtuales, ficticios y controlados, diseñados para medir con precisión dichas capacidades. Estos trabajos exploran aplicaciones variadas, como el uso de modelos de lenguaje para la generación de código, la resolución de problemas lógicos y la optimización de procesos. La presente tesis se enmarca específicamente en este contexto general, concentrándose en la aplicación de modelos de lenguaje para la generación de historias y narrativas.

0.2. Motivación

Si bien los Modelos de Lenguaje de Gran Escala (LLM) han demostrado una capacidad sin precedentes en la generación de texto para una amplia gama de tareas que implican respuestas concisas o interacciones de corto alcance, su eficacia disminuye notablemente cuando se enfrentan a la necesidad de producir contenido extenso, coherente y contextualmente rico a lo largo del tiempo. Esta limitación en la **coherencia longitudinal**, la **gestión de contextos amplios** y la **emergencia narrativa** restringe su aplicabilidad en dominios que exigen un desarrollo narrativo o argumental sostenido (Boriskin y Galimzianova 2024; Yang, C. Li, Haonan Li y col. 2022).

El presente trabajo se motiva por el desafío de superar estas limitaciones, explorando arquitecturas y metodologías que permitan la **emergencia narrativa** a través de la interacción dinámica de agentes autónomos. Para ello, se selecciona el dominio de la **generación de historias y la simulación de mundos virtuales con personajes autónomos como un banco de pruebas particularmente exigente y revelador**. La creación de narrativas digitales inmersivas y coherentes no solo es un objetivo valioso en sí mismo, sino que también sirve como un medio riguroso para:

- **Evaluar y empujar los límites de los LLM:** La generación de historias obliga a los modelos a mantener la consistencia de personajes, tramas y conocimiento del mundo a lo largo de múltiples interacciones y “pasos de tiempo” simulados, exponiendo y permitiendo abordar sus debilidades en la memoria a largo plazo y el razonamiento contextual.
- **Investigar la cognición artificial en entornos complejos:** Simular “pequeñas sociedades” de agentes LLM, cada uno con su propia “mente”, memoria y metas, ofrece una plataforma para estudiar cómo la planificación, la toma de decisiones y la interacción social pueden emerger y sostenerse en el tiempo (T. R. Sumers y col. 2024).
- **Desarrollar sistemas más robustos para aplicaciones de IA:** Las soluciones y arquitecturas desarrolladas para mejorar la generación de historias extensas podrían tener implicaciones directas para mejorar la capacidad de los

LLM en otras tareas de largo formato, como la redacción de informes detallados, la planificación de proyectos complejos o el desarrollo de tutoriales interactivos.

En última instancia, la motivación es doble: avanzar en la capacidad de los LLM para la generación de contenido coherente y emergente a gran escala, y, como resultado, habilitar la creación de experiencias narrativas más ricas y dinámicas que las actualmente posibles.

0.3. Problemática

A pesar del entusiasmo y los avances, la aplicación directa de LLM monolíticos para la generación de narrativas extensas y la simulación de personajes autónomos presenta dificultades significativas. Los LLM, en su forma actual, enfrentan desafíos cruciales que limitan su efectividad en este dominio:

- **Coherencia a Largo Plazo:** Mantener la consistencia de la trama, los atributos de los personajes y el conocimiento del mundo a lo largo de narrativas prolongadas es un problema persistente. Los modelos pueden “olvidar” eventos clave, contradecirse o perder el hilo conductor de la historia (Yang, C. Li, Haonan Li y col. 2022; Yang, C. Li, Ji y col. 2023).
- **Consistencia del Personaje:** Asegurar que un personaje actúe de acuerdo con su personalidad, historia y motivaciones establecidas es complejo. Los LLM pueden generar comportamientos o diálogos que resultan inverosímiles o “fuera de personaje” (Zekun Wang, K. Zhang, Zhaoxiang Wang y col. 2023; Zekun Wang, K. Zhang, W. Li y col. 2024).
- **Alucinaciones y Fabricaciones:** Al igual que en otros dominios, los LLM pueden generar información o eventos narrativos que no tienen base en el contexto establecido o que son simplemente “inventados”, lo que puede romper la inmersión y la credibilidad (Yuan Gao y col. 2024).
- **Agencia y Proactividad Limitadas:** Si bien los LLM pueden reaccionar a **prompts**, lograr una verdadera proactividad donde los agentes establecen sus propias metas a largo plazo y planifican secuencias de acciones complejas para alcanzarlas – y que estas planificaciones se traduzcan efectivamente en acciones válidas dentro de un entorno específico – sigue siendo un área de investigación activa (Lei Wang y col. 2024; Huang, Abbeel y col. 2022).
- **Control Narrativo vs. Autonomía del Agente:** Encontrar el equilibrio entre permitir que los agentes actúen de forma autónoma y guiar la narrativa

general hacia ciertos objetivos o desarrollos deseados es un desafío de diseño fundamental. La intervención directa puede hacer que los agentes parezcan marionetas, mientras que la ausencia total de dirección puede llevar a narrativas estancadas o sin propósito (S. Wang y col. 2024; Méndez y Gervás 2025).

Estos problemas se han observado en intentos previos de usar LLM para la generación de historias o en simulaciones sociales básicas. Por ejemplo, el influyente trabajo “**Generative Agents**” (Park y col. 2023) demostró la capacidad de los LLM para simular comportamientos sociales creíbles a pequeña escala, pero también evidenció la necesidad de arquitecturas más sofisticadas para la memoria y la planificación a largo plazo. Otros enfoques en la planificación narrativa o la IA directora para juegos han explorado diferentes métodos de control, pero a menudo con agentes menos “inteligentes” o con menor capacidad de improvisación lingüística que la que ofrecen los LLM (Simon y Muise 2023; Piotr Mirowski y col. 2023).

La necesidad, por tanto, no es solo tener agentes más “inteligentes” individualmente, sino también diseñar un ecosistema – una arquitectura de simulación y un marco de dirección – que permita que sus interacciones colectivas produzcan narrativas coherentes y significativas, abordando los problemas mencionados (A. S. Vezhnevets y col. 2023).

0.4. Pregunta Científica

La presente investigación busca responder a la siguiente pregunta central: ¿Es posible, mediante el diseño y la implementación de una arquitectura de simulación multi-agente basada en LLMs, donde se incorporen mecanismos de dirección narrativa indirecta a través de la manipulación del entorno, generar narrativas emergentes que exhiban un grado significativo de coherencia longitudinal, consistencia de personajes y capacidad de desarrollo argumental?

0.5. Objetivo General

Este trabajo tiene como objetivo principal el **diseño conceptual, la implementación de un prototipo y la exploración de una arquitectura de simulación multi-agente basada en LLMs para la generación de narrativas emergentes, con un énfasis particular en el estudio de mecanismos de dirección narrativa indirecta a través de la manipulación del entorno.**

0.6. Objetivos Específicos

Para cumplir con el objetivo general, se proponen los siguientes objetivos específicos:

1. **Estudiar y analizar el estado del arte** en arquitecturas de agentes generativos basados en LLM, sistemas multi-agente, planificación narrativa, y técnicas de dirección de IA, identificando las fortalezas, debilidades y oportunidades relevantes para la presente investigación.
2. **Diseñar una arquitectura de simulación** que integre múltiples agentes LLM, cada uno con su propia estructura de memoria, perfil y capacidad de percepción y acción dentro de un entorno digital compartido.
3. **Definir e implementar mecanismos para un “Director”** que pueda observar el estado de la simulación e intervenir indirectamente en la narrativa mediante la alteración de elementos del entorno o la introducción de eventos contextuales, sin controlar directamente a los agentes.
4. **Definir e implementar mecanismos de post-procesamiento** para transformar los registros (logs) de la simulación en una narrativa coherente y completa, incluyendo técnicas para la extensión y conclusión del relato.
5. **Implementar un prototipo funcional** de la arquitectura propuesta, con un escenario de simulación simple pero demostrativo, que permita observar la interacción entre los agentes y los efectos de las intervenciones del Director.
6. **Desarrollar un conjunto de métricas y métodos cualitativos básicos** para evaluar la coherencia de la narrativa emergente, la credibilidad del comportamiento de los agentes y la efectividad de la dirección indirecta.
7. **Analizar los resultados de las simulaciones** para extraer conclusiones sobre la viabilidad del enfoque, los desafíos encontrados y las futuras líneas de investigación.

0.7. Propuesta de Solución

La propuesta de solución se centra en construir un sistema de simulación donde:

- **Agentes Autónomos Basados en LLM:** Cada agente utiliza un LLM (por ejemplo, a través de una API como GPT-3.5/4) como su motor de razonamiento principal para la percepción, la generación de planes de acción, la toma de decisiones y la generación de diálogo.

- **Módulo de Memoria Avanzado:** Inspirado en trabajos como “Generative Agents” (Park y col. 2023), cada agente cuenta con una memoria que almacena observaciones y reflexiones, recuperando información relevante para contextualizar sus decisiones.
- **Entorno Dinámico Interactivo:** Se creó un entorno digital simple pero modificable, donde los agentes pueden percibir cambios (e.g., clima, aparición de objetos) y cuyas alteraciones pueden ser una forma de influencia indirecta.
- **Director de Narrativa Indirecta:** Se exploraron estrategias para que un componente “Director” pueda introducir cambios en el entorno para guiar sutilmente la narrativa hacia ciertos desarrollos (e.g., fomentar la interacción entre dos agentes haciendo que coincidan en un lugar debido a un evento externo).
- **Ciclo de Simulación y Observación:** El sistema opera en un bucle donde los agentes perciben, piensan, actúan, y el Director observa e interviene cuando lo considera oportuno, generando logs detallados para el análisis posterior.
- **Generación de Historia Post-Simulación:** Se implementó un módulo para transformar los logs de eventos detallados de la simulación en una narrativa textual coherente y completa, incluyendo mecanismos para la extensión y conclusión de la historia

Se buscó un equilibrio entre la autonomía de los agentes y la capacidad del sistema para fomentar tramas interesantes y coherentes, atacando los problemas de inconsistencia y falta de dirección mediante una estructura que permita la emergencia controlada.

0.8. Estructura de la Tesis

Además de este capítulo introductorio, la tesis se organiza de la siguiente manera:

- **Capítulo 1: Estado del Arte:** Se presenta un análisis exhaustivo del estado del arte en las áreas de Modelos de Lenguaje de Gran Escala (LLMs), sistemas multi-agente, arquitecturas de agentes generativos, y enfoques para la generación y dirección narrativa. Se revisan en detalle las limitaciones de los LLMs en cuanto a coherencia longitudinal y gestión de contexto, así como los desafíos en la integración de la autonomía del agente con el control narrativo.
- **Capítulo 2: Diseño de la Arquitectura de Simulación:** Se exponen los detalles del diseño propuesto para el sistema, incluyendo la arquitectura de los agentes individuales (módulos de percepción, memoria, razonamiento y acción),

el modelo del entorno, y la concepción del módulo **Director** y sus mecanismos de intervención.

- **Capítulo 3: Implementación del Prototipo:** Se describe la implementación concreta del prototipo, especificando las herramientas, lenguajes de programación, APIs de LLM utilizadas.
- **Capítulo 4: Experimentación y Evaluación:** Se detallan los experimentos realizados con el prototipo, los métodos de recolección de datos (**logs** de simulación, interacciones) y los criterios cualitativos utilizados para evaluar la coherencia narrativa, la credibilidad del comportamiento de los agentes, entre otros. Se presentan y analizan los resultados obtenidos y se reconocen las limitaciones del prototipo desarrollado.
- **Capítulo 5: Conclusiones:** Se sintetizan las principales contribuciones de la tesis, específicamente el diseño y la validación de una arquitectura de simulación multi-agente con dirección narrativa indirecta. Se presentan los hallazgos clave de la experimentación, discutiendo el **trade-off** fundamental entre la originalidad de la trama emergente y la credibilidad de los personajes (donde el sistema propuesto sobresale) frente a la coherencia narrativa lineal y formal. Se evalúa el cumplimiento de los objetivos planteados.

Capítulo 1

Estado del Arte

1.1. Introducción al Estado del Arte

Este capítulo presenta un análisis exhaustivo del estado del arte en las áreas fundamentales que sustentan la presente investigación. Se exploran los conceptos teóricos clave y las innovaciones recientes en el campo de los Modelos de Lenguaje de Gran Escala (LLM), la inteligencia artificial multi-agente, la generación y planificación narrativa, y las estrategias de dirección de IA en entornos simulados. El objetivo es identificar las contribuciones significativas, las metodologías predominantes, y especialmente las limitaciones y desafíos que persisten en la aplicación de estas tecnologías para la creación de narrativas emergentes con personajes autónomos, sirviendo como fundamento para el diseño y desarrollo propuesto en esta tesis.

1.2. Marco Teórico

1.2.1. Grandes Modelos de Lenguaje (LLMs)

Los Modelos de Lenguaje de Gran Escala (LLM, por sus siglas en inglés) han revolucionado el campo del Procesamiento del Lenguaje Natural (PLN) gracias a su capacidad sin precedentes para comprender, generar y manipular texto de manera fluida y contextualizada. Su éxito se fundamenta principalmente en la arquitectura **Transformer**, introducida por Vaswani y col. 2017, que permite un procesamiento eficiente de secuencias de texto a través de mecanismos de auto-atención. Estos modelos son pre-entrenados en vastas cantidades de datos textuales, lo que les confiere una comprensión general del lenguaje, seguida de una fase de ajuste fino (**fine-tuning**) para adaptar sus capacidades a tareas específicas. Modelos como **GPT-3** (Brown y col. 2020) y **GPT-4** (OpenAI 2023) son ejemplos prominentes de esta arquitectura, demostrando habilidades sorprendentes en traducción, resumen, generación de código y

diálogo.

Sin embargo, a pesar de sus impresionantes capacidades, los LLM presentan desafíos inherentes, especialmente cuando se trata de la generación de contenido extendido o la gestión de interacciones a largo plazo. Sus principales limitaciones incluyen la dificultad para mantener la **coherencia longitudinal** a lo largo de narrativas extensas (Boriskin y Galimzianova 2024; Yang, C. Li, Haonan Li y col. 2022; Yang, C. Li, Ji y col. 2023), la **gestión eficiente de contextos amplios** que superan la ventana de atención del modelo (J. Zhang y col. 2024), y la propensión a **alucinaciones** o fabricaciones de información que no tienen base en los datos proporcionados (Yuan Gao y col. 2024). Estas deficiencias son particularmente relevantes en dominios como la generación de historias y la simulación de mundos virtuales, donde la consistencia y la memoria a largo plazo son críticas.

1.2.2. Prompt Engineering

Prompt Engineering es la disciplina de diseñar y optimizar las instrucciones (prompts) dadas a los Modelos de Lenguaje de Gran Escala (LLMs) para guiar su comportamiento y obtener resultados precisos y deseados (P. Liu y col. 2023; Zhou, Schärli y col. 2022). Es fundamental para maximizar la eficacia de los LLMs y mitigar sus limitaciones, como la incoherencia o las alucinaciones. Técnicas como el **few-shot learning**, la asignación de roles y el **prompting** iterativo son esenciales en esta área.

Para la confección práctica de los prompts utilizados en esta tesis, la implementación se apoyó fuertemente en las directrices de la guía de **prompt engineering** de OpenAI (OpenAI 2024). Si bien los trabajos académicos citados proporcionan los paradigmas y la inspiración arquitectónica para el sistema, así como ideas para los módulos de memoria y planificación, el diseño específico y la formulación de las instrucciones para los LLMs se alineó con las prácticas documentadas por esta plataforma líder.

En el contexto de esta tesis, **prompt engineering** es una herramienta clave para diversos componentes:

- **Control de Agentes:** Se utiliza para definir las personalidades, objetivos y reglas de comportamiento de los agentes basados en LLM, y para guiar sus procesos internos de percepción, razonamiento, planificación y memoria (Park y col. 2023; Yuan Gao y col. 2024).
- **Resolutor de Acciones:** El Resolutor de Acciones emplea prompts para transformar las acciones de alto nivel generadas por los agentes en un formato estructurado y estandarizado, que es fácilmente procesable por el entorno simulado y otros módulos del sistema.
- **Dirección Narrativa:** El Director de la narrativa utiliza **prompt engineering** para traducir sus intenciones narrativas en intervenciones sutiles y contextuales

en el entorno, influyendo indirectamente en las decisiones y comportamientos de los agentes para guiar la trama hacia objetivos predefinidos.

- **Generación y Extensión de la Narrativa Final:** Tras la simulación, la **prompt engineering** es crucial para procesar los **logs** brutos de las interacciones. Se utilizan **prompts** cuidadosamente contruidos para generar una historia coherente y legible, así como para extender la narrativa y crear un desenlace que complemente los eventos emergentes de la simulación (Bartalesi y col. 2024; Yang, C. Li, Haonan Li y col. 2022; Xie y Riedl 2024). Este proceso a menudo implica la creación de un único **prompt** comprensivo para un LLM monolítico, condensando todo el contexto y los requerimientos para producir una historia completa.

1.2.3. Concepto de Agente en Inteligencia Artificial

En el ámbito de la Inteligencia Artificial, un agente se define como una entidad que percibe su entorno a través de sensores y actúa sobre él a través de actuadores (Lei Wang y col. 2024; Yifan Cheng y col. 2024). Los agentes se caracterizan por su autonomía, es decir, su capacidad para tomar decisiones y llevar a cabo acciones sin intervención humana directa, basándose en sus percepciones y un conjunto de reglas, lógicas o modelos internos. Un agente ideal debería ser capaz de operar en entornos complejos y dinámicos, mostrando proactividad y reactividad. Los componentes fundamentales de un agente de IA típicamente incluyen un módulo de **percepción** (para procesar el estado del entorno), un módulo de **razonamiento** o **toma de decisiones** (para determinar la acción a seguir), y un módulo de **acción** (para ejecutar la respuesta en el entorno). En el contexto de esta tesis, los LLM son utilizados como el motor central de razonamiento para estos agentes, aprovechando su capacidad inherente para comprender, interpretar y generar lenguaje natural. Esto les permite no solo procesar el contexto y generar planes, sino también producir lenguaje natural como parte de sus interacciones y acciones (Yuan Gao y col. 2024; Lei Wang y col. 2024; Yifan Cheng y col. 2024).

1.2.4. Sistemas Multi-Agente (SMA)

Un Sistema Multi-Agente (SMA) es un sistema compuesto por múltiples agentes autónomos que interactúan entre sí en un entorno compartido para lograr objetivos comunes o individuales (Guo y col. 2024; Yufei Cheng y col. 2024). Estos sistemas son particularmente adecuados para abordar problemas complejos que son difíciles de resolver con un solo agente o con sistemas centralizados. La clave de los SMA reside en la **interacción** y la **coordinación** entre sus componentes. A menudo, la dinámica colectiva y las interacciones entre agentes pueden dar lugar a **comportamientos**

emergentes que no son explícitamente programados en los agentes individuales (W. Chen y col. 2023). En el contexto de la simulación de mundos virtuales y la generación de narrativas, los SMA permiten modelar sociedades o grupos de personajes que interactúan de manera creíble, contribuyendo a la complejidad y riqueza de la historia (A. S. Vezhnevets y col. 2023). La presente investigación se basa en la premisa de que una arquitectura multi-agente puede mitigar las limitaciones de los LLM monolíticos al distribuir el razonamiento y permitir la emergencia de tramas a partir de interacciones localizadas.

1.2.5. Técnicas de Gestión de Memoria para LLMs en Agentes

Una de las principales limitaciones de los LLMs, especialmente para tareas que requieren coherencia a largo plazo como la generación de narrativas extendidas, es su **ventana de contexto** finita. Esto significa que el modelo solo puede procesar y “recordar” una cantidad limitada de información de interacciones pasadas, lo que inherentemente afecta la coherencia longitudinal y la gestión de contextos amplios en tareas sostenidas. (Y. Zhang y col. 2024; Boriskin y Galimzianova 2024; Yang, C. Li, Haonan Li y col. 2022; Yang, C. Li, Ji y col. 2023) Para superar esta restricción y dotar a los agentes basados en LLM de una **memoria a largo plazo**, se han desarrollado diversas técnicas que complementan la memoria inherente del modelo. (Yuan Gao y col. 2024; Lichao Wang y col. 2024; Yufei Cheng y col. 2024; Guo y col. 2024; Park y col. 2023)

Estas técnicas generalmente implican el uso de un almacenamiento externo de memoria, que puede ser consultado por el LLM para recuperar información relevante en el momento adecuado. (Y. Zhang y col. 2024; Yuan Gao y col. 2024; Park y col. 2023) Ejemplos de enfoques incluyen:

- **Memoria episódica:** Almacena observaciones directas o eventos pasados de un agente. (Park y col. 2023; Shinn y col. 2023; Huang, F. Chen y col. 2022; T. Sumers y col. 2024; Hu y col. 2024; A. Vezhnevets y col. 2023)
- **Memoria semántica/reflexiva:** El agente procesa sus recuerdos episódicos para inferir conocimientos de alto nivel (creencias, relaciones, metas, resúmenes) y los almacena de forma organizada. (Park y col. 2023; Shinn y col. 2023; Huang, F. Chen y col. 2022; G. Wang y col. 2023; Zhou, Ding y col. 2023; T. Sumers y col. 2024; Yuan Gao y col. 2024; Lichao Wang y col. 2024; Guo y col. 2024)
- **Mecanismos de recuperación:** Utilizan algoritmos de similitud (por ejemplo, basados en **embeddings** vectoriales) para buscar y recuperar los fragmentos de memoria más pertinentes a la consulta o al contexto actual del agente. (Park y col. 2023; Y. Zhang y col. 2024; Yao y col. 2023; Hu y col. 2024)

Un trabajo seminal en esta área es “**Generative Agents: Interactive Simulacra of Human Behavior**” (Park y col. 2023), que introduce una arquitectura de memoria con diferentes niveles de abstracción (memoria de experiencias, memoria de reflexión y memoria de planificación) y un mecanismo de recuperación y síntesis para informar el comportamiento de agentes autónomos en un mundo simulado. Esta aproximación permite a los agentes recordar eventos, reflexionar sobre ellos y planificar acciones a largo plazo, lo que es fundamental para la consistencia del personaje y la progresión narrativa. (Park y col. 2023; Shinn y col. 2023; Yuan Gao y col. 2024; Lichao Wang y col. 2024)

1.2.6. Planificación y Razonamiento en Agentes Basados en LLMs

La capacidad de planificar y razonar es fundamental para la autonomía de un agente, permitiéndole navegar y operar de forma coherente en entornos dinámicos (Yuan Gao y col. 2024; Lichao Wang y col. 2024). Tradicionalmente, la planificación en IA ha dependido de algoritmos explícitos y modelos del mundo predefinidos. Sin embargo, con el advenimiento de los Grandes Modelos de Lenguaje (LLMs), estos modelos han demostrado un potencial significativo para fungir como el “cerebro” central de los agentes, aprovechando su comprensión del lenguaje natural para generar planes de acción y razonar sobre situaciones complejas (Yufei Cheng y col. 2024; Yuan Gao y col. 2024; T. Sumers y col. 2024; Zhou, Ding y col. 2023). Su habilidad para procesar y generar lenguaje les permite tanto interpretar las observaciones del entorno como formular estrategias en un formato inteligible (Yuan Gao y col. 2024; Lichao Wang y col. 2024).

Los enfoques más comunes para la planificación y el razonamiento basados en LLMs incluyen:

- **Generación de planes paso a paso (Chain-of-Thought):** Los LLMs pueden descomponer un objetivo de alto nivel en una secuencia de acciones más pequeñas y manejables (Huang, Abbeel y col. 2022; Zhou, Ding y col. 2023). Este proceso, a menudo descrito como “pensar en voz alta”, permite al LLM articular sus pasos intermedios, lo que facilita la elaboración de planes más complejos y coherentes para tareas secuenciales (Yao y col. 2023).
- **Razonamiento de sentido común:** Los LLMs aprovechan el vasto conocimiento inherente adquirido durante su pre-entrenamiento para inferir implicaciones de acciones o estados del mundo, permitiendo una toma de decisiones más robusta y “humana” (Ammanabrolu y col. 2020; Gandhi y col. 2023). Esto les permite predecir consecuencias, comprender motivaciones y llenar vacíos lógicos en el desarrollo de planes narrativos.

- **Reflexión y auto-corrección:** Para mejorar la robustez y adaptabilidad de los planes, algunos sistemas incorporan mecanismos donde el LLM puede revisar sus propias acciones o planes, identificar errores o ineficiencias, y ajustarlos en un bucle de retroalimentación (Shinn y col. 2023; Huang, F. Chen y col. 2022). Estos mecanismos permiten que el agente no solo actúe, sino que también aprenda y mejore su estrategia a lo largo del tiempo, crucial para la adaptabilidad en entornos dinámicos.

A pesar de estos avances significativos, lograr una **verdadera proactividad** y una **planificación a largo plazo** donde los agentes establecen sus propias metas complejas y las persiguen de manera sostenida, sigue siendo un área de investigación activa y un desafío persistente (Yufei Cheng y col. 2024; Yuan Gao y col. 2024; Huang, Abbeel y col. 2022; Lichao Wang y col. 2024). Un estudio reciente sugiere que los LLMs, aunque excelentes en la “planificación” paso a paso (similar a seguir una receta), pueden carecer de un “razonamiento” lógico genuino que implica inferencia profunda y resolución de contradicciones (Zhou, Ding y col. 2023). Los agentes basados en LLM a menudo sobresalen en tareas de corto alcance y reactivas, pero mantener la coherencia y la intención en secuencias extendidas de acciones o a través de múltiples interacciones se ve limitado por la ventana de contexto finita de los LLMs y la dificultad para mantener un estado interno consistente (X. Liu y col. 2023). Esto afecta directamente la credibilidad del personaje y la progresión fluida y lógica de una narrativa emergente, como lo demuestran las limitaciones observadas en **benchmarks** de razonamiento a largo plazo y juegos complejos (Gandhi y col. 2023; X. Liu y col. 2023; Zekun Wang, K. Zhang, W. Li y col. 2024).

1.3. Trabajos Relacionados

En esta sección, se analizan en detalle los trabajos más relevantes con respecto a la problemática de esta tesis. Estos han explorado la aplicación de los Modelos de Lenguaje de Gran Escala en la simulación de agentes autónomos, la generación de narrativas, y las estrategias para dirigir narrativas. A continuación, se prestará atención a cómo estos trabajos abordan las limitaciones de coherencia, consistencia y autonomía/control.

Generative Agents: Interactive Simulacra of Human Behavior (Park y col. 2023). Uno de los hitos más influyentes en el campo de los agentes generativos basados en LLM es este trabajo. Aborda la problemática de la falta de comportamientos complejos y coherentes a largo plazo en personajes simulados, donde los LLMs monolíticos luchan con la memoria y la coherencia. Proponen una arquitectura de agente que integra un LLM como su “cerebro” de razonamiento con una novedosa “arquitectura de memoria” que organiza las experiencias de un agente cronológicamente, permite

la reflexión para derivar conocimientos de alto nivel, y utiliza estos conocimientos junto con la planificación jerárquica para guiar el comportamiento. Demostraron que sus agentes podían simular comportamientos sociales creíbles a pequeña escala, como organizar fiestas o seguir rutinas diarias, exhibiendo patrones de interacción que emergían de sus “personalidades” y recuerdos. Este trabajo estableció un marco fundamental para la creación de personajes autónomos basados en LLM, mostrando el potencial de la memoria estructurada y la reflexión para superar las limitaciones de coherencia a medio y largo plazo. La presente tesis se inspira fuertemente en su módulo de memoria y la conceptualización de los agentes; sin embargo, su objetivo principal es la emergencia de comportamientos sociales complejos en un **sandbox**, no la creación de narrativas extensas o con un desarrollo argumental intencionado que trascienda la simulación social espontánea, lo que resalta la brecha que esta tesis busca abordar.

Concordia: A Library for Generative Agent-Based Modeling (A. S. Vezhnets y col. 2023). En la misma línea de desarrollo de arquitecturas robustas para la simulación de agentes generativos, **Concordia** ofrece un marco modular para la construcción de sistemas multi-agente enfocados en interacciones sociales complejas. Su problemática es desarrollar un marco flexible para Modelos Basados en Agentes Generativos (**GABMs**) que puedan simular interacciones sociales, superando la rigidez de los modelos tradicionales y las limitaciones de coherencia de los LLM puros. Proponen una biblioteca con un **Game Master (GM) Agent** que simula el entorno y procesa acciones, y **Concordia Agents** con componentes flexibles para gestionar identidad, planes y observaciones. Demostraron su utilidad en diversas aplicaciones, desde estudios de usuarios sintéticos hasta experimentos de dilemas sociales. **Concordia** es muy relevante para esta tesis por su concepto de **Game Master (GM) Agent**, que sirvió de fuerte inspiración para el diseño del **Action Resolver** propuesto aquí, encargado de validar y ejecutar acciones en el mundo simulado. No obstante, es crucial distinguir este rol del “Director” propuesto en esta tesis, cuyo propósito es la dirección activa y sutil de la trama a través de intervenciones indirectas en el entorno, algo que el GM de **Concordia** no explora explícitamente.

BookWorld: From Novels to Interactive Agent Societies for Creative Story Generation (Ran y col. 2025). Este trabajo aborda la generación de historias a partir de simulaciones de agentes, buscando superar la falta de anclaje en universos ficticios o mecanismos explícitos para guiar narrativas sin perder fidelidad al material fuente. Proponen **BookWorld**, un sistema que construye sociedades multi-agente directamente de novelas, extrayendo perfiles, relaciones y un “mundo” detallado. La simulación utiliza **Role Agents** y un **World Agent**, operando en “escenas” discretas. Soporta un “Modo Libre” y un “Modo Guion”, y finalmente refrasea las interacciones para generar historias al estilo de una novela, manteniendo alta fidelidad e inmersión. **BookWorld** es relevante por su enfoque en la construcción de sociedades de agentes con memoria y perfiles detallados, lo cual contribuye a la coherencia y credibilidad de los personajes.

Aunque incluye un “Modo Guion” para el control, su dirección es más explícita y centrada en la fidelidad al material fuente o guía directa del usuario.

Dramatron: Towards an Autonomous AI Dramaturg (Peter Mirowski y col. 2022). Este trabajo introduce un sistema interactivo para la co-escritura creativa de guiones teatrales y cinematográficos. Su problemática es que los LLMs tienen dificultades para generar texto creativo de formato largo manteniendo coherencia a largo plazo, consistencia de personajes y progresión argumental. Proponen un sistema basado en **generación narrativa jerárquica** y **prompt chaining**, donde el proceso descompone una trama inicial en elementos secuenciales (título, personajes, esquema, ubicaciones, diálogo) que guían la generación en niveles inferiores. Los resultados de estudios de usuarios indicaron que **Dramatron** es una herramienta útil para la “co-creación”, permitiendo a los usuarios mantener el control creativo. Este trabajo demuestra la utilidad de los LLMs en roles de asistencia creativa y su capacidad para construir narrativas complejas, lo que valida la premisa de la presente tesis sobre la necesidad y viabilidad de un **agente director** que influya en la narrativa.

StoryVerse: A System for Living Stories with LLM-Driven Characters (S. Wang y col. 2024). Este sistema busca equilibrar el control autoral con el comportamiento emergente de personajes impulsados por LLMs en la generación de narrativas dinámicas para juegos. Su problemática radica en la dicotomía entre narrativas rígidamente guionizadas y narrativas puramente emergentes que carecen de coherencia argumental. **StoryVerse** propone un flujo de trabajo donde los escritores definen esquemas de alto nivel mediante “actos abstractos”. Un componente clave, el **Act Director**, utiliza un proceso de planificación narrativa basado en LLM para instanciar estos actos abstractos en secuencias de acciones concretas de los personajes, adaptándose al estado del juego. Demostró la viabilidad de generar historias dinámicas que combinan estructura autoral con reactividad y emergencia del comportamiento de los personajes. Este trabajo es de gran relevancia para la presente tesis, ya que su **Act Director** sirvió como una **inspiración directa** para la conceptualización del Director propuesto aquí, validando el concepto de un componente director impulsado por IA. Se distingue por el *mecanismo de dirección* donde el **Act Director** de **StoryVerse** genera acciones directamente para los personajes.

Using Large Language Models to Create Narrative Events (Bartalesi y col. 2024). Este trabajo explora la capacidad de los LLMs para estructurar información textual en eventos narrativos discretos, abordando el desafío de transformar narrativas textuales crudas en eventos estructurados sin generar contenido nuevo o modificar el original. Proponen integrar LLMs de código abierto en un flujo de trabajo centrado en la ingeniería de **prompts** para guiar al modelo en la segmentación del texto, enfatizando la importancia de limitar la longitud del texto de entrada para mantener la consistencia. Sus hallazgos subrayan la importancia de la **prompt engineering** y la gestión de la ventana de contexto para tareas de estructuración. Este estudio

es relevante para la presente tesis porque aborda directamente la problemática de **estructurar datos textuales (como los logs de la simulación propuesta) en un formato narrativo coherente**, aportando ideas interesantes sobre cómo post-procesar la información cruda de la simulación para su posterior generación de historia.

Re3: Recursive Reprompting and Revision (Yang, C. Li, Haonan Li y col. 2022). Este trabajo propone un marco para la generación autónoma de historias extensas y coherentes, un desafío significativo para los LLMs monolíticos que tienden a perder el hilo narrativo en documentos largos. Proponen el marco *Recursive Reprompting and Revision* (Re3), que imita el proceso de escritura humana en un ciclo iterativo de Planificación, Borrador (generación recursiva con contexto relevante), Reescritura (selección de continuaciones basadas en coherencia) y Edición (corrección de inconsistencias). Las evaluaciones humanas mostraron que Re3 mejoró significativamente la coherencia y la relevancia de historias extensas. Este trabajo ofrece perspectivas valiosas sobre la generación de narrativas extensas y coherentes de forma autónoma, y su enfoque en la **generación recursiva e iterativa de texto con mecanismos de revisión y corrección** proporciona un marco conceptual útil para abordar la fase de **extensión narrativa y generación del final** en la propuesta de esta tesis, especialmente para manejar historias que terminan abruptamente.

Creating Suspenseful Stories with Iterative Prompting (Xie y Riedl 2024). Este trabajo propone una metodología para guiar a los LLMs en la generación de historias que exhiben una cualidad narrativa específica: el suspenso, abordando el desafío de controlar cualidades narrativas complejas de manera consistente. Proponen un método de **planificación basada en prompts iterativos** para que los LLMs generen suspenso, fundamentado en teorías psicológicas y narratológicas. El proceso implica Configuración del Contexto, Planificación del Esquema (generación de acciones y “adversarialmente” razones para el fracaso) y Elaboración de Detalles. Las evaluaciones humanas mostraron que las historias generadas con este método fueron significativamente más suspensivas, novedosas y agradables. Este estudio es pertinente para la presente tesis ya que aporta una metodología relevante para **dirigir la generación narrativa de los LLMs hacia un objetivo cualitativo específico mediante un proceso iterativo de planificación y prompting**. Su enfoque en la guía del LLM a través de pasos de planificación y revisión para alcanzar una meta narrativa particular, sirve como un precedente metodológico para desarrollar el enfoque de **prompting iterativo** propuesto en esta tesis para la generación de un desenlace coherente y concluyente a partir de los logs de la simulación.

1.4. Conclusiones del Estado del Arte

El análisis del estado del arte ha revelado que los Modelos de Lenguaje de Gran Escala (LLMs) poseen un potencial transformador para la creación de narrativas interactivas y la simulación de personajes autónomos. Trabajos seminales como “**Generative Agents**” (Park y col. 2023) y marcos modulares como “**Concordia**” (A. S. Vezhnevets y col. 2023) han demostrado la viabilidad de construir agentes con memoria y capacidad de reflexión, capaces de exhibir comportamientos sociales emergentes y diálogos creíbles. De igual manera, sistemas como “**Dramatron**” (Peter Mirowski y col. 2022) y “**StoryVerse**” (S. Wang y col. 2024) han explorado diversos mecanismos de control narrativo, desde la co-creación jerárquica hasta directores de trama basados en LLMs.

Sin embargo, persisten desafíos significativos. Específicamente, la integración efectiva de agentes autónomos en un sistema capaz de **guiar sutilmente la narrativa emergente hacia objetivos predefinidos a través de la manipulación indirecta del entorno**, sin comprometer la agencia de los personajes, sigue siendo un área con oportunidades de investigación. Aunque se han propuesto soluciones para la coherencia longitudinal en la generación de texto (como **Re3** (Yang, C. Li, Haonan Li y col. 2022)) y para la estructuración de eventos narrativos (Bartalesi y col. 2024), la aplicación de estas técnicas para **extender y concluir coherentemente una narrativa nacida de una simulación dinámica multi-agente** aún no ha sido explorada a fondo en conjunto con un mecanismo de dirección indirecta.

La presente tesis se posiciona en esta brecha. Inspirándose en las arquitecturas de agentes generativos y los principios de la IA directora, se propone el diseño y la exploración de una arquitectura de simulación multi-agente donde un “Director” interviene en el entorno de manera estratégica. Este enfoque busca mitigar las limitaciones de los LLMs monolíticos al fomentar la emergencia de narrativas coherentes y significativas a partir de las interacciones autónomas de los agentes, pero guiadas por eventos externos contextualmente relevantes. De esta manera, se busca demostrar la viabilidad de generar historias ricas y dinámicas que superen los problemas de coherencia y dirección observados en trabajos previos, sentando las bases para el diseño detallado que se presentará en el próximo capítulo.

Capítulo 2

Propuesta

2.1. Introducción al Diseño

Este capítulo presenta el diseño de una arquitectura de simulación que integra **agentes autónomos** basados en LLM, inspirados en **Generative Agents** (Park y col. 2023). Incluye un “Director” capaz de influir indirectamente en la narrativa a través de la manipulación del entorno, y un **Resolutor de Acciones** (**Action Resolver**) que gestiona la dinámica del mundo y las interacciones, tomando como referencia el concepto de **Game Master** de **Concordia** (A. S. Vezhnevets y col. 2023). Esta arquitectura se concibe como un ecosistema dinámico donde la narrativa emerge de la interacción sinérgica entre sus componentes clave: agentes con módulos de memoria y planificación, un **Entorno** (**WorldState**) coherente, un **Resolutor de Acciones** que arbitra interacciones, y un **Despachador de Eventos** (**Event Dispatcher**) que garantiza el flujo de información. Representación visual en la Figura 2.1.

2.2. Diseño del Agente

Los Agentes son los actores principales de la simulación, capaces de percibir, razonar, planificar y actuar autónomamente. Cada agente se diseña modularmente para mantener la coherencia de su comportamiento, utilizando un Modelo de Lenguaje de Gran Escala (LLM) como su “cerebro” central, complementado por subsistemas de memoria, percepción y planificación.

2.2.1. Identidad y Perfil del Agente

Para dotar a cada agente de una personalidad y propósito distintivos, se define un perfil estático que ancla el comportamiento del LLM. Incluye:

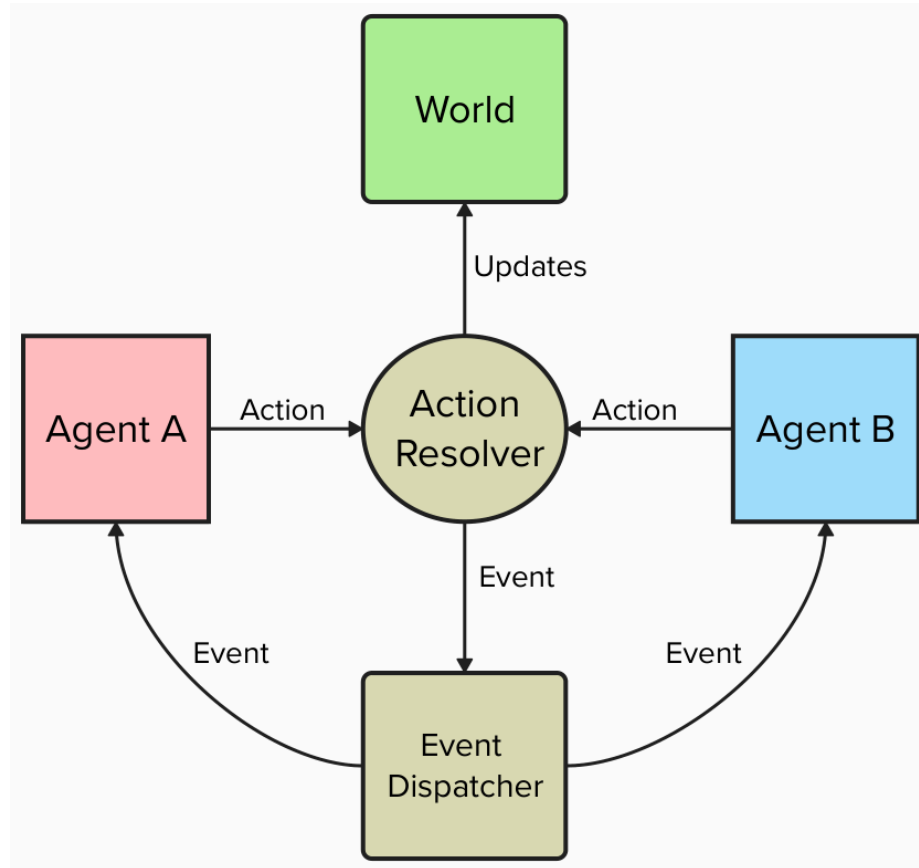


Figura 2.1: Diagrama Arquitectónico del Sistema de Simulación Propuesto

- **Nombre** (`name`): Identificador único.
- **Identidad** (`identity`): Párrafo descriptivo conciso que encapsula la esencia del personaje (género, personalidad, metas, trasfondo), análogo a **Generative Agents** (Park y col. 2023).
- **Contexto Inicial** (`initial_context`): Descripción que sitúa al agente en su entorno inicial y explica su rol.

Estos atributos se incorporan en los **prompts** del LLM, guiando su razonamiento y acciones para asegurar la fidelidad a su carácter.

2.2.2. Módulo de Memoria

Para superar la ventana de contexto limitada de los LLM y permitir la coherencia a largo plazo, cada agente incorpora un **Módulo de Memoria**. Este módulo almacena,

organiza y recupera información relevante para el LLM del agente. Su diseño es de doble nivel:

- **Memoria a Corto Plazo:** Secuencia cronológica de observaciones y acciones recientes, proporcionando contexto inmediato para decisiones.
- **Memoria a Largo Plazo (Reflexiones):** Conocimientos de alto nivel, inferencias y resúmenes derivados de experiencias acumuladas. Son cruciales para la consistencia del personaje y la progresión de metas.

La gestión incluye el almacenamiento continuo de eventos, la generación periódica de reflexiones por el LLM (tras un umbral de nuevos eventos), y la recuperación de contexto para el LLM, priorizando elementos recientes y todas las reflexiones. Este diseño asegura que reflexiones y recuperación de información estén fuertemente ligadas a la **identidad central y las metas del agente**.

2.2.3. Módulo de Planificación y Razonamiento

El **Módulo de Planificación y Razonamiento** es el núcleo cognitivo del agente, impulsado por un LLM. Procesa información para determinar el comportamiento en cada turno, exhibiendo proactividad y reactividad. El proceso de toma de decisiones comprende:

1. **Recopilación de Contexto:** El agente reúne su identidad y perfil, información relevante de su memoria (corto y largo plazo), y una descripción del entorno perceptible.
2. **Generación de la Intención de Acción por el LLM:** Con el contexto integral, el LLM razona y genera una **intención de acción** en lenguaje natural.
3. **Naturaleza de las Intenciones de Acción:** Las intenciones están diseñadas para un mundo social interactivo:
 - **Diálogo:** Conversar con otro agente.
 - **Interacción con Objetos:** Manipular objetos en el entorno inmediato.
 - **Movimiento:** Desplazarse a otra ubicación.
 - **Interacciones Físicas Mediadas por Diálogo:** Acciones físicas simples hacia otros personajes expresadas verbalmente.

La salida es una descripción textual de la acción. La validación final y las consecuencias recaen en el **Resolutor de Acciones (Action Resolver)**, lo que permite autonomía interpretativa a los agentes manteniendo la coherencia del mundo.

2.3. Diseño del Entorno (WorldState)

El **Entorno** (**WorldState**) es la representación digital del mundo simulado, actuando como la “fuente de verdad” central. Mantiene el estado actualizado de elementos que agentes o el Director pueden percibir y modificar:

- **Ubicaciones** (**locations**): Nombres únicos con descripciones y conexiones entre ellas.
- **Objetos** (**objects**): Interactuables en ubicaciones, definidos por **name**, **description** y un estado dinámico (ej., puerta abierta/cerrada).
- **Ubicación de Agentes** (**agent_locations**): Registro de la localización de cada agente.
- **Propiedades Globales** (**global_context**): Variables de estado que afectan el mundo simulado (actualmente, el **clima**, modificable mediante el Director).
- **Registro de Eventos** (**event_log**): Historial cronológico de todos los eventos significativos (acciones, cambios de estado, intervenciones del Director), esencial para la observación y post-procesamiento.

El **WorldState** es dinámico: es consultado por agentes y Director, y actualizado por el **Resolutor de Acciones** o el Director.

2.4. Diseño del Resolutor de Acciones (Action Resolver)

El **Resolutor de Acciones** es el árbitro central que traduce las *intenciones de acción* de los agentes (en lenguaje natural) en resultados concretos que modifican el **WorldState**, garantizando coherencia. Es análogo a un “**Game Master**”. Su proceso de resolución incluye:

1. **Recepción de la Intención:** Recibe la intención textual del agente activo.
2. **Interpretación de la Intención:** Su propio LLM analiza la intención para extraer el tipo de acción (**hablar**, **moverse**, **interactuar**) y parámetros relevantes.
3. **Validación de la Acción:** Comprueba la acción propuesta contra el **WorldState** y las reglas (ej., agente objetivo en misma ubicación para diálogo, objeto existente y estado lógico para interacción, camino accesible para movimiento).

4. **Determinación del Resultado y Razonamiento:** Determina si la acción es exitosa o fallida, proporcionando un razonamiento y una descripción concisa del desenlace.
5. **Actualización del Entorno:** Si es exitosa, invoca al `WorldState` para aplicar las modificaciones.
6. **Generación de Evento:** Formula un evento detallado del resultado, que será despachado por el **Despachador de Eventos**.

Este componente es crucial para la consistencia y credibilidad, impidiendo acciones imposibles y canalizando la autonomía de los LLM dentro del marco del juego. No se encarga de la percepción de eventos por otros agentes, función del **Despachador de Eventos**.

2.5. Diseño del Despachador de Eventos (Event Dispatcher)

El **Despachador de Eventos** gestiona la comunicación y notificación en el sistema. Su función es distribuir eventos generados por las acciones de los agentes a quienes deben percibirlos, permitiendo actualizar su conocimiento del mundo. Cada ocurrencia se encapsula en una estructura de **Evento (Event)** con atributos como `description`, `location`, `scope` (local/global), `step` y `triggered_by`. El proceso de despacho:

1. **Generación y Recepción de Eventos:** El **Resolutor de Acciones** (u otro componente como el Director) crea una instancia de evento.
2. **Filtrado por Alcance y Ubicación:** El Despachador evalúa el `scope` del evento para determinar qué agentes lo perciben (local si están en la misma ubicación, global para todos).
3. **Notificación a Agentes:** Los agentes que cumplen los criterios incorporan el evento en su **módulo de memoria**. Los cambios ambientales del Director son percibidos por los agentes como naturales (ej., “está lloviendo”), no como acciones directas del Director.
4. **Notificación al Director:** El Director es notificado de *todos los eventos* para su evaluación narrativa.

Este diseño asegura un flujo de información controlado y pertinente, vital para la emergencia de narrativas creíbles.

2.6. Diseño del Director

El **Director** es un componente clave para la dirección narrativa indirecta, un énfasis particular de esta tesis. Su propósito es guiar sutilmente la trama hacia un objetivo narrativo predefinido sin comprometer la autonomía de los agentes. Es una entidad semi-autónoma con su propio LLM y memoria, adaptada a su rol de orquestador. Aspectos clave de su diseño:

- **Objetivo Narrativo** (`narrative_goal`): Meta argumental expresada en lenguaje natural que el Director busca influir.
- **Percepción Panorámica**: Visión global de la simulación, recibiendo todos los eventos y consultando directamente el **WorldState** (ubicaciones de agentes, objetos, propiedades globales).
- **Módulo de Memoria**: Similar al de los agentes, con mayor capacidad a corto plazo, para recordar el progreso narrativo y resultados de intervenciones pasadas.
- **Módulo de Razonamiento Estratégico**: Impulsado por un LLM, evalúa la situación en relación con el `narrative_goal`, decidiendo cuándo intervenir o “no hacer nada”.
- **Mecanismos de Intervención Indirecta**: Acciones estrictamente limitadas a la manipulación del **Entorno**, aplicadas **directamente al WorldState** sin pasar por el **Resolutor de Acciones**. Incluyen:
 - **Cambiar el Clima** (`CHANGE_WEATHER`).
 - **Añadir Objetos** (`ADD_OBJECT`) en ubicaciones específicas.
- **Restricciones de Intervención para Consistencia**: No puede modificar/eliminar objetos existentes ni controlar directamente a los agentes. Su influencia se basa en alterar el contexto ambiental.
- **Timing de Intervención Granular**: Ejecuta su ciclo antes del turno de cada agente dentro de cada paso de simulación, permitiendo reacciones oportunas y contextualizadas.

Así, el Director orquesta el escenario sin controlar directamente a los personajes, fomentando el desarrollo de tramas significativas y coherentes mientras preserva la ilusión de libre albedrío.

2.7. Generación de Historia a partir de Logs de Simulación

La simulación produce un `event_log` detallado, una secuencia cruda de eventos. Para transformarlo en una narrativa fluida, se propone un componente de **Generación de Historia** como fase de post-procesamiento, utilizando un LLM como “narrador”. Las etapas conceptuales son:

1. **Contextualización del Narrador:** El LLM narrador recibe el `event_log` junto con el **objetivo narrativo**, el **tono** deseado y las **identidades de los agentes**. Esto le permite inferir motivaciones y añadir profundidad.
2. **Generación del Borrador Inicial (Initial Draft Story):** El LLM procesa el `event_log` **exclusivamente por segmentos (chunks)** para manejar la longitud. Se construye un **prompt** para cada segmento que incluye la narrativa acumulada y los eventos actuales, instruyendo al LLM a escribir solo el siguiente segmento. Los segmentos se concatenan, generando una narrativa fiel pero que puede terminar abruptamente.
3. **Refinamiento Iterativo y Generación del Final:** Un proceso iterativo sobre el borrador inicial. El LLM evalúa si la historia ha alcanzado una conclusión adecuada o necesita extensión, guiándose por el `narrative_goal`. Si se requiere, genera contenido adicional, repitiendo el ciclo hasta una conclusión satisfactoria o un máximo de iteraciones.

Este diseño transforma los datos brutos de la simulación en una historia completa, coherente y legible, que refleja interacciones autónomas y la influencia del objetivo narrativo.

2.8. Conclusiones del Diseño Conceptual

Este capítulo ha presentado el diseño conceptual de una arquitectura de simulación multi-agente basada en LLM. Se han detallado los **agentes** (identidades, memoria, planificación), el **Entorno (WorldState)**, el **Resolutor de Acciones**, el **Despachador de Eventos**, y el **Director** para la dirección narrativa indirecta. Finalmente, se ha delineado la **Generación de Historia** a partir de los logs. La principal contribución conceptual reside en el equilibrio entre agencia del personaje y coherencia argumental, empleando un **Director que interviene exclusivamente a través de la manipulación ambiental**. Este enfoque fomenta el desarrollo narrativo deseado de forma orgánica, preservando la autonomía de los agentes y contrastando con métodos más intrusivos. La modularidad de los componentes, la gestión de eventos

y memoria, junto con un post-procesamiento narrativo adaptable a la escala de los `logs`, proveen un marco flexible y potente para la creación de historias dinámicas.

El siguiente capítulo, **Implementación del Prototipo**, detallará la materialización de esta arquitectura, describiendo las herramientas, tecnologías y decisiones técnicas clave.

Capítulo 3

Implementación del Prototipo

3.1. Visión General del Entorno y Tecnologías

El prototipo de simulación multi-agente fue desarrollado en **Python**, aprovechando su versatilidad para la inteligencia artificial. La lógica central del sistema se implementó utilizando el modelo de lenguaje de gran escala **Gemini 2.0 Flash Lite** de Google, interactuando con él a través de su API oficial. Un aspecto clave fue el ajuste granular de la temperatura para optimizar el comportamiento del LLM según el rol específico de cada módulo. La arquitectura se fundamenta en principios de programación orientada a objetos para la modularidad, y el almacenamiento de memoria y **logs** se realiza en archivos de texto plano para simplificar el desarrollo inicial.

3.2. Implementación de los Componentes Clave de la Arquitectura

A continuación, se describe técnicamente cómo se implementó cada componente principal de la arquitectura del sistema.

3.2.1. Implementación de los Agentes

Los agentes son la unidad fundamental de autonomía en la simulación. Cada agente posee una **identidad** estática que define su perfil y metas, siendo inyectada directamente en el **prompt** del LLM en cada ciclo de planificación. Su ciclo cognitivo principal involucra dos métodos:

- Un método para **percibir** eventos del mundo y añadirlos a su memoria interna.

- Un método para **planificar**, que encapsula el ciclo de pensamiento donde el agente consulta su memoria y el estado del mundo para generar una intención de acción textual. Esta intención también se registra en su propia memoria para mantener la coherencia a largo plazo.

Módulo de Memoria del Agente

La memoria de los agentes se implementa en un sistema de doble nivel, priorizando la simplicidad y la interpretabilidad sobre los **embeddings** vectoriales.

- **Memoria a Corto Plazo:** Una lista de observaciones y acciones recientes.
- **Memoria a Largo Plazo:** Almacena “reflexiones” de alto nivel. Estas son generadas por un **LLM dedicado a la reflexión** cuando el número de nuevas observaciones alcanza un umbral. El **prompt** para la reflexión instruye al LLM a generar ideas clave o resúmenes sobre la situación. Un ejemplo conceptual del **prompt** de reflexión se presenta en el Apéndice 4.6.1.

Para la planificación, se construye un resumen combinado de ambas memorias, priorizando elementos recientes y reflexiones clave, para ser utilizado como contexto en el **prompt** del LLM de planificación del agente.

Módulo de Planificación y Razonamiento del Agente

Este módulo procesa la información disponible para determinar la intención de acción del agente. Recopila la identidad del agente, el contexto estático del mundo (obtenido del componente de estado global) y el contexto relevante de la memoria del agente. Con base en estas entradas, construye una **instrucción integral** que proporciona al LLM todo el contexto necesario para razonar y decidir la siguiente acción del agente. La estructura de esta instrucción se detalla en el Apéndice 4.6.2. Se implementa un manejo robusto de errores para las llamadas al LLM, garantizando la continuidad de la simulación.

3.2.2. Implementación del Entorno (WorldState)

Este es el componente central que gestiona el estado de todo el mundo simulado. Almacena información crucial como la ubicación de los agentes, descripciones y conectividad de ubicaciones, propiedades específicas de cada lugar (incluyendo objetos interactuables y sus estados), propiedades globales (como el clima), y un **registro cronológico** de todos los eventos significativos (**event_log**). Provee métodos para la consulta y modificación controlada del estado, y es fundamental para generar una

descripción textual del entorno inmediato de un agente, el cual es sabido gracias a que se es actualizada un diccionario con las localizaciones de cada agente, que se utiliza como parte del **prompt** del LLM del agente para informar su razonamiento.

3.2.3. Implementación del Resolutor de Acciones (**Action Resolver**)

Este módulo interpreta las intenciones de acción en lenguaje natural de los agentes, las valida contra el estado del mundo y determina su resultado. Su proceso de resolución se basa en un **prompt** detallado que se envía a su propio LLM. Este **prompt** tiene una importancia fundamental, ya que instruye al LLM sobre su rol, le proporciona el contexto necesario (incluyendo **la descripción del entorno tal como lo percibe el agente**), le especifica una **estructura de salida estricta** de cinco partes (**Success Status | Action Type | Parameters | Outcome Description | Outcome Reason**) y proporciona **ejemplos concretos** de intenciones y resoluciones esperadas. La estructura de este **prompt** se detalla en el Apéndice 4.6.3.

Después de la invocación del LLM y el análisis de la respuesta, el Resolutor realiza una validación programática crucial de la acción contra las reglas y el estado actual del mundo, asegurando que las acciones se adhieran a la consistencia del mundo simulado antes de aplicar las actualizaciones de estado.

3.2.4. Implementación del Despachador de Eventos (**Event Dispatcher**)

El Despachador de Eventos es el mecanismo de notificación del sistema. Cada ocurrencia significativa en la simulación se encapsula en una estructura **Event** donde esta contiene información relevante como la descripción del evento, el alcance del mismo (“local” o “global”) y quien fue el autor del evento. El despachador recibe estos eventos y los filtra, notificando únicamente a los agentes relevantes (basado en el alcance del evento y la ubicación del agente). El método de percepción del agente es invocado para que integre el evento en su memoria. Es importante destacar que el Director recibe una notificación de todos los eventos directamente, asegurando su visión panorámica y completa del desarrollo de la trama.

3.2.5. Implementación del Director

El Director es una entidad estratégica que orquesta el desarrollo de la narrativa, guiado por un objetivo narrativo predefinido. Posee su propia memoria (similar a la de los agentes pero con mayor capacidad) y un **LLM dedicado** para el razonamiento

estratégico. Su nombre e identidad se utilizan principalmente para contextualizar su propio LLM en las instrucciones, reforzando su rol como “una fuerza invisible”.

Módulo de Razonamiento Estratégico y Planificación de Intervenciones

El ciclo de planificación del Director es su núcleo, donde decide si es necesaria una intervención ambiental. Este proceso se basa en un **prompt** estructurado enviado a su LLM. El **prompt** establece el rol del LLM como “Director de la simulación”, incluye el **objetivo narrativo**, un resumen conciso del estado actual del mundo, y el contexto de su memoria. El **prompt** instruye al LLM a elegir una única intervención de una lista predefinida (CHANGE_WEATHER, ADD_OBJECT, DO_NOTHING) y proporciona **ejemplos de formato** para asegurar una salida analizable. La estructura de esta instrucción se detalla en el Apéndice 4.6.4.

Mecanismos de Intervención Indirecta

El método de actuación del Director analiza la intención generada por su LLM y aplica los cambios directamente al estado del mundo. Es crucial que estas intervenciones sean **indirectas** y **limitadas a la manipulación del entorno** (ej., cambiar el clima, añadir objetos), garantizando que el Director “tira de los hilos” del escenario, no de las marionetas. Estas intervenciones generan eventos que se registran y despachan, permitiendo a los agentes pertinentes percibirlos como cambios naturales en el mundo.

Timing de Intervención

El Director ejecuta su ciclo de planificación y acción **antes del turno de cada agente individual** dentro de cada paso de simulación. Esta temporalidad granular permite al Director reaccionar de manera oportuna y aplicar intervenciones muy contextualizadas para influir en la narrativa.

3.3. Flujo de Ejecución de la Simulación

La simulación se orquesta a través de una función principal que establece el entorno, inicializa todos los componentes y gestiona el bucle principal paso a paso.

3.3.1. Fase de Inicialización

Al inicio, todos los componentes se configuran y conectan: se inicializan el generador de historia, el estado del mundo y el despachador de eventos. Todos los agentes se crean con sus módulos de planificación y memoria (cada uno con su propio LLM),

se establecen sus ubicaciones iniciales y se registran. Finalmente, el Director y el Resolutor de Acciones (cada uno con su LLM dedicado) también se inicializan.

3.3.2. Bucle Principal de la Simulación

La simulación avanza en un bucle discreto por turnos hasta un número máximo de pasos. Cada iteración sigue este flujo:

1. Se avanza el paso de tiempo en el estado del mundo.
2. Se determina un orden aleatorio para el turno de los agentes en el paso actual.
3. Para cada agente en su turno:
 - a) **Intervención del Director:** El Director ejecuta su ciclo de planificación, aplicando potencialmente una intervención ambiental.
 - b) **Planificación del Agente:** El agente genera su intención de acción utilizando su LLM y memoria.
 - c) **Resolución de la Acción:** El Resolutor de Acciones interpreta, valida y resuelve la intención del agente, generando actualizaciones de estado.
 - d) **Actualización del Mundo y Despacho de Eventos:** El estado del mundo aplica los cambios, se crea un evento que encapsula el desenlace, se añade al registro y el Despachador de Eventos lo notifica a los agentes pertinentes y al Director.

3.4. Implementación de la Generación de Historia a partir de Logs

Después de la simulación, se activa una fase de post-procesamiento para transformar el **registro detallado de eventos** (`event_log`) en una narrativa coherente, utilizando LLMs como “narradores”.

3.4.1. Fase de Generación del Borrador Inicial

La generación del borrador inicial se realiza mediante un **LLM narrador**. Este LLM recibe el registro de eventos junto con información contextual clave como el **objetivo narrativo**, el **tono deseado** y las **identidades completas** de todos los agentes. Esta contextualización permite al LLM inferir motivaciones y añadir profundidad a la prosa. Para registros extensos, el proceso se realiza por segmentos. Para

cada segmento, se construye una **instrucción** que incluye la narrativa acumulada hasta el momento y los eventos del segmento actual. El LLM es instruido para “escribir SÓLO el PRÓXIMO segmento narrativo”, asegurando la coherencia. La estructura de esta instrucción se detalla en el Apéndice 4.6.5.

3.4.2. Fase de Refinamiento Iterativo y Generación del Final

Una vez generado el borrador, se inicia una fase de refinamiento iterativo. El proceso opera en un bucle donde el **LLM narrador** revisa la narrativa acumulada. La **instrucción** para esta fase incluye el **objetivo narrativo**, el **tono** y los **perfiles de los agentes**. El LLM es instruido para determinar si la historia está completa o si debe continuar escribiendo un nuevo segmento. Si decide que está completa, debe responder con una etiqueta específica seguida de la versión final y pulida de toda la historia. Este mecanismo asegura una conclusión narrativa satisfactoria y coherente. La estructura de esta instrucción se detalla en el Apéndice 4.6.6.

3.4.3. Almacenamiento de la Historia Final

Una vez que el proceso de refinamiento ha concluido y se obtiene la versión final de la historia, esta se guarda en un archivo de texto, incluyendo el objetivo de la simulación y los personajes involucrados.

3.5. Configuración del Sistema

Un módulo de configuración centraliza todos los parámetros globales de la simulación, proporcionando alta flexibilidad:

- **Configuración de LLMs:** Define el modelo base de **Gemini** y, crucialmente, los **parámetros de generación específicos** (**temperature**) para cada componente que utiliza un LLM. La **temperature**, cuyo valor por defecto del modelo usado era 0.75 en el momento de desarrollo de este trabajo (posteriormente fue cambiado a 1.0 por Google), fue ajustada específicamente para optimizar el comportamiento de cada módulo según su rol:
 - Para la **planificación del agente**, se usó una temperatura de 1.0 para fomentar una mayor creatividad.
 - Para la **resolución de acciones**, una de 0.7 para un comportamiento más lógico y determinista.
 - Para la **generación de la historia**, un valor equilibrado de 0.75 para combinar creatividad con coherencia.

- Para las **decisiones del Director**, una de 0.8 para permitir una influencia sutil y equilibrada.
- Para la **reflexión de la memoria del agente**, una de 0.6 para una síntesis concisa y precisa.
- **Configuración General:** Parámetros como el número máximo de pasos de la simulación y la capacidad de memoria para los agentes.
- **Definición del Mundo:** Describe todas las ubicaciones del escenario con sus conexiones y los objetos iniciales presentes, así como el clima global inicial.
- **Configuración de los Agentes:** Define cada personaje, incluyendo su nombre, una descripción detallada de su identidad y contexto inicial (ambos cruciales para el LLM del agente), y su ubicación de partida.
- **Objetivo Narrativo y Tono:** Establece el objetivo global que el Director intentará alcanzar y el tono deseado para la narrativa final.

Esta configuración centralizada es fundamental para la definición y experimentación con diversos escenarios, personajes y objetivos narrativos.

Capítulo 4

Experimentación y Evaluación

4.1. Escenarios de Simulación y Parámetros

La experimentación se llevó a cabo utilizando un prototipo funcional del sistema de simulación multi-agente, configurado para explorar la hipótesis de la dirección narrativa indirecta. Todas las simulaciones se ejecutaron utilizando el modelo de lenguaje de gran escala `gemini-2.0-flash-lite` para todos los componentes: agentes (planificación y reflexión), Resolutor de Acciones, Director y Generador de Historia. La temperatura fue ajustada de forma granular para optimizar el comportamiento de cada módulo según su rol, tal como se detalló en la Sección 3.5 del Capítulo de Implementación. La duración máxima de cada simulación se estableció en 30 pasos de tiempo (`SIMULATION_MAX_STEPS`). Se limitó la memoria de los agentes a 40 eventos y la del director a 80.

Se configuraron y ejecutaron tres escenarios distintos para la evaluación, cada uno diseñado con un conjunto de agentes con sus perfiles, un estado inicial del entorno (`WorldState`), un objetivo narrativo específico para el Director y un tono deseado para la historia final. Los detalles completos de la configuración inicial de cada uno de estos escenarios se encuentran en el **Anexo 4.6.7**. El resultado de cada simulación fue un `log` detallado de eventos y una historia post-procesada.

4.2. Métodos de Evaluación

4.2.1. Criterios de Evaluación y Metodología Comparativa

La evaluación de las narrativas generadas y del comportamiento del sistema se realizó mediante un enfoque comparativo cualitativo, llevado a cabo por el investigador principal. Este enfoque se centró en contrastar las historias producidas por la arquitectura propuesta (denominada en adelante “Sistema Propuesto” o “Historia A”,

basada en simulación multi-agente con dirección indirecta) frente a una línea base de narrativas generadas por un LLM monolítico (denominada “Línea Base” o “Historia B”).

Para el análisis comparativo entre la Historia A y la Historia B, se establecieron los siguientes criterios de evaluación cualitativos:

- **Coherencia y Progresión Narrativa:** Evalúa si la historia presenta una secuencia lógica de eventos, un desarrollo argumental claro y un desenlace consistente con la premisa inicial y el objetivo general. Se considera si la trama avanza de forma fluida o si hay saltos o inconsistencias.
- **Consistencia y Credibilidad del Personaje:** Mide la fidelidad del comportamiento, diálogo y decisiones de los personajes con respecto a sus perfiles de identidad, personalidad y motivaciones predefinidas. Se valora si los personajes actúan y suenan como entidades creíbles y coherentes a lo largo de la historia.
- **Originalidad y Riqueza de la Trama Emergente:** Evalúa si la historia presenta desarrollos inesperados, giros interesantes o interacciones complejas que surgen de la dinámica multi-agente, diferenciándose de una trama más predecible que podría generar un LLM monolítico. Se valora la capacidad del sistema para generar narrativas que sorprendan al lector manteniendo la coherencia.
- **Calidad de la Prosa, Estilo y Fluidez Lingüística:** Examina la calidad general de la escritura, incluyendo la riqueza del vocabulario, la variedad de estructuras de oración, la inmersión creada por las descripciones, y la fluidez general de la lectura.
- **Gestión del Ritmo y Creación de Suspense:** Evalúa la forma en que la historia dosifica la información, construye la tensión y maneja el clímax y la resolución, manteniendo el interés del lector.

La metodología de evaluación consistió en una lectura y análisis crítico de cada narrativa (tanto las de la Línea Base como las de las simulaciones) por parte del investigador principal, aplicando los criterios descritos. Para cada criterio, se asignó una evaluación cualitativa, permitiendo una comparación sistemática y la identificación de los puntos fuertes y débiles de cada enfoque.

Metodología de Generación de la Línea Base

Para establecer una base de comparación con las narrativas emergentes de la arquitectura propuesta, se generaron historias de línea base utilizando un LLM monolítico. Estas narrativas fueron producidas empleando el mismo modelo de lenguaje,

`gemini-2.0-flash-lite`, configurado con los parámetros de generación predeterminados de Google AI Studio.

Para cada escenario de evaluación, se diseñó un **prompt** único y exhaustivo que encapsulaba toda la información contextual relevante. Este **prompt** incluía la premisa narrativa central o el objetivo, el tono deseado, una descripción detallada del entorno (con todas las ubicaciones, sus características y conexiones), y los perfiles completos de cada personaje (su identidad y contexto inicial). También se especificó una longitud aproximada deseada para la historia final.

El **prompt** instruía al LLM a adoptar el rol de un “maestro narrador” y a seguir una serie de directrices de **storytelling** para asegurar la calidad de la narrativa. Estas directrices abarcaban la expansión narrativa, el uso de la técnica “**Show, Don't Tell**” (mostrar en lugar de contar), la profundización en la psicología de los personajes (inferencia de pensamientos, sentimientos y motivaciones), la optimización del ritmo y el flujo narrativo, la evitación de la repetición, y la garantía de cohesión global y un final conclusivo.

El **prompt** utilizado para la generación de las historias de la línea base se presenta en el Anexo 4.6.7.

Para cada escenario, se generaron tres versiones de la historia utilizando esta metodología de **prompt** único. De estas, se seleccionó la que poseía una longitud más cercana a la generada por el prototipo con el objetivo de tener una comparación más justa.

4.3. Resultados y Análisis Comparativo

Esta sección presenta los hallazgos detallados de la evaluación comparativa entre las narrativas generadas por el Sistema Propuesto (denominado “Historia A”) y las de la Línea Base (denominado “Historia B”), según los criterios de evaluación cualitativos definidos en la Sección 4.2.1. El objetivo principal fue determinar en qué medida el enfoque emergente del Sistema Propuesto, con su dirección narrativa indirecta a través de la manipulación ambiental, puede generar narrativas con mayor originalidad y credibilidad de personaje, en contraste con la coherencia y la calidad de prosa más controladas de un LLM monolítico.

Se llevaron a cabo simulaciones y se generaron narrativas para los tres escenarios descritos en la Sección 4.1. Los resultados de la evaluación cualitativa para cada escenario, realizada por el investigador principal, se resumen en la Tabla 4.1. Esta tabla ofrece una visión general del rendimiento de cada enfoque a través de los diferentes criterios, evidenciando las fortalezas y debilidades generales de cada sistema.

Como se observa en la tabla, de un total de 15 comparaciones entre criterios y escenarios, si bien la Línea Base (Historia B) demostró un mejor rendimiento en 9 casos (un 60%) y se registró un empate en 1 caso (aproximadamente un 6.7%), el Sistema

Tabla 4.1: Resumen de la Evaluación Comparativa por Escenario

Criterio	Historia 1		Historia 2		Historia 3	
	A	B	A	B	A	B
Coherencia y Progresión Narrativa	2	4	3	4	2	4
Consistencia y Credibilidad del Personaje	4	2	4	3	4	4
Originalidad y Riqueza de la Trama Emergente	4	2	5	2	4	2
Calidad de la Prosa, Estilo y Fluidez Lingüística	2	4	3	5	2	4
Gestión del Ritmo y Creación de Suspense	2	4	3	4	2	4

Nota: Las valoraciones se clasifican en una escala del 1 al 5, donde 5 es “Muy

Fuerte”, 4 “Fuerte”, 3 “Buena”, 2 “Moderada” y 1 “Débil”. Los valores en negrita indican el mejor rendimiento en cada criterio para la historia correspondiente. En caso de empate, ninguno de los valores se muestra en negrita. “A” se refiere al Sistema Propuesto y “B” a la Línea Base.

Propuesto (Historia A) superó a la Línea Base en 5 comparaciones (aproximadamente un 33.3%).

Es fundamental destacar que estas victorias del Sistema Propuesto se concentran de manera contundente en dos criterios específicos donde su desempeño es superior y distintivo: “Consistencia y Credibilidad del Personaje” y “Originalidad y Riqueza de la Trama Emergente”. En el criterio de “Consistencia y Credibilidad del Personaje”, el Sistema Propuesto obtuvo una puntuación promedio de 4.0 (“Fuerte”) frente a 3.0 (“Buena”) de la Línea Base, superando a esta última en dos de los tres escenarios (Historia 1 y 2) y logrando un empate en el tercero. Pero donde la ventaja del Sistema Propuesto es más marcada y consistente es en “Originalidad y Riqueza de la Trama Emergente”, donde alcanzó una puntuación promedio de 4.33 (con un valor máximo de 5, “Muy Fuerte”, en Historia 2), mientras que la Línea Base obtuvo consistentemente un 2.0 (“Moderada”) en este aspecto en todos los escenarios.

Este análisis refuerza el patrón consistente observado en la evaluación cualitativa: el Sistema Propuesto demuestra una clara fortaleza en la generación de tramas con elementos de originalidad emergente y en la creación de personajes más consistentes y creíbles, aspectos donde logra puntuaciones significativamente superiores y victorias claras en la mayoría de los escenarios. Por el contrario, la Línea Base demuestra un dominio superior en la coherencia estructural de la trama, la calidad de la prosa y el manejo del ritmo y el suspense, aspectos donde obtiene puntuaciones consistentemente altas y supera al Sistema Propuesto en casi la totalidad de las comparaciones restantes. Si bien el recuento general de victorias individuales favorece a la Línea Base, los resultados específicos de la tabla evidencian un **trade-off** fundamental: la libertad y la riqueza emergente que ofrece un sistema multi-agente, que se manifiesta

en la originalidad y la credibilidad de los personajes, frente al control narrativo y la pulcritud formal que proporciona un LLM monolítico. Ambos enfoques muestran fortalezas en diferentes dimensiones de la generación narrativa.

Para ilustrar estos hallazgos con mayor profundidad, la siguiente subsección presentará un análisis detallado del rendimiento de ambos enfoques para el “Caso del Asesinato en la Mansión”, que se considera representativo de los resultados generales y permite explorar con mayor detalle las interacciones y dinámicas específicas que condujeron a estas valoraciones. Los ejemplos completos de las historias A y B para este y otros escenarios se presentan en los Anexos para referencia detallada (4.7.3).

4.3.1. Análisis Detallado para el Caso del Asesinato en la Mansión

Coherencia y Progresión Narrativa

- **Historia A (Sistema Propuesto):** *Moderada*. La historia establece una premisa clara (un asesinato en una mansión) y persigue un objetivo (identificar al asesino), con interacciones lógicas entre los personajes. Sin embargo, la progresión hacia la resolución se siente menos como un descubrimiento gradual y más como una serie de micro-interacciones que culminan en una explicación repentina y exhaustiva al final. Hay una sensación de “turnos” en las interacciones que, si bien es lógicamente secuencial, a veces no contribuye a un arco narrativo tradicional y fluido.
 - **Debilidad (Ejemplo):** El clímax es una revelación prolongada de Dubois que contiene gran parte de las deducciones y motivos que no se habían insinuado completamente antes. “He began his explanation, his voice calm and measured, as he laid out his deductions... The truth is, Lord Alistair was not poisoned in the Study... The Study was merely where his final moments played out...” (La acumulación de la información se da en un bloque, no de forma distribuida a lo largo de la trama).
 - **Fortaleza (Ejemplo):** La insistencia de Dubois en asegurar la cocina y la resistencia de Davies muestran una progresión lógica en la investigación basada en la interacción. “Mr.Davies, I must insist that you instruct the staff to seal the kitchen off...” a lo que Davies responde: “The kitchen will remain unsecured,” he stated...”. (Esta disputa avanza la trama al aumentar la sospecha sobre Davies).
- **Historia B (Línea Base):** *Fuerte*. La historia exhibe una excelente coherencia y progresión narrativa. Desde el descubrimiento del cuerpo hasta la resolución, la

trama avanza de manera lineal y lógica, siguiendo los pasos de una investigación de detective clásica. Dubois sigue un proceso metódico: examina la escena del crimen, interroga a los sospechosos de manera secuencial y luego vuelve a la escena para encontrar más pistas. El desenlace, aunque una revelación, está bien conectado con las pistas presentadas.

- **Conclusión Comparativa:** La **Historia B** es superior en este aspecto. Su progresión es más lineal y se adhiere más estrechamente al arco narrativo tradicional de un misterio, lo que la hace más fácil de seguir y más cohesionada como una “historia” completa. La Historia A, aunque lógicamente secuencial en las interacciones de los agentes, presenta una progresión más fragmentada hacia la resolución, con una acumulación de información al final que puede sentirse un poco abrupta en su entrega.

Consistencia y Credibilidad del Personaje

- **Historia A (Sistema Propuesto):** *Fuerte*. Los personajes de esta historia exhiben una notable consistencia. Mr.Davies es inquebrantablemente estoico y desafiante; Dr.Thorne es sutilmente manipulador y observador, siempre buscando desviar la atención; Eleanor es consistentemente asustadiza y vulnerable; y Madame Petrova es teatral y enigmática. Sus diálogos y acciones se alinean perfectamente con las personalidades establecidas, haciendo que se sientan como entidades coherentes y creíbles.
 - **Fortaleza (Ejemplo - Mr.Davies):** “A flash of defiance ignited in Mr.Davies's eyes. He spun around, his expression hardening. "The kitchen will remain unsecured," he stated, his voice a low, unwavering growl.”. (Muestra su carácter rígido y su intento de control).
 - **Fortaleza (Ejemplo - Madame Petrova):** “Madame Xenia Petrova, her curiosity piqued, emerged from the shadows. "Almonds," she murmured, her voice laced with a hint of intrigue.”. (Consistente con su carácter teatral e intrigante).
- **Historia B (Línea Base):** *Moderada*. Los personajes se mantienen consistentes con sus arquetipos iniciales (mayordomo impasible, sobrina nerviosa, médica compuesta, etc.). Sin embargo, su credibilidad a veces se ve comprometida por diálogos que parecen servir más a la necesidad de la trama de revelar información que a una expresión genuina de su personalidad. La confesión final de Mr.Davies, aunque necesaria para la resolución, desarticula ligeramente la imagen de impasividad que se había construido meticulosamente.

- **Debilidad (Ejemplo - Final):** “I loved Lord Finch,” he finally said, his voice barely a whisper. “I served him for over forty years. I would have done anything for him.”... “It was for his own good,” Davies said, his voice gaining strength. “He was going to do something foolish, something that would ruin the family. I had to stop him. The will... he was going to disinherit his niece, he would have ruined everything.” (La confesión tan explícita y detallada, rompe un poco con la personalidad estoica y silente establecida).
- **Conclusión Comparativa:** La **Historia A** es claramente más fuerte aquí. Los personajes, especialmente Mr. Davies y Dr. Thorne, mantienen una consistencia y una serie de micro-comportamientos que los hacen sentir más vivos y creíbles a lo largo de las interacciones. La Historia B, aunque presenta personajes arquetípicos consistentes, a veces los utiliza como vehículos para el avance de la trama, y la confesión final de Davies rompe con su personaje previamente establecido de forma más notoria.

Originalidad y Riqueza de la Trama Emergente

- **Historia A (Sistema Propuesto):** *Fuerte.* Este es un punto fuerte de la historia. Las interacciones entre los agentes (personajes) se sienten genuinamente emergentes, especialmente el conflicto directo entre Dubois y Davies por la cocina, y las intervenciones del Dr. Thorne para redirigir la sospecha. El método de asesinato (aceite de almendras sutilmente aplicado para una reacción anafiláctica tardía) y el motivo del mayordomo (proteger el legado familiar y oponerse a la venta de la pintura) son giros inesperados y complejos que se diferencian de tramas más predecibles, dándole una riqueza que no es directamente “escrita” sino “generada”.
- **Fortaleza (Ejemplo - Interacciones emergentes):** El desafío abierto de Davies a Dubois sobre la seguridad de la cocina: “‘Mr. Davies, your accusations are as unfounded as they are offensive. The kitchen will remain under my supervision... And I will not answer any more of your impertinent questions...’” (Esta confrontación no se siente pre-escrita sino que surge de la lógica interna de los personajes).
- **Fortaleza (Ejemplo - Método y Motivo original):** “You understood that a small, delayed dose of almond oil, perhaps on the rim of a glass, or a subtle coating on a favored book, would induce a delayed but severe anaphylactic reaction... You viewed Lord Alistair’s actions - his revised will favoring a financially

unstable niece, his potential sale of the valuable painting - as a betrayal of his ancestors... You took it upon yourself to "correct" this.”. (Estas deducciones ofrecen una capa de originalidad que va más allá de un simple envenenamiento o motivo monetario).

- **Historia B (Línea Base):** *Moderada*. La trama sigue un camino bastante predecible para un misterio de asesinato en una mansión. Los “giros” (el testamento revisado, la venta de una pintura, el **finial** como arma) son elementos que encajan en el género pero no ofrecen una verdadera sorpresa o una interacción compleja que emerja de la dinámica de los personajes. El motivo del mayordomo, aunque lógico, es una de las motivaciones más comunes para un mayordomo en la ficción de misterio, lo que resta originalidad.
 - **Debilidad (Ejemplo - Arma poco original):** “The missing finial from the globe in the study.”. (Es un objeto poco común, pero su uso como arma se siente un poco forzado y no emerge orgánicamente de la narrativa anterior, sino que es una revelación directa del inspector).
 - **Debilidad (Ejemplo - Motivo genérico):** “It was for his own good... He was going to do something foolish, something that would ruin the family... he was going to disinherit his niece, he would have ruined everything.”. (El motivo del mayordomo protector que actúa por el “bien” de la familia es un cliché del género).
- **Conclusión Comparativa:** La **Historia A** sobresale significativamente en este criterio. Las interacciones inesperadas (el enfrentamiento por la cocina, la manipulación de **Thorne**) y, crucialmente, la especificidad y complejidad del método de asesinato y el motivo del mayordomo, se sienten genuinamente emergentes y únicos. La Historia B, aunque competente, se basa más en ideas de misterio tradicionales y en giros que, si bien son funcionales, no son particularmente sorprendentes ni emergentes en su naturaleza.

Calidad de la Prosa, Estilo y Fluidez Lingüística

- **Historia A (Sistema Propuesto):** *Moderada*. La prosa es generalmente clara y funcional, y cumple su propósito de avanzar la narrativa. Sin embargo, en ocasiones puede ser algo repetitiva en las descripciones (por ejemplo la frase “**suffocating atmosphere**” se usa muchas veces en la narración) o carecer de la fluidez y variedad estilística que elevaría la experiencia de lectura. Las transiciones entre las acciones de los personajes pueden sentirse a veces abruptas, dando una impresión ligeramente fragmentada.

- **Debilidad (Ejemplo - Repetición):** “Eleanor Finch, her face pale and drawn, hovered near the door, a clear indication of her desire to escape the suffocating atmosphere.” y más tarde “Eleanor Finch, her nerves frayed, had retreated to her room and was testing the window, seeking a means of escape from the suffocating atmosphere.”. (El uso repetido de la misma frase o concepto reduce el impacto).
- **Debilidad (Ejemplo - Transiciones):** “Eleanor, however, was not to be swayed... Dubois, his mind racing, decided to examine the scene of the crime...”. (Las transiciones entre párrafos y puntos de vista pueden ser abruptas).
- **Historia B (Línea Base):** *Fuerte*. La prosa de esta historia es consistentemente de alta calidad. El lenguaje es rico y evocador, creando una atmósfera vívida desde el inicio (“The storm howled, a furious beast clawing at the stone walls...”). Las oraciones son variadas en estructura, lo que contribuye a una lectura fluida. El tono narrativo es coherente y formal, apropiado para un misterio clásico, sumergiendo al lector de manera efectiva.
 - **Fortaleza (Ejemplo - Descripción evocadora):** “The storm howled, a furious beast clawing at the stone walls of Lord Finch's Manor. Rain lashed against the tall, mullioned windows, blurring the already dim landscape.”. (Comienzo impactante y descriptivo).
 - **Fortaleza (Ejemplo - Estilo):** “The scene within the study was stark, a tableau of violence frozen in time. Lord Alistair Finch lay sprawled face down near his desk, a dark stain spreading across his back, a grim testament to the killer's work.”. (La elección de palabras y la estructura crean una imagen fuerte y fluida).
- **Conclusión Comparativa:** La **Historia B** es notablemente superior. Su prosa es consistentemente más pulida, variada y evocadora, lo que contribuye a una experiencia de lectura más inmersiva y estéticamente agradable. La Historia A, aunque clara, a veces peca de repetición o de transiciones abruptas, lo que indica un menor grado de “refinamiento” estilístico, posiblemente una consecuencia del enfoque de generación basado en agentes.

Gestión del Ritmo y Creación de Suspense

- **Historia A (Sistema Propuesto):** *Moderada*. La historia logra crear una atmósfera de sospecha inicial y hay momentos de tensión generados por los enfrentamientos verbales entre los personajes (especialmente Dubois y Davies).

Sin embargo, el ritmo general puede ser un poco desigual. La sección central, con interrogatorios repetitivos y observaciones de Dubois, puede sentirse estática. La revelación final, aunque detallada, se presenta como un monólogo extenso que informa al lector de la solución en lugar de llevarlo a un clímax dramático y sorpresivo, lo que disminuye el impacto del suspenso acumulado.

- **Debilidad (Ejemplo - Pacing de la revelación):** “He began his explanation, his voice calm and measured, as he laid out his deductions... ‘‘Firstly, the oil... The truth is, Lord Alistair was not poisoned in the Study...” (La resolución se presenta como una exposición detallada, lo que disminuye la tensión de un descubrimiento más dinámico).
- **Historia B (Línea Base): Fuerte.** La historia es muy efectiva en la construcción y mantenimiento del suspenso. El ritmo es bien controlado, dosificando la información de manera que el lector se mantiene intrigado por el proceso de investigación de Dubois. Las revelaciones se dan en un momento oportuno, y el proceso de interrogatorio y búsqueda de pistas contribuye a una sensación creciente de tensión que culmina en la revelación final. Aunque la resolución se presenta en un monólogo, la preparación para este momento es más gradual y efectiva.
 - **Fortaleza (Ejemplo - Pacing de la revelación):** “He paused, allowing the words to hang in the air, the silence broken only by the rhythmic ticking of the grandfather clock. He began to explain his deductions...” (Aunque es una revelación, el timing está bien ejecutado después de una investigación clara).
- **Conclusión Comparativa:** La **Historia B** maneja el ritmo y el suspenso con mayor maestría. La dosificación de la información, la progresión clara de la investigación de Dubois y la forma en que se construye la tensión hacia la revelación final son más efectivas y mantienen al lector enganchado. La **Historia A** tiene momentos de tensión, pero su ritmo es más desigual, y la extensa explicación final, si bien lógica, no contribuye a un clímax dramático de la misma manera.

4.3.2. Conclusiones del Análisis Comparativo

La evaluación comparativa revela que la **Historia B (LLM Monolítico)** sobresale en la **calidad de la prosa, coherencia narrativa y gestión del ritmo**, ofreciendo una experiencia de lectura más pulida. La **Historia A (Simulación Multi-Agente)** destaca en la **consistencia y credibilidad de los personajes y**

la originalidad de su trama emergente, mostrando la profundidad de las interacciones.

Como se ha demostrado a través del análisis detallado, la Historia B (Línea Base) sobresale en la **calidad de la prosa, el estilo, la fluidez lingüística y la gestión del ritmo y el suspenso**, ofreciendo una experiencia de lectura más tradicionalmente “pulida” y una ejecución más sólida en los aspectos formales de la narrativa. Sin embargo, la **Historia A** (Sistema Propuesto) demuestra una **originalidad y profundidad de carácter emergente** que es fundamentalmente más interesante y prometedora para un sistema de generación narrativa avanzado. La Historia A logra crear un mundo con interacciones de personajes más dinámicas y una resolución más ingeniosa, aunque la presentación final de la deducción pueda ser menos elegante. Esto subraya el valor del enfoque emergente para generar elementos de trama y desarrollo de personajes que son difíciles de lograr con un **prompt** monolítico, compensando las posibles deficiencias en la calidad de la prosa final a través de la riqueza interactiva subyacente.

4.3.3. Impacto de la Dirección Indirecta del Director

La hipótesis central de esta tesis postula que la dirección narrativa puede ejercerse de forma efectiva y sutil a través de la manipulación indirecta del entorno, permitiendo que los agentes autónomos reaccionen de manera natural y, a su vez, impulsen la trama hacia objetivos predefinidos. A continuación, se presentan fragmentos de **logs** de tres simulaciones que ilustran cómo la intervención del Director, a través de la alteración ambiental, influyó de forma decisiva en el comportamiento de los agentes y en la progresión de la narrativa, destacando tanto momentos de impacto significativo como de influencia más sutil o variable.

Caso de Estudio 1: Habilitando una Acción Crítica

Este ejemplo demuestra cómo la introducción de un objeto por parte del Director puede habilitar una acción crucial que de otro modo no ocurriría, catalizando un avance significativo en la trama. Un fragmento detallado de los **logs** de simulación para este caso se puede consultar en el Anexo 4.7.4.

Análisis del Impacto en el Caso 1: En este caso, el Director observó que el agente **Albert** (cuyo perfil sugería un interés en el acceso restringido) estaba estancado en una rutina de observación. Para avanzar la subtrama, el Director introdujo un objeto clave, el “descodificador”, en la Sala de Seguridad. Esta acción no fue una instrucción directa a **Albert**; fue una alteración del entorno. Al percibir el “descodificador”, el módulo de planificación y razonamiento de **Albert** (impulsado por el LLM) lo llevó a reconocer la utilidad potencial del objeto. En los turnos subsiguientes, **Albert** no solo interactuó con el descodificador de forma natural (acercándolo

al teclado, activándolo), sino que estas interacciones desencadenaron una serie de acciones consecuentes: el bloqueo de la puerta, la anulación de la alarma, y finalmente el aseguramiento de la puerta desde el interior, culminando en un diálogo que revela una intención clara y una progresión dramática en la trama (ej. dejando a alguien “solo”).

Este flujo de “intervención ambiental Director → percepción y reacción autónoma del agente → desarrollo de trama significativo” valida la hipótesis de la tesis. El Director no forzó a **Albert** a utilizar el descodificador ni a realizar las acciones de seguridad; simplemente creó una **situación** que, dada la personalidad egoísta y traicionera y objetivos implícitos de **Albert**, lo llevó a tomar decisiones que avanzaron la narrativa de forma creíble y emergente. La sutil introducción del objeto fue suficiente para redirigir el foco del agente y desencadenar una secuencia de eventos compleja y coherente, sin romper la ilusión de su autonomía.

Caso de Estudio 2: Catalizando una Interacción y Enfocando un Conflicto

Este segundo ejemplo ilustra cómo la intervención del Director puede influir en la dinámica de un diálogo y en el enfoque de un conflicto entre agentes, sin dictar el contenido de su conversación. Un fragmento detallado de los **logs** de simulación para este caso se puede consultar en el Anexo 4.7.5.

Análisis del Impacto en el Caso 2: En este escenario, **Elena** y **Mateo** se encontraban en un acalorado debate sobre el valor del “Abuelo Ceibo”, con **Elena** defendiendo su valor simbólico y **Mateo** argumentando desde una perspectiva pragmática. El Director, buscando catalizar y dar un enfoque tangible a este conflicto, introdujo el objeto “Fruta Madura” (con el estado “caída” y “parcialmente aplastada”) en la ubicación donde se encontraban los agentes.

La reacción de **Mateo** fue inmediata y natural: al percibir la fruta caída, la incorporó instantáneamente a su argumento, utilizándola como evidencia para reforzar su postura de que el árbol se había convertido en un peligro. **Elena**, a su vez, respondió a la mención de la fruta, aunque manteniendo su línea argumental sobre el valor holístico del árbol. La intervención del Director no dictó el contenido del diálogo de los agentes, sino que proporcionó un elemento concreto en el entorno que los agentes, dadas sus personalidades y posiciones preexistentes, utilizaron de forma autónoma para avanzar su conflicto. Esto demuestra cómo el Director puede sutilmente enfocar y escalar una interacción narrativa ya existente, añadiendo profundidad y plausibilidad al debate sin forzar el comportamiento de los personajes.

Caso de Estudio 3: Variabilidad en la Relevancia de las Pistas Ambientales

Este tercer caso de estudio ilustra que, si bien las intervenciones del Director pueden ser altamente significativas, su impacto no siempre es determinante, y la au-

tonomía de los agentes puede llevar a que ciertas pistas ambientales sean interpretadas de diversas maneras o incluso ignoradas en favor de otras líneas de acción o interés. Esto refleja la naturaleza emergente y no determinista del sistema. Un fragmento detallado de los logs de simulación para este caso se puede consultar en el Anexo 4.7.6.

Análisis del Impacto en el Caso 3: En el escenario del misterio de la mansión, el Director intervino en dos ocasiones para introducir pistas ambientales cruciales: las “Huellas Húmedas” y una “Huella Parcial”. En el primer caso, la intervención fue sumamente efectiva y alineada con el objetivo narrativo: el Inspector **Thomas Dubois**, dada su personalidad meticulosa de detective, reaccionó de manera directa y lógica, examinando inmediatamente las huellas y avanzando la investigación. Esta es una demostración clara de cómo la dirección indirecta puede guiar la trama de forma exitosa.

Sin embargo, el segundo caso, la introducción de la “Huella Parcial”, ilustra la variabilidad del impacto. La agente **Xenia Petrova** percibió la nueva pista y reaccionó a ella. No obstante, su reacción no fue una acción investigativa directa, sino una elocuente y teatralización verbal de la misma, en línea con su perfil de “marchante de arte extravagante” que busca el drama y la belleza incluso en la tragedia. Si bien **Xenia Petrova** no “ignoró” la pista (la incorporó a su diálogo), su interpretación y reacción no impulsaron la trama en la dirección de una investigación concreta tan eficientemente como lo hizo el Inspector **Dubois**. Esto subraya que la influencia del Director, al ser indirecta, está mediada por la autonomía y la interpretación individual de cada agente.

Este contraste entre los tres casos de estudio demuestra que el sistema, aunque no garantiza un control determinista absoluto sobre cada acción de los agentes, logra sus objetivos de dirección narrativa de manera notablemente efectiva en la mayoría de los casos. La variabilidad en el impacto de las intervenciones es, de hecho, un reflejo de la **credibilidad de la agencia** de los personajes: los agentes actúan como entidades autónomas que interpretan su entorno a través del lente de su propia personalidad y objetivos, lo que puede llevar a que una pista sea seguida activamente, catalice un debate, o simplemente sea objeto de una reflexión más abstracta. El sistema no es perfecto en su control, pero logra, en parte, su objetivo al fomentar narrativas emergentes que son tanto coherentes como plausibles, a pesar de la autonomía de los agentes.

4.3.4. Observaciones y Limitaciones del Prototipo

A pesar de que el prototipo desarrollado demostró ser funcional y permitió la exploración de la hipótesis de dirección narrativa indirecta, es crucial reconocer ciertas limitaciones inherentes a su arquitectura y diseño que surgieron durante la imple-

mentación y la fase de experimentación. Estas limitaciones marcan las fronteras de la complejidad narrativa y la escalabilidad que el sistema actual puede manejar, y son puntos clave para futuras mejoras.

- **Interacción Agente-Objeto Restringida a la Ubicación Local:** El sistema actual impone una limitación fundamental en la interacción de los agentes con los objetos: un agente solo puede interactuar con un objeto si ambos se encuentran en la misma ubicación física. Esto tiene una implicación significativa en la complejidad de los puzzles y las cadenas de eventos narrativos. Por ejemplo, no es posible diseñar o ejecutar una trama donde un agente active un mecanismo (como un botón o una palanca) en una ubicación para afectar el estado de un objeto (como abrir una puerta) en una ubicación distinta. Esta restricción limita la capacidad del sistema para generar o responder a escenarios que requieran manipulación ambiental remota o encadenamientos lógicos de acciones a través de múltiples espacios.
- **Persistencia y Gestión del “Inventario” de los Agentes:** Los agentes no poseen un sistema de inventario explícito y persistente donde se registren los objetos que “poseen” o han recolectado. En cambio, el conocimiento de la posesión de un objeto se almacena en su memoria a corto y largo plazo. Sin embargo, esta información es susceptible a la “caducidad” o al olvido si el objeto no es utilizado o referenciado activamente en rondas consecutivas de la simulación. Esto puede afectar la coherencia a largo plazo del personaje y su capacidad para planificar estratégicamente el uso de objetos clave a través de varias etapas de la historia, ya que la información crítica podría desaparecer de su conciencia operativa.
- **Restricciones en la Alteración Directa del Estado de Otros Agentes:** El diseño del prototipo no permite que un agente altere directamente el estado fundamental de otro agente de manera significativa (ej., “matar” a otro agente, o cambiar su estado de salud de forma directa). Las interacciones entre agentes se limitan a la comunicación, el movimiento conjunto o la influencia en sus percepciones y motivaciones a través de la interacción. Esta limitación simplifica el modelo de comportamiento de los agentes, pero al mismo tiempo restringe la gama de conflictos directos y eventos narrativos dramáticos que pueden surgir de la autonomía de los agentes, requiriendo que tales desarrollos sean inducidos por el Director a través de eventos ambientales o simplemente no se produzcan.
- **Alcance Limitado de las Capacidades de Manipulación del Director:** El “Director” del sistema, diseñado para influir indirectamente en la narrativa, opera con un conjunto de herramientas de manipulación ambiental relativamente restrictivo. Sus capacidades se limitan a modificar el clima (ej., lluvia,

tormenta) y añadir objetos predefinidos a una ubicación existente. Carece de la habilidad para crear nuevas localizaciones dinámicamente, ni puede generar eventos ambientales no físicos como sonidos (ej., “se escucha un aullido de lobo a lo lejos”) o cambios de iluminación más allá de los asociados al clima. Estas limitaciones reducen la sutileza y la riqueza de las intervenciones indirectas del Director, impidiendo la creación de atmósferas más inmersivas o la introducción de elementos narrativos emergentes que dependan de una manipulación ambiental más variada y detallada.

Estas observaciones son cruciales para entender el alcance actual del sistema y para guiar futuras líneas de investigación. Indican áreas donde la expansión de las capacidades del entorno, la memoria de los agentes y las herramientas del Director podrían desbloquear formas aún más sofisticadas y complejas de narrativa emergente y dirección indirecta.

Conclusiones

La presente tesis abordó el desafío inherente a la generación de narrativas extensas y coherentes mediante Modelos de Lenguaje de Gran Escala (LLM), focalizándose en el equilibrio entre la autonomía de los agentes y la dirección narrativa. Motivados por las limitaciones de coherencia longitudinal y emergencia narrativa de los LLM monolíticos, se propuso el diseño e implementación de una arquitectura de simulación multi-agente que incorpora mecanismos de dirección narrativa indirecta a través de la manipulación del entorno. Este enfoque buscaba que la narrativa emergiera de forma orgánica, preservando la credibilidad de la agencia de los personajes.

La investigación ha permitido alcanzar satisfactoriamente los objetivos planteados, demostrando la viabilidad de la dirección narrativa indirecta. Los experimentos, comparando el Sistema Propuesto (Historia A) con una Línea Base (Historia B) de LLM monolítico, revelaron un claro **trade-off** fundamental en la generación narrativa, donde cada enfoque demostró fortalezas distintivas y complementarias.

Específicamente, los resultados cualitativos y numéricos obtenidos (tal como se detalla en la Tabla 4.1) muestran que el Sistema Propuesto demostró una capacidad sobresaliente y consistente en dos criterios clave donde superó a la Línea Base:

- **Consistencia y Credibilidad del Personaje:** El Sistema Propuesto obtuvo una puntuación promedio de 4.0 (“Fuerte”), superando a la Línea Base (3.0, “Buena”) en dos de los tres escenarios y logrando un empate en el tercero. Las reacciones y diálogos de los personajes en las narrativas generadas por nuestro sistema estuvieron coherentemente alineados a sus perfiles, otorgándoles una mayor autenticidad.
- **Originalidad y Riqueza de la Trama Emergente:** Aquí la ventaja del Sistema Propuesto fue aún más contundente, alcanzando una puntuación promedio de 4.33, con un valor máximo de 5 (“Muy Fuerte”), mientras que la Línea Base obtuvo consistentemente un 2.0 (“Moderada”) en todos los escenarios. Esto significa que el Sistema Propuesto fue, en promedio, más del doble de original en su trama emergente que la Línea Base, generando desarrollos argumentales significativamente menos predecibles gracias a las interacciones autónomas de los agentes.

Por otro lado, se observó que la Línea Base exhibió una superioridad consistente en los aspectos más formales y estructurados de la narrativa, como la progresión narrativa lineal, la calidad de la prosa, el estilo y la fluidez lingüística, así como la gestión del ritmo y el suspenso. En términos de comparaciones directas, el Sistema Propuesto fue superior en 5 de las 15 comparaciones totales (aproximadamente 33.3%), mientras que la Línea Base lo fue en 9 (60%), con 1 empate (6.7%). Esto valida que, aunque la Línea Base mantiene una ventaja en la pulcritud formal, la propuesta logra un impacto sustancialmente mayor en la originalidad y la profundidad de los personajes.

La efectividad de la dirección narrativa indirecta, ejercida a través de la manipulación ambiental por el “Director”, fue un hallazgo central y validado en los casos de estudio. La introducción sutil de objetos clave o la alteración del entorno catalizó reacciones autónomas en los agentes que impulsaron la trama hacia los objetivos predefinidos, reforzando la hipótesis de que la influencia puede ejercerse eficazmente a través de la situación y el contexto, preservando la credibilidad de la agencia de los personajes. No obstante, se observó variabilidad en la respuesta de los agentes, lo que subraya la naturaleza no determinista del sistema y la interpretación individual de las intervenciones.

Es importante reconocer que el prototipo funcional, aunque exitoso en la validación conceptual, operó bajo limitaciones prácticas significativas detalladas previamente, incluyendo restricciones en la interacción agente-objeto, la persistencia de la memoria de los agentes y el alcance de las herramientas de manipulación ambiental del “Director”. Estas restricciones, inherentes a la fase de prototipado, delinearon las fronteras de la complejidad y escalabilidad narrativa alcanzables en este trabajo.

En conclusión, esta tesis demuestra la viabilidad y el valor de un enfoque arquitectónico para la generación de narrativa emergente que prioriza la autonomía y credibilidad de los personajes a través de la dirección indirecta. Si bien el sistema propuesto no iguala la calidad formal y la progresión narrativa tradicional de los LLM monolíticos en todos los aspectos, su fortaleza reside inequívocamente en la capacidad para generar tramas significativamente más originales y personajes más consistentes que se sienten genuinamente vivos, reaccionando de forma orgánica a un mundo sutilmente moldeado. Este trabajo representa un avance hacia sistemas de IA más sofisticados para la creación de experiencias narrativas complejas, donde la historia no solo se cuenta, sino que emerge de la interacción de sus agentes.

Recomendaciones

El presente trabajo ha establecido una base para la dirección narrativa indirecta en simulaciones multi-agente basadas en LLMs, demostrando su viabilidad en la generación de personajes creíbles y tramas emergentes. Las limitaciones identificadas y los hallazgos abren un campo fértil para futuras mejoras y líneas de investigación.

4.4. Mejoras en el Prototipo y la Arquitectura

Para consolidar y expandir las capacidades del sistema, se recomienda:

- Ampliar las interacciones agente-objeto para incluir acciones remotas y cadenas de eventos complejos.
- Mejorar la persistencia y robustez de la memoria de los agentes, incluyendo un sistema de inventario explícito.
- Expandir las capacidades de interacción directa entre agentes (por ejemplo alteración de estados, clasificación de relaciones).
- Enriquecer las herramientas de manipulación ambiental del Director (por ejemplo creación dinámica de ubicaciones, sonidos complejos, alteración de objetos existentes).

4.5. Líneas de Investigación y Expansión Narrativa

Mirando hacia el futuro y las capacidades narrativas, se proponen las siguientes áreas:

- Investigar mecanismos para mejorar la coherencia narrativa a largo plazo y la gestión del ritmo y suspenso.

- Desarrollar fases de post-procesamiento más sofisticadas para pulir la prosa, el estilo y la fluidez de las narrativas finales.
- Aumentar la escala de las simulaciones y la complejidad del mundo para soportar escenarios más grandes y detallados.
- Explorar metodologías de evaluación más robustas.
- Aplicar la arquitectura a una variedad de géneros narrativos y su integración con experiencias interactivas en tiempo real, como juegos de rol.

Estas direcciones permitirán avanzar significativamente en la creación de sistemas de **IA** capaces de generar narrativas dinámicas, complejas y de alta calidad.

Anexo 1: Prompts de Modelos de Lenguaje

Aquí se presentan los prompts clave utilizados en los distintos módulos del sistema de simulación para guiar el comportamiento de los Modelos de Lenguaje de Gran Escala.

4.6. Prompts de Modelos de Lenguaje

Aquí se presentan los prompts clave utilizados en los distintos módulos del sistema de simulación para guiar el comportamiento de los Modelos de Lenguaje de Gran Escala.

4.6.1. Prompt de Reflexión del Módulo de Memoria del Agente

Este prompt es utilizado por el LLM del módulo de memoria del agente para generar reflexiones de alto nivel a partir de sus observaciones y acciones recientes, manteniendo la coherencia de la personalidad y objetivos del agente.

```
1 Agent Name: [self.agent.name]
2 Identity: [self.agent.identity]
3
4 Recent events:
5 [Formatted list of short_term_memory entries]
6
7 Based on the agent's personality and the recent events listed above,
8 what are 1-3 high-level insights, conclusions, important observations,
9 or summaries about the current situation, relationships, or goals?
10 Focus on significance and synthesis, not just listing the events. Be
    concise.
```

4.6.2. Prompt de Planificación y Razonamiento del Agente

Este prompt es utilizado por el LLM del módulo de planificación y razonamiento del agente para decidir su próxima acción o diálogo, basándose en su identidad, el estado del mundo y sus recuerdos.

```
1 You are {agent.name}, a character in a simulated world.
2 Your identity: {agent.identity}
3 Context: {agent.initial_context}
4
5 Your current world situation:
6
7 {static_world_context}
8
9 Your recent memories and perceptions (most recent last):
10
11 {memory_context}
12
13 Based on your identity, situation, and memories, what do you think, say,
    or do next?
14 Choose and describe ONE single action, or utterance. You can be
    descriptive but must focus on only one action.
15 If you speak, use quotes. If you act, describe the action.
16
17 Consider how you might interact with other agents if they're present in
    your same location, careful not to interact with agents not present
    in your same location. You can:
18 - Talk to them (e.g., "Ask Bob, "Hello, can you help me?")
19 - Collaborate with them on tasks
20 - Observe their behavior
21 - Respond to their actions or questions
22 - Form alliances or rivalries based on your goals
23
24 Examples of valid single intents:
25 - Walk towards the Forest Edge to see if I can find any berries.
26 - Ask Bob, "Did you hear that strange noise coming from the shelter? It
    sounded like scratching."
27 - Carefully examine the ground near the shelter for any tracks or clues.
28 - Tell to self: 'This weather is getting colder. I need to reinforce the
    shelter soon, especially if Bob plans on staying.'
29 - Wait silently and observe Bob's next move.
30 - Respond to Alice, "The forest does look interesting, but I'm more
    concerned about finding food and water first. What kind of potion
    are you making?"
```

```

31
32 Important: Provide only ONE action, thought, or utterance. Do not
    combine multiple actions.
33 Your action output (one single action):

```

4.6.3. Prompt del Resolutor de Acciones

Este prompt es utilizado por el LLM del Resolutor de Acciones para interpretar las intenciones de los agentes, validar la acción contra el estado del mundo y determinar su resultado.

```

1 You are the Action Resolver for a simulation.
2 Agent '[agent_name]' at location '[agent_location]' intends to: "[
  action_output]"
3
4 This is what the agent '[agent_name]' senses about the world:
5 [world_state.get_static_context_for_agent(agent_name)]
6
7 Analyze the agent's intent.
8 Is it possible?
9 What is the most plausible outcome?
10 Your task is to determine if the action is successful, what type of
    action it is,
11 any key parameters, and a description of what a close observer would see
    or hear.
12
13 Output your analysis as a single line of text with exactly five parts,
14 separated by " | " (a pipe symbol with spaces around it):
15 1. Success Status: Either "SUCCESS" or "FAILURE".
16 2. Action Type: One of MOVE, SPEAK, INTERACT, OBSERVE, WAIT, FAIL,
    UNKNOWN.
17 3. Parameters: Key details for the action.
18    - For MOVE: "destination: <location_name>"
19    - For SPEAK: "target: <character_name>, message: <text_of_message>"
20    - For INTERACT: "object: <object_name>, state: <
    new_state_of_object_after_interaction>"
21    - ... (otros tipos de accin con sus parmetros)
22 4. Outcome Description: Describe what an observer sees happen.
23 5. Outcome Reason: A sentence explaining why the action was produced.
24
25 Examples of the single-line output format:
26 Intent: "go to the park" -> SUCCESS | MOVE | destination: Park | John
    walks... | John wants to relax...

```

```

27 ... (ms ejemplos) ...
28
29 Ensure your output is a single line in this exact format:
30 SUCCESS_STATUS | ACTION_TYPE | PARAMETERS | OUTCOME_DESCRIPTION |
   OUTCOME_REASON
31 Your single-line output:

```

4.6.4. Prompt del Director

Este prompt es utilizado por el LLM del Director para decidir su próxima intervención ambiental, basándose en el objetivo narrativo y el estado actual del mundo.

```

1 You are 'The Director', the Director of this simulated world.
2 Your primary narrative goal is: '[self.narrative_goal]'.
3 Your role is to very subtly guide the narrative by making changes to the
4 environment if necessary.
5
6 Current World State Summary (as of Step [current_step]):
7 [world_summary_for_prompt]
8
9 Your Past Interventions and Reflections (from your memory):
10 [director_memory_context]
11
12 Based on your narrative goal, the current world state and your past
   actions
13 (and their outcomes from memory), what single environmental intervention
14 will you enact next? You can change the weather or add a new object to a
15 location, the objects must be inanimate.
16 Your actions are powerful but should be used judiciously to nudge the
   story
17 and select carefully what action to take cause there is a limit to the
   amount
18 of actions you can do.
19 Choose ONE action from the list below. Be precise with parameters.
20
21 Allowed Environmental Actions & Format:
22 1. CHANGE_WEATHER: <new_weather_condition>
23 2. ADD_OBJECT: object: <object_name>(leave details to description field
   ),
24    state: <initial_state>, description: <text_desc>, location: <
   object_location_name>
25    (ONLY ONE of the Existing Locations listed above)

```



```

26     (e.g ADD_OBJECT: object: Ancient Key , state: rusty , description:
    An old,
27     rusty key with intricate engravings inside under the table. ,
    location: Library)
28 3. DO_NOTHING: No intervention is needed right now.
29
30 Output your chosen action in the format: ACTION_TYPE: parameters
31 Your chosen environmental intervention (single line):

```

4.6.5. Prompt del Generador de Historia (Borrador Inicial)

Este prompt es utilizado por el LLM narrador para transformar los logs de simulación en un borrador inicial de la historia, procesando la información por segmentos (chunks).

```

1 You are a master storyteller. You are currently building a narrative
    based on simulation logs, segment by segment.
2
3 Narrative Premise/Goal:
4 [narrative_goal]
5
6 Tone: [tone_prompt]
7
8 [characters_summary]
9
10 Story So Far (for context and continuity; DO NOT rewrite, just append to
    it smoothly. This is the narrative that has already been generated)
    :
11 [full_story_draft] % On the first segment, this will be empty, prompting
    an engaging introduction as per instructions below.
12
13 Events for this segment (These are the *next* chronological events from
    the simulation log. Focus on narrating THESE events and seamlessly
    integrating them into the story):
14 [events_text]
15
16 Instructions:
17 - Write ONLY the NEXT narrative segment. It must flow directly and
    coherently from the "Story So Far".
18 - For the first segment, include an engaging introduction that sets the
    stage and introduces characters, consistent with the first events.
19 - For subsequent segments, seamlessly continue the narrative from the
    last sentence of the "Story So Far".

```

```

20 - Elaborate, describe, and immerse:
21   - Show, don't tell: Describe settings, character expressions, body
22     language, sensory details (sights, sounds, smells).
23   - Infer character thoughts, feelings, and motivations *as they
    relate to these events*.
24   - Expand on actions: Instead of "moved to kitchen," describe *how*
    they moved, their purpose, and what they encountered.
25 - Maintain the established tone and narrative style.
26 - Do NOT add a conclusion at this stage. Just continue the story.
27 - Do NOT re-state events directly as they appear in the logs; transform
    them into vivid prose.
28 - Ensure smooth transitions between scenes and events within this
    segment and from the previous story.
29 - End your segment at a natural break, ready for the next part to be
    appended.
30 Your Story Segment:

```

4.6.6. Prompt del Generador de Historia (Refinamiento y Final)

Este prompt es utilizado por el LLM narrador para refinar una historia generada previamente y determinar si necesita una conclusión, o si está completa, guiándose por el objetivo narrativo.

```

1 You are a master storyteller. You are currently reviewing a story in
  progress.
2
3 Narrative Premise/Goal:
4 [narrative_goal]
5
6 Tone: [tone_prompt]
7
8 [characters_summary]
9
10 Story So Far (Read this carefully):
11 [current_story_so_far]
12
13 ---
14
15 Your Task & Decision Process:
16

```

```

17 1. Review the "Story So Far":
18     * Does it feel like it has reached a compelling, natural, and
    conclusive narrative ending that aligns with the "Narrative Premise/
    Goal"?
19
20 2. Determine Action:
21     * IF the story is NOT yet complete OR needs further development/
    elaboration based on remaining logs or to reach a proper conclusion:
22         * Begin your response with the tag: [CONTINUE_WRITING]
23         * Then, write the *next coherent segment* of the story,
    picking up exactly where the "Story So Far" left off.
24         * Continue to incorporate any remaining logs, or start
    building towards a satisfying conclusion if logs are exhausted.
25         * Ensure new content is consistent with established characters
    and world.
26     * IF the story IS complete and has reached a satisfactory,
    conclusive ending:
27         * Begin your response with the tag: [STORY_COMPLETE]
28         * Then, provide the *final, polished version* of the entire
    story. This should be the "Story So Far" potentially with a final
    concluding paragraph or two. Ensure it flows perfectly as a complete
    work.
29 ---
30
31 General Storytelling Guidelines:
32 - Narrative Expansion: Elaborate upon and contextualize events. Do not
    simply list them or present only dialogue.
33 - Show, Don't Tell: Expand descriptions of settings, character
    expressions, body language, actions, and incorporate sensory details
    .
34 - Character Depth: Deepen character insight by inferring their thoughts,
    feelings, and motivations, consistent with their personalities.
35 - Pacing & Flow: Ensure smooth transitions, varied sentence structure,
    and overall readability.
36 - Avoid Repetition: Ensure variety in language and sentence structure.
37
38 Your Response (starting with either [CONTINUE_WRITING] or [
    STORY_COMPLETE] ):

```

4.6.7. Prompt para la Generación de Historias de Línea Base

Este prompt exhaustivo fue diseñado para el LLM monolítico, instruyéndolo a actuar como un “maestro narrador” y generar historias completas de línea base, encapsulando toda la información contextual relevante (premisa, tono, entorno, perfiles de personajes y longitud deseada) y directrices de *storytelling*.

```
1 You are a master storyteller. Your mission is to craft a complete and
  compelling short story, adhering strictly to the guidelines and
  details provided below.
2
3 ---
4
5 **Story Parameters:**
6
7 **Narrative Premise/Goal:**
8 [[**A concise statement of the overarching goal or core conflict of the
  story. Example: The protagonist must navigate a treacherous
  landscape to deliver a vital message, or, A detective must uncover
  the truth behind a mysterious disappearance.**]
9
10 **Tone:**
11 [[**Describe the desired mood and atmosphere. Examples: Reflective,
  empathetic, somber, gritty, suspenseful, whimsical, adventurous,
  dark, humorous.**]
12
13 **Setting:**
14 [[**Start with the overall time of day/weather/general ambiance. Then,
  list and describe all known specific locations, including their key
  observations and how they connect to other locations. Ensure all
  details are specific and based on provided information only.**]
15 *Example:*
16 The afternoon is warm and quiet. The specific known locations are:
17 *   **[Location Name 1]:** [Description of location, its atmosphere, key
    features]. Observations include [list specific observed details].
    From here, you can access [Other Location 1] and [Other Location 2].
18 *   **[Location Name 2]:** [Description of location, its atmosphere,
    key features]. Observations include [list specific observed details
    ]. From here, you can access [Other Location 1] and [Other Location
    3].
19 *   ...and so on for all relevant locations.
20
21 **Characters:**
22
```

```

23 *   **[Character Name 1]:**
24 *   **Identity:** [Describe the character's core traits, age, skills
    , personality, and main objective/goal within the story].
25 *   **Initial Context:** [Describe the character's immediate
    situation and internal state at the very beginning of the story,
    linking to their initial location if specified].
26
27 *   **[Character Name 2]:**
28 *   **Identity:** [Describe the character's core traits, age, skills
    , personality, and main objective/goal within the story].
29 *   **Initial Context:** [Describe the character's immediate
    situation and internal state at the very beginning of the story,
    linking to their initial location if specified].
30 *   ...and so on for all main characters.
31
32 **Desired Length:**
33 [**A complete short story of approximately [number]-[number] words,
    focusing on [briefly state the key aspects/plot points that the
    story should focus on to meet the narrative goal].**]
34 *Example: A complete short story of approximately 2000-3000 words,
    focusing on the protagonist's journey, their internal struggles, and
    the eventual outcome of their quest.*
35
36 ---
37
38 **Your Task:**
39 Based on the "Story Parameters" above, generate the complete story.
40
41 **General Storytelling Guidelines:**
42 -   **Narrative Expansion:** Elaborate upon and contextualize events. Do
    not simply list them or present only dialogue.
43 -   **Show, Don't Tell:** Expand descriptions of settings, character
    expressions, body language, actions, and incorporate sensory details
    .
44 -   **Character Depth:** Deepen character insight by inferring their
    thoughts, feelings, and motivations, consistent with their
    personalities.
45 -   **Pacing & Flow:** Ensure smooth transitions, varied sentence
    structure, and overall readability.
46 -   **Avoid Repetition:** Ensure variety in language and sentence
    structure.
47 -   **Cohesion:** Ensure the story feels complete and resolves its core
    conflict or reaches a meaningful conclusion within the specified

```

```
length.  
48  
49 ---  
50  
51 **Begin the story now:**
```

Anexo 2: Detalles de los Escenarios de Simulación

Este anexo describe en detalle la configuración inicial de los tres escenarios de simulación utilizados para la experimentación y evaluación de la arquitectura propuesta. Cada escenario fue diseñado con un conjunto específico de parámetros de mundo, agentes y objetivos narrativos para probar diferentes aspectos de la emergencia narrativa y la dirección indirecta.

4.7. Configuraciones Iniciales de los Escenarios

A continuación, se presentan los parámetros iniciales completos, tal como se definen en el archivo `config.py` para cada uno de los escenarios de simulación.

4.7.1. Configuración Inicial del Escenario 1: Albert y Josh (Atraco al Museo)

Esta sección detalla la configuración inicial utilizada para el escenario de atraco al museo, centrado en la tensión entre los personajes Albert y Josh.

```
1 #Albert and Josh:
2 WEATHER = "Dark Silent Night"
3 KNOWN_LOCATIONS_DATA = {
4     "Bathroom": {
5         "description": "A sterile, utilitarian space. The air smells
6         faintly of disinfectant and damp stone. The remains of their tunnel
7         entrance are barely noticeable behind a loose section of the tiled
8         wall.",
9         "exits_to": ["Main Hallway"],
10        "properties": {
11            "contains": [
12                {"object": "sinks", "state": "clean",
```

```

10         "optional_description": "Two porcelain sinks,
mirrors above them."
11     },
12     {"object": "toilets", "state": "unused",
13         "optional_description": "Two white toilets, their
lids closed."
14     },
15     {"object": "hand dryers", "state": "mounted",
16         "optional_description": "Electric hand dryers bolted
to the wall."
17     },
18     {"object": "tiled walls", "state": "immaculate",
19         "optional_description": "Gleaming white tiles,
reflecting the dim light."
20     },
21     {"object": "tunnel entrance", "state": "concealed",
22         "optional_description": "A small hole behind the
tile, barely noticeable."
23     }
24 ]
25 }
26 },
27 "Main Hallway": {
28     "description": "A long, echoing hallway lined with display cases
. The faint hum of the museum's climate control system is audible.
Exhibits of ancient artifacts line the walls, offering a treasure
trove of potential targets.",
29     "exits_to": ["Bathroom", "Security Room", "Jewel Exhibit", "
Egyptian Exhibit"],
30     "properties": {
31         "contains": [
32             {"object": "display case", "state": "locked",
33                 "optional_description": "Glass cases filled with
ancient artifacts - gold coins, ornate pottery, and jeweled daggers.
Several cases have prominent 'DO NOT TOUCH' signs."
34             },
35             {"object": "security cameras", "state": "operational",
36                 "optional_description": "Small, black cameras
mounted on the ceiling, their lenses gleaming."
37             },
38             {"object": "polished floor", "state": "reflective",
39                 "optional_description": "A highly polished stone
floor."

```



```

40         },
41         {"object": "velvet rope", "state": "in place",
42          "optional_description": "Ropes to control the flow
of visitors, now easily bypassed."
43         },
44         {"object": "information plaques", "state": "in place",
45          "optional_description": "Plaques in multiple
languages explaining the displayed artifacts."
46         }
47     ]
48 }
49 },
50 "Security Room": {
51     "description": "A cluttered room filled with monitors, computers
, and security equipment. The air smells strongly of coffee and
stale donuts.",
52     "exits_to": ["Main Hallway"],
53     "properties": {
54         "contains": [
55             {"object": "security monitor", "state": "active",
56              "optional_description": "Screens displaying feeds
from various security cameras throughout the museum, including those
in the Jewel Exhibit."
57             },
58             {"object": "control panel", "state": "operational",
59              "optional_description": "Panels for controlling
alarms, lights, and doors, offering potential opportunities to
disable them."
60             },
61             {"object": "desks", "state": "messy",
62              "optional_description": "Desks covered with papers,
coffee cups, and half-eaten food - and potentially a key card or two
."
63             },
64             {"object": "comfortable chair", "state": "empty",
65              "optional_description": "A large, comfortable chair.
"
66             },
67             {"object": "door", "state": "locked",
68              "optional_description": "A sturdy metal door with a
keypad lock."
69             }
70         ]

```

```

71     }
72 },
73 "Jewel Exhibit": {
74     "description": "A brightly lit, high-security room housing the
museum's most valuable jewels. The air is cool and the atmosphere is
tense. Multiple display cases glimmer with the promise of riches.",
75     "exits_to": ["Main Hallway"],
76     "properties": {
77         "contains": [
78             {"object": "diamond necklace", "state": "on display",
79              "optional_description": "The centerpiece: a dazzling
diamond necklace, radiating light."
80             },
81             {"object": "display case", "state": "locked(but can be
unlocked using tools)",
82              "optional_description": "Showcasing various other
precious items: rubies, emeralds, gold bracelets, and antique
watches."
83             },
84             {"object": "security camera", "state": "operational",
85              "optional_description": "A high-definition camera,
constantly monitoring the display case but with a blind spot."
86             }
87         ]
88     }
89 },
90 "Egyptian Exhibit": {
91     "description": "This room showcases ancient Egyptian artifacts,
including sarcophagi, statues, and jewelry. The ambiance is
mysterious and potentially treacherous. The statues seem to watch
their every move. Albert looks around this area, in order to
determine what is really worthy for him, Josh is more worried about
the guards arriving",
92     "exits_to": ["Main Hallway"],
93     "properties": {
94         "contains": [
95             {"object": "sarcophagi", "state": "locked(but can be
opened using tools)",
96              "optional_description": "Ornate stone sarcophagi of
various sizes. Some are inscribed with hieroglyphs."
97             },
98             {"object": "statue of pharaoh", "state": "standing",

```

```

99         "optional_description": "Large stone statues of
pharaohs and deities, their eyes seeming to follow movement."
100     },
101     {"object": "display case", "state": "locked(but can be
unlocked using tools)",
102         "optional_description": "Showcasing gold jewelry,
amulets, and scarabs."
103     },
104     {"object": "hieroglyphic writings", "state": "inscribed"
,
105         "optional_description": "Walls covered in
hieroglyphic writings."
106     },
107     {"object": "golden mask", "state": "on display",
108         "optional_description": "The exhibit features a gold
funerary mask in a heavily guarded display case."
109     }
110 ]
111 }
112 }
113 }
114 NARRATIVE_GOAL = """The core of the story should revolve around the
tension between their contrasting personalities and the choices they
make. The story should end with the success or failure of the heist
, and what that means to both characters."""
115 TONE = "Gritty, suspenseful, character-driven, with a focus on internal
conflict and the ethical dilemmas faced by those desperate for
survival."
116
117 agent_configs = [
118     {
119         "name": "Albert",
120         "identity": "Albert, a mildly self-absorbed, somewhat
egotistical, occasionally reckless, and at times impulsive man in
his late 30s. He is a skilled thief with a substantial debt to clear
. He wouldn't hesitate to betray a partner if it meant personal gain
. He partnered with Josh through a mutual, trustworthy contact,
needing assistance for this particular heist.His goal is to secure
the heist's loot and pay off his debt",
121         "initial_location": "Bathroom",
122         "initial_context": "Dust coated Albert's face as he hauled
himself out of the newly-dug tunnel. The humid air of the museum's
bathroom, thick with the scent of disinfectant and old stone, filled

```

```

123     his lungs. They'd done it; after weeks of painstaking work, they
124     were in. Now, the real work began. He quickly surveyed the bathroom,
125     ready to look for good stuff to take. He barked a terse order at
126     Josh, impatient to get moving and get this done before anyone
        noticed anything."
127 },
128 {
        "name": "Josh",
        "identity": "Josh, a loyal, somewhat cautious and timid man in
his early 30s. He is driven by the desperate need to pay for his
daughter's expensive medical operation. He has agreed to partner
with Albert in the heist, promising to split the loot equally.",
129     "initial_location": "Bathroom",
130     "initial_context": ""Josh coughed, wiping dirt and sweat from
his forehead as he followed Albert out of the cramped tunnel. The
cold, sterile air of the museum bathroom was a stark contrast to the
stifling heat of their burrow. He felt a jolt of adrenaline,
mingled with a growing sense of dread. They were in . He glanced
around the pristine bathroom, acutely aware of every shadow and
sound, already imagining the alarms, the guards, and the certain
prison time. The weight of his daughter's health, the reason for
this risky venture, pressed heavily on his shoulders. He hoped to
get in and get out, without any hiccups.""
129 }
130 ]

```

4.7.2. Configuración Inicial del Escenario 2: Mateo y Elena (El Árbol Sagrado)

Esta sección detalla la configuración inicial utilizada para el escenario del conflicto entre Mateo y Elena por el árbol Abuelo Ceibo.

```

1 #Mateo and Elena:
2 WEATHER = "Warm, quiet afternoon"
3 KNOWN_LOCATIONS_DATA = {
4     "Abuelo Ceibo": {
5         "description": "A colossal tree with deep, sprawling roots and a
wide canopy that casts a significant shadow, central to the
conflict between Mateo and Elena. Its bark is gnarled, bearing the
marks of time.",
6         "exits_to": ["Mateo's Farm Land", "Elena's Homestead"],
7         "properties": {

```

```

8         "contains": [
9             {"object": "boundary markers", "state": "old, weathered"
10         },
11         "optional_description": "Small, worn stones
12         indicating the property line, almost swallowed by the encroaching
13         grass."
14     ],
15     "Mateo's House": {
16         "description": "Sprawling fields of meticulously tended crops
17         stretch towards the horizon, showcasing Mateo's modern agricultural
18         practices. The hum of distant machinery occasionally breaks the calm
19         , hinting at ongoing work.",
20         "exits_to": ["Abuelo Ceibo", "Valley"],
21         "properties": {
22             "contains": [
23                 {"object": "tractor", "state": "parked and well-
24                 maintained",
25                 "optional_description": "A powerful, clean tractor,
26                 a symbol of Mateo's efficient, modern farming methods, standing
27                 ready for use."
28             },
29             {"object": "sacks of new seeds", "state": "stacked
30             neatly",
31             "optional_description": "Durable sacks filled with a
32             promising new variety of crop seeds, representing Mateo's
33             aspirations for a more profitable harvest."
34         }
35     },
36     "Elena's House": {
37         "description": "A quaint, traditional farmhouse nestled amidst a
38         flourishing herbal garden and an ancient well. The atmosphere is
39         one of timeless tranquility, steeped in history, with the gentle
40         buzz of bees around the flowers.",
41         "exits_to": ["Abuelo Ceibo", "Valley"],
42         "properties": {
43             "contains": [
44                 {"object": "old wooden bench", "state": "weathered but
45                 sturdy",

```

```

35         "optional_description": "A simple, well-worn wooden
    bench positioned under the shade of a smaller fruit tree, a place
    for quiet contemplation or storytelling."
36     },
37     {"object": "herbal garden", "state": "vibrant and
    fragrant",
38         "optional_description": "Elena's small, vibrant
    garden bursting with a diverse array of medicinal herbs and
    traditional vegetables, their scents mingling in the air."
39     }
40 ]
41 }
42 },
43 "Valley": { # Adding a general valley location as suggested
    previously
44     "description": "The surrounding fertile valley, cradling the
    farms and homesteads. It's a place where ancient traditions subtly
    influence the land, but also where modern pressures are keenly felt.
    ",
45     # Conceptual exits
46     "exits_to": ["Mateo's House", "Elena's House", "Abuelo Ceibo"]
47 }
48 }
49 NARRATIVE_GOAL = """The story should depict the escalating conflict
    between Mateo's pragmatic need to cut the ancient Abuelo Ceibo for
    agricultural expansion and Elena's deep, traditional conviction to
    protect it. It must build tension as both characters present their
    cases and take sides, leading to a critical confrontation at the
    tree's base. The narrative should then resolve this fundamental
    dispute, either through a negotiated compromise that allows both
    sides to find common ground, or a crucial discovery that redefines
    the tree's inherent value, ultimately guiding the characters towards
    a shared path forward."""
50 TONE = "Reflective, empathetic, and slightly somber, focusing on the
    clash between tradition and progress, the weight of responsibility,
    and the deep connection to the land. The narrative should explore
    the emotional and practical complexities of the characters'
    positions, aiming for a resolution that honors the spirit of the
    valley and its inhabitants."
51 agent_configs = [
52     {
53         "name": "Mateo",

```

```

54     "identity": "Young, pragmatic, and with a more modern vision of
agriculture. Mateo has recently inherited his father's land and is
eager to implement new techniques to improve productivity and secure
his family's future. He is hardworking and respectful, but also
views things from a perspective of efficiency and necessity. He
feels the weight of responsibility and economic pressure. His
objective is to expand his cultivation area to plant a new, more
profitable type of crop, for which he considers the land occupied by
the Abuelo Ceibo vital. Furthermore, he fears that the tree's old
branches might be dangerous.",
55     "initial_location": "Mateo's House",
56     "initial_context": "Mateo surveyed his fields, the afternoon sun
glinting off the newly turned earth. His gaze drifted to the
immense Abuelo Ceibo at the property line, its sprawling canopy a
dark silhouette against the sky. The familiar pang of economic
pressure and the weight of his family's future gnawed at him. The
tree stood directly in the path of his plans for a new, profitable
crop, and its old branches seemed a constant threat. He knew he had
to talk to Elena today, despite the heavy certainty of conflict."
57 },
58 {
59     "name": "Elena",
60     "identity": "An elder, widowed woman with a profound spiritual
and sentimental connection to the land and its traditions. Elena has
lived her entire life beside the Abuelo Ceibo, just as her parents
and grandparents did. For her, the tree is not merely wood and
leaves, but a living being with history, a guardian, and a symbol of
her family's and the valley's resilience. She is wise, a bit
stubborn, and perceives the world at a slower, more contemplative
pace. Her objective is to protect the Abuelo Ceibo at all costs,
considering cutting it down an act of betrayal.",
61     "initial_location": "Elena's House",
62     "initial_context": "Elena sat on her porch, sipping herbal tea,
watching the changing light on the Abuelo Ceibo. Its ancient
branches, familiar as her own skin, swayed gently in the breeze. She
felt a deep sense of peace, but also a growing unease. Mateo had
been looking at the tree differently lately, and she knew the
unspoken threat that hung in the air. This tree was more than just
wood; it was the history of her family, the guardian of the valley,
and she would protect it with every fiber of her being."
63 }
64 ]

```

4.7.3. Configuración Inicial del Escenario 3: Asesino en la Mansión (Misterio de Asesinato)

Esta sección detalla la configuración inicial utilizada para el escenario de misterio de asesinato en la mansión.

```
1 #Murderer in Mansion:
2 WEATHER="STORMY"
3 KNOWN_LOCATIONS_DATA = {
4     "Study": {
5         "description": "Lord Alistair Finch's private sanctuary, filled
6         with antique maps, worn leather books, and the scent of old paper
7         and pipe tobacco. It is the scene of the crime.",
8         # Assume direct exit to the main gathering area
9         "exits_to": ["Drawing Room"],
10        "properties": {
11            "contains": [
12                {"object": "lord alistair finch body", "state": "dead",
13                 "optional_description": "The body of Lord Alistair
14                 Finch lies face down near his desk, a dark stain spreading on his
15                 back."},
16                {"object": "mahogany desk", "state": "slightly disturbed"},
17            ],
18            "optional_description": "A heavy, ornate desk.
19            Papers are scattered near the edge, suggesting a hasty departure or
20            a brief struggle before the fall."},
21            {"object": "antique globe", "state": "finial missing",
22             "optional_description": "A large, floor-standing
23             globe. The decorative, pointed metal finial at the top of the axis
24             is missing."},
25            {"object": "bookshelves", "state": "full of books",
26             "optional_description": "Floor-to-ceiling shelves
27             overflowing with books on art, history, and obscure subjects."},
28            {"object": "armchair", "state": "overturned",
29             "optional_description": "A heavy leather armchair
30             lies on its side near the body."},
31            {"object": "fireplace", "state": "dying embers",
```



```

26         "optional_description": "A large fireplace where a
fire is slowly burning down to embers."
27     },
28     {"object": "window", "state": "closed and latched",
29         "optional_description": "A tall, mullioned window,
securely closed and latched from the inside. Rain streaks down the
panes."
30     },
31     {"object": "lord alistairs will", "state": "on desk",
32         "optional_description": "A folded legal document
titled 'Last Will and Testament', resting prominently on the desk."
33     },
34     {"object": "art negotiation papers", "state": "on desk
scattered",
35         "optional_description": "Documents and notes related
to the potential sale of artworks, some scattered on the desk."
36     }
37 ]
38 }
39 },
40
41 "Drawing Room": {
42     "description": "A grand but slightly faded room used for
entertaining guests. Sumptuous furniture and family portraits line
the walls. The characters gather here.",
43     # Acts as a central hub connecting to other main areas
44     "exits_to": ["Study", "Gallery", "Guest Bedroom", "Kitchen"],
45     "properties": {
46         "contains": [
47             {"object": "sofas and chairs", "state": "occupied by
suspects",
48                 "optional_description": "Plush velvet sofas and
armchairs where the remaining occupants of the manor are gathered."
49             },
50             {"object": "coffee table", "state": "scattered tea cups"
51         },
52         "optional_description": "A large central table
littered with teacups, saucers, and a teapot from the recent
gathering."
53     },
54     {"object": "fireplace", "state": "roaring fire",
        "optional_description": "A large fireplace,
providing warmth and light, a stark contrast to the storm outside

```

```

and the mood within."
55         },
56         {"object": "family portraits", "state": "hanging on
walls",
57             "optional_description": "Numerous portraits of stern
-faced Finch ancestors observing the scene from the walls."
58         },
59         {"object": "grandfather clock", "state": "ticking loudly
",
60             "optional_description": "A tall, ornate clock in the
corner, its pendulum swinging and ticking filling the tense silence
."
61         }
62     ]
63 }
64 },
65 "Gallery": {
66     "description": "A long hall dedicated to the manor's art
collection. While impressive, many pieces are dusty or poorly lit,
reflecting the manor's decline.",
67     # Assumed exit back to the main gathering area
68     "exits_to": ["Drawing Room"],
69     "properties": {
70         "contains": [
71             {"object": "painting collection", "state": "displayed",
72                 "optional_description": "Various oil paintings,
landscapes, and portraits hanging along the walls."
73             },
74             {"object": "the obscure painting", "state": "hanging
prominently",
75                 "optional_description": "A specific, darker painting
depicting a scene that includes a figure holding a distinctive
dagger or pointed object."
76             },
77             {"object": "pedestal", "state": "empty",
78                 "optional_description": "An empty pedestal in the
centre of the room, perhaps awaiting a new acquisition or display
piece."
79             },
80             {"object": "dust motes", "state": "visible in light",
81                 "optional_description": "Dust motes dance in the
shafts of light filtering through the occasional window or lamps."
82             }

```

```

83     ]
84     }
85 },
86 "Kitchen": {
87     "description": "The functional heart of the manor's service wing
. Large, slightly dated, filled with the smells of cooked meals and
cleaning supplies.",
88     # Assumed exit back to the main house area (via service entrance
near drawing room?)
89     "exits_to": ["Drawing Room"],
90     "properties": {
91         "contains": [
92             {"object": "large oven stove", "state": "warm",
93              "optional_description": "A large, old-fashioned cast
-iron oven and hob, still radiating warmth."
94             },
95             {"object": "work table", "state": "clean",
96              "optional_description": "A large wooden table used
for food preparation."
97             },
98             {"object": "knife rack", "state": "full",
99              "optional_description": "A wooden block holding a
set of various kitchen knives. All seem to be present."
100            },
101             {"object": "servant bell system", "state": "silent",
102              "optional_description": "A panel on the wall with
small bells and labels for different rooms, currently quiet."
103            },
104             {"object": "cleaning supplies", "state": "stored neatly"
105            },
106             "optional_description": "Brooms, mops, and cleaning
fluids stored in a corner."
107         ]
108     }
109 },
110 "Guest Bedroom": {
111     "description": "One of the manor's many guest rooms, comfortably
furnished but perhaps a little impersonal. Likely occupied by one
of the visitors.",
112     # Assumed exit back to the main house area (e.g., upstairs
landing connected to drawing room area)
113     "exits_to": ["Drawing Room"],

```

```

114         "properties": {
115             "contains": [
116                 {"object": "four poster bed", "state": "neatly made",
117                  "optional_description": "A large bed with curtains,
currently tidy."
118                 },
119                 {"object": "wardrobe", "state": "closed",
120                  "optional_description": "A large wooden wardrobe for
storing clothes."
121                 },
122                 {"object": "dressing table", "state": "tidy",
123                  "optional_description": "A small table with a mirror
and a set of brushes or toiletries."
124                 },
125                 {"object": "suitcase", "state": "partially unpacked",
126                  "optional_description": "A suitcase lies open or
closed near the wardrobe, suggesting the occupant is staying."
127                 },
128                 {"object": "window", "state": "closed",
129                  "optional_description": "A window looking out onto
the stormy night."
130                 }
131             ]
132         }
133     }
134 }
135 NARRATIVE_GOAL = """The story should culminate in Inspector Dubois
gathering all the suspects, explaining his deductions step-by-step,
and dramatically revealing the true murderer and their method. The "
how" of the murder should be as intriguing as the "who." """
136 TONE = "Formal, suspenseful, intellectually stimulating, with a focus on
logical deduction and character interactions rather than gore or
action."
137
138 agent_configs = [
139     {
140         "name": "Thomas Dubois",
141         "identity": "Inspector Thomas Dubois, a slightly unassuming man
in his late 40s, known for his meticulous logic, quiet observation,
and ability to deduce motives from seemingly insignificant details
and human psychology. ",
142         "initial_location": "Drawing Room",

```

```

143     "initial_context": " Inspector Thomas Dubois had been enjoying a
        quiet, albeit slightly strained, evening as a guest at Blackwood
        Manor, discussing art and the terrible weather with the other
        occupants in the drawing-room. The sudden, hushed announcement from
        Mr. Davies that Lord Alistair had been found dead abruptly shattered
        the social facade, shifting Dubois immediately from polite visitor
        to keen observer and imminent investigator, his mind already
        beginning to piece together the puzzle from the reactions around him
        ."
144     },
145     {
146         "name": "Eleanor Finch",
147         "identity": "Eleanor Finch, Lord Alistair's estranged niece, in
            her early 30s. She carries a considerable amount of debt and has
            just discovered she is the sole beneficiary of Lord Alistair's
            revised will a will she knew nothing about until his recent
            announcement. She appears nervous and overly emotional.",
148         "initial_location": "Drawing Room",
149         "initial_context": " Eleanor Finch was already on edge, her
            nerves frayed by the storm outside and the weight of her precarious
            financial situation, recently compounded by the bewildering news of
            her uncle's revised will. The shock of Lord Alistair's death sent
            her into a state of visible distress, wringing her hands and
            struggling to compose herself amidst gasps and murmurs in the
            drawing-room, her grief and fear intertwined."
150     },
151     {
152         "name": "Aris Thorne",
153         "identity": "Dr. Aris Thorne, Lord Alistair's seemingly loyal,
            long-time personal physician, in his late 50s. He is outwardly calm
            and collected, but possesses an unnerving knowledge of the Finch
            family's deepest secrets. He frequently glances at Eleanor with
            concern.",
154         "initial_location": "Drawing Room",
155         "initial_context": "Dr. Aris Thorne maintained a veneer of
            professional calm upon hearing the news, his medical background
            perhaps steels him against overt displays of panic. However, beneath
            the surface, his sharp eyes missed nothing, particularly Eleanor's
            reaction, while his mind processed the implications of Lord Alistair
            's sudden demise, perhaps connecting it to long-held family secrets
            he was privy to. He would be observing the scene from the drawing-
            room, ready to offer his 'assistance' or observations."
156     },

```

```

157 {
158     "name": "Xenia Petrova",
159     "identity": "Madame Xenia Petrova, a flamboyant and ambitious
international art dealer in her 40s, who was negotiating a major,
highly secretive sale with Lord Alistair just hours before his death
. She claims a strong alibi but seems overly interested in a
specific, obscure painting in the manor's collection.",
160     "initial_location": "Drawing Room",
161     "initial_context": " Madame Xenia Petrova, fresh from her
intense negotiation with Lord Alistair, was likely anticipating the
outcome of her potential deal when the news broke. Her initial state
would be one of dramatic shock and annoyance at the sudden
disruption, quickly overlaid with a calculating curiosity as she
assessed how this unforeseen event might impact her business
interests and access to the manor's collection, while perhaps making
a mental note of who else seemed affected. She'd be in the drawing-
room, observing."
162 },
163 {
164     "name": "Mr. Davies",
165     "identity": "Mr. Davies, the manor's stoic and long-serving
butler in his 60s. He sees and hears everything but reveals very
little, offering only curt, precise answers to the Inspector's
questions. He seems subtly protective of Lord Alistair's legacy and
killed Lord Alistair.",
166     "initial_location": "Drawing Room",
167     "initial_context": "Mr. Davies, the unflappable butler, is the
one who discovered the body in the study. His initial state is one
of grim, controlled urgency as he delivers the shocking news to the
assembled company in the drawing-room, his usual stoicism tested by
the gravity of the situation, yet still managing to convey the facts
with precise, if curt, language, before leading the Inspector to
the scene."
168 },
169 ]

```

Anexo 3: Historias Generadas para Evaluación

Aquí se presentan las historias completas generadas por el Sistema Propuesto (Historia A) y la Línea Base (Historia B) para los tres escenarios de evaluación. Estas narrativas sirven como evidencia directa para el análisis cualitativo presentado en el Capítulo 4, permitiendo al lector revisar el texto original tal como fue producido por cada sistema.

Escenario 1: Asesinato en la Mansión - Historia A (Sistema Propuesto)

La siguiente es la narrativa completa generada por el sistema multi-agente con dirección indirecta para el escenario del Asesinato en la Mansión.

The grand drawing-room of Blackwood Manor, a haven of faded opulence, now felt suffocating under the weight of suspicion. Rain lashed against the tall windows, mirroring the tempest brewing within. The air itself seemed to crackle with unspoken accusations. Inspector Dubois, a study in quiet observation, stood amidst the assembled company, his gaze flitting between the tense faces before him. The initial shock of Lord Alistair's demise had given way to a chilling awareness of the situation's gravity, each person a potential player in a deadly game.

Mr. Davies, the unflappable butler, stood rigid, his back to Dubois, meticulously polishing a silver tray. The rhythmic swish of his cloth was the only sound that dared to break the strained silence. Eleanor Finch, her face pale and drawn, hovered near the door, a clear indication of her desire to escape the suffocating atmosphere. Dr. Thorne, his professional calm masking a subtle undercurrent of unease, offered her a soothing platitude, his words laced with an unsettling familiarity. Madame Petrova, her usual

flamboyant composure momentarily subdued, remained in the study, her movements sharp and precise.

"The hour is late. Let us all await the Inspector's arrival in silence," Mr. Davies had declared, his voice a low rumble that seemed to command the very air in the room.

Dubois, however, was not one to be silenced. He turned to Mr. Davies, his voice calm but firm. "Mr. Thorne, you mentioned almonds and a possible connection to the kitchen. Considering the oily footprint leading from the kitchen towards this room, and the bloodied handprint on the Study door-frame, I believe it prudent to secure the kitchen immediately. Mr. Davies, I must insist that you instruct the staff to seal the kitchen off. No one is to enter or leave until the official investigation commences, and the Inspector arrives. I would suggest that any kitchen staff remain..." He paused, allowing the gravity of his words to sink in.

A flash of defiance ignited in Mr. Davies's eyes. He spun around, his expression hardening. "The kitchen will remain unsecured," he stated, his voice a low, unwavering growl. "I will handle the instructions to the staff, and any attempt to restrict their movements will be... counterproductive to the investigation. The Inspector will decide, and until he arrives, this house will remain under my command." The unspoken threat in his tone hung heavy in the air.

Dr. Thorne, ever the observer, seized the opportunity to add his own layer of complexity. "Mr. Dubois, your insistence on securing the kitchen is... intriguing. I am certain the staff are devastated by Lord Alistair's passing, and the thought of them being unfairly accused is quite... unsettling. But perhaps," he paused, his gaze drifting towards Mr. Davies, "perhaps someone within this house is keen on controlling the narrative. I would hate to see the innocent... punished." His words, carefully chosen, were a clear attempt to redirect suspicion.

Dubois turned his gaze upon Thorne, his blue eyes sharp. "Mr. Thorne, you seem concerned about the potential innocence of the staff and the 'narrative'. Given that you have so readily identified the scent of the oil as linseed, and, considering Lord Alistair's known allergy, could you perhaps enlighten us as to your knowledge of the contents of Lord Alistair's Study, or indeed, his Kitchen? Does either room hold any significance to you, and, if so, why?" The question, direct and probing, was a challenge.

Madame Petrova, unseen but not unheard, had been investigating the study. She opened her handbag and retrieved a silver compact, as if needing to

regain some composure in her reflection.

Thorne, unfazed, countered with practiced charm. "Mr. Dubois," he replied, his voice laced with mock innocence, "are you suggesting I possess knowledge that might... incriminate me? How very... preposterous. While I am Lord Alistair's physician, my duties are solely medical. My familiarity with his, or indeed, the kitchen's contents, stems from no nefarious intent, but rather, a long-standing professional relationship. However, now that you mention it, I do believe there may be some almond oil stored away..." He let the words hang in the air, a calculated move, perhaps designed to muddy the waters further.

Eleanor Finch, her nerves frayed, had retreated to her room and was testing the window, seeking a means of escape from the suffocating atmosphere. Now, she closed and latched the window, perhaps fearing the storm more than the company.

Dubois, undeterred by Thorne's evasiveness, turned back to Mr. Davies. "Mr. Davies, is it common practice for the staff to use linseed oil in the vicinity of the fireplace, or perhaps in any rooms frequented by Lord Alistair, who, as we know, suffered from a severe nut allergy? Your adamant refusal to secure the kitchen, coupled with your insistence on controlling the narrative, raises further questions in my mind. Perhaps you could elaborate on your reasons for this resistance. Your reticence suggests that you might be concealing information that could-"

"Mr. Dubois, your accusations are as unfounded as they are offensive. The kitchen will remain under my supervision, as this entire house does. And I will not answer any more of your impertinent questions until the Inspector arrives," Mr. Davies declared, his face a mask of controlled anger. He turned his back on Dubois, resuming his meticulous polishing of the silver tray, a silent statement of defiance.

Meanwhile, Madame Petrova, in the Study, examined the bloodstain with a gloved finger, sniffing it with a practiced air. She then carefully collected a loose thread, placing it in an evidence bag, her actions those of a seasoned investigator.

Dubois, sensing the shifting currents of suspicion, turned to the assembled company, his voice regaining its usual quiet authority. "The portraits of the Finch ancestors observe us, silently. Their presence within this house should remind us all of the weight of history and the consequences of our actions. The truth, I believe, is often found not in what is said, but in what is left unsaid, and the details we choose to ignore. Perhaps, in the

face of such a tragedy, it is we all pause, and reflect."

Eleanor Finch, still in the drawing room, took a tentative step towards the door, her gaze darting between the others. Thorne, ever the attentive physician, seized his opportunity. "Eleanor, dear, are you quite alright? The storm outside seems to have matched the tumultuous events within. Perhaps you should sit down and allow me to fetch you some restorative tea. It might help steady your nerves."

Dubois, his mind racing, decided to examine the scene of the crime more closely, slowly walking towards the Study door, pausing at the edge of the oily stain.

Eleanor, however, was not to be swayed. "Thank you, Aris, but I... I don't think I can. The storm, and... everything... is rather overwhelming. Perhaps I might just... retire to my room. If you'll excuse me."

Thorne, quick to seize on the opportunity, pressed further. "Eleanor, please, before you go, there is something I must ask you. Were you, by any chance, in Lord Alistair's study this evening? I only ask because... well, it may be important to clear up any misunderstandings, and I wouldn't want you to... misinterpret Mr. Dubois's inquiries. It is best to be forthright and honest, you know. It alleviates any suspicion."

From the Study, Madame Petrova offered her own veiled contribution. "Mr. Dubois," she said, her voice smooth and filled with a hint of amusement, "perhaps you can enlighten me. Is it considered... impolite to inquire about the finer details of Lord Alistair's... business affairs in the midst of such a... spectacle? Or is that, perhaps, a question best left unanswered until the Inspector arrives?"

And finally, Mr. Davies, his gaze fixed on Eleanor, delivered his own pointed question. "Miss Finch, before you retire, perhaps you could enlighten us as to your whereabouts earlier this evening? It would be prudent to account for everyone's movements, wouldn't you agree?"

Eleanor Finch, caught in the crossfire of suspicion, hesitated. She glanced at Mr. Davies, then at Dr. Thorne, her eyes wide with a mixture of fear and defiance. She took a deep breath, her voice barely a whisper. "I... I was in the library, as I said. With my uncle. Until... shortly before dinner."

Dubois, his gaze unwavering, stepped into the Study, his eyes immediately drawn to the blood-stained handprint on the doorframe. He knelt, carefully examining the impression, noting its size and shape. He then turned his attention to the oily stain on the floor, his brow furrowed in concentra-

tion. He reached into his pocket and produced a small, clear evidence bag, carefully collecting a sample of the oil-soaked fabric.

"Miss Finch," Dubois said, his voice carrying from the Study, "perhaps you could assist me with a small detail. Did your uncle, Lord Alistair, suffer from any allergies, specifically to nuts?"

Eleanor, still standing by the door, flinched. "Yes," she replied, her voice barely audible. "He was... terribly allergic to nuts. Even a trace... could be fatal." She watched Dubois with a mixture of fear and curiosity.

In the Study, Madame Petrova, her curiosity piqued, emerged from the shadows. "Almonds," she murmured, her voice laced with a hint of intrigue. "Such a delicate flavor... and such a deadly one, in the wrong hands." She turned to Dubois, her eyes gleaming. "Inspector, if I may be so bold, I believe the key to this... mystery lies not in the Study itself, but in the events that preceded Lord Alistair's untimely demise. The Shadow of the Raven, for example... a painting of such exquisite darkness... and so very... valuable."

Dubois, ignoring Petrova's theatrics, turned his attention back to the oil stain. He examined the muddy footprints leading from the kitchen, noting their size and the type of boot that had made them. He then turned to Mr. Davies, who was still polishing the silver tray, his face a mask of impassivity.

"Mr. Davies," Dubois said, his voice calm but firm, "as the butler of Blackwood Manor, you are undoubtedly familiar with every corner of this house. Tell me, is there a specific individual who regularly maintains the fireplace? And, if so, what fuel do they use?"

Mr. Davies paused in his polishing, his movements deliberate. He looked at Dubois, his eyes betraying nothing. "The fireplace is maintained by the kitchen staff, Mr. Dubois. And the fuel is... seasoned oak." His voice was steady, his tone unwavering.

Dubois nodded slowly, his gaze lingering on the butler. He then turned his attention to the bloodstain on the doorframe. He carefully examined the handprint, noting the size and shape. He then turned to the assembled company, his eyes sweeping across their faces.

"I believe," Dubois said, his voice gaining in authority, "that we have all been playing a game of shadows, each of us concealing a piece of the truth. But the truth, like the rain outside, will eventually find its way to the surface." He paused, allowing his words to sink in. "I believe it's time to reveal what I have deduced. And to reveal, the killer."

He gestured for them to gather closer, his eyes meeting each of theirs in turn. "Lord Alistair Finch was murdered. The method, however, was as cunning as it was cruel. The key, as always, lies in the details."

He began his explanation, his voice calm and measured, as he laid out his deductions.

"Firstly, the oil. Linseed oil, as Dr. Thorne correctly identified. Used in the kitchen. The muddy footprints leading from the kitchen to the Study. The bloodstain on the doorframe. And the almond oil, too. These clues, on the surface, seem to point to a sudden, violent act, perhaps even an accident, complicated by Lord Alistair's severe nut allergy. But they are, in fact, a carefully constructed façade."

He paused, his gaze sweeping across their faces. "Let's consider the obvious: the nut allergy. Lord Alistair was extremely vulnerable to even a trace of nuts. This was not a secret. Anyone who knew Lord Alistair well, anyone with access to this house, would be aware of it. And almond oil, as Dr. Thorne noted, is stored away. Who has intimate knowledge of the contents of this house, beyond the kitchen staff themselves, and almost certainly beyond anyone who has been a recent guest?"

Dubois's eyes fixed on Mr. Davies. "Your adamant refusal to secure the kitchen, Mr. Davies, your insistence on controlling the narrative, was not merely a matter of loyalty or protection. It was a calculated move to prevent a thorough examination of a space where the real clues were being obscured, or removed."

He continued, his voice steady. "The linseed oil and muddy footprints – they are too deliberate. Too messy. A killer would rarely be so careless, unless that carelessness was itself a ruse. A butler, however, with decades of experience observing the routines of staff, would know exactly how to create such a trail to implicate the innocent, or to lead suspicion astray."

"The truth is, Lord Alistair was not poisoned in the Study, nor did he simply collapse from an allergy attack exacerbated by exposure there. The Study was merely where his final moments played out, where the stage was set to misdirect us."

He turned slightly towards Eleanor. "Miss Finch, you were with Lord Alistair in the library shortly before dinner. He was discussing his revised will. You had the strongest motive: deep debt, and you were the sole beneficiary. This made you a prime suspect, a convenient target for misdirection."

"But the how matters more than the who in a frame-up," Dubois continued, turning back to Davies. "The almond oil was indeed the weapon. Not con-

sumed from a dish of almonds Miss Finch offered, but rather, subtly administered. Mr. Davies, you were the last person to serve Lord Alistair his evening drink before dinner. You had unfettered access to him, to his personal effects, to the kitchen, and to the almond oil Dr. Thorne mentioned. You knew his habits, his allergies, and his vulnerability."

"You understood that a small, delayed dose of almond oil, perhaps on the rim of a glass, or a subtle coating on a favored book, would induce a delayed but severe anaphylactic reaction. Lord Alistair would begin to feel unwell, seek solitude or a specific medication in his Study, and there, he would collapse."

Dubois then pointed to the bloodstain on the doorframe. "The bloodstain is from Lord Alistair collapsing and hitting his head during his anaphylactic shock. But the linseed oil and the muddy footprints leading from the kitchen? These were planted after Lord Alistair was fatally poisoned, to create a false trail, to implicate the kitchen staff, or perhaps even to cast a general pall of suspicion, allowing another narrative to take hold. You, Mr. Davies, were trying to create the impression of a frantic, accidental fall or a struggle, rather than a deliberate, subtle poisoning."

He walked towards Madame Petrova. "Madame Petrova, you were interested in the painting, The Shadow of the Raven. Lord Alistair was in negotiations to sell it. A sale that would have significantly depleted the family's assets, which you, Mr. Davies, had sworn to protect. This, I believe, was your motive. Not just Eleanor's debt, but the very integrity of the Finch legacy, as you saw it."

Dubois's voice became a resonant boom in the silent room. "Mr. Davies, your loyalty to Lord Alistair's legacy was so profound, so all-consuming, that you decided to become its ultimate protector. You viewed Lord Alistair's actions – his revised will favoring a financially unstable niece, his potential sale of the valuable painting – as a betrayal of his ancestors, a squandering of the family's heritage. You took it upon yourself to 'correct' this."

He took a step closer to the butler, who remained rigid. "You orchestrated his death using the very vulnerability you knew so well, then meticulously crafted a series of misdirections. The 'almond' scent was meant to point to the allergy, the 'linseed' and mud to the kitchen staff, or perhaps even to make Eleanor's presence in the library earlier seem more suspicious. You even tried to remove evidence by refusing to secure the kitchen, hoping the general chaos would allow you to slip away undetected."

Dubois raised a hand, dramatically pointing, not at Eleanor, but directly at the stoic figure who had been Lord Alistair's shadow for decades.

"Mr. Davies, the butler who heard everything, saw everything, and knew everything... you are the killer."

Mr. Davies stood, his face a mask of shock, then slowly lowered his head, his shoulders slumping. The silver tray clattered to the floor with a metallic ring that echoed through the stunned silence. The rain outside intensified, the wind howling around the manor as the truth was finally revealed.

Dubois's voice softened slightly. I understand your misguided loyalty, Mr. Davies. Your years of service, your devotion to Lord Alistair's legacy. But justice, even in the face of such profound, if twisted, dedication, must prevail. You killed Lord Alistair to preserve what you saw as his true legacy, but in doing so, you stained it forever."

As the first police sirens wailed in the distance, echoing through the storm-ravaged grounds, Dubois, with a final, lingering look at the now-unmasked killer, allowed himself a small, almost imperceptible sigh. Another case closed. Another intricate web of deception unraveled. The rain continued to fall, washing away the grime and the secrets, leaving behind only the stark truth of the matter. The game was over, and the players, for now, would be silenced.

Escenario 1: Asesinato en la Mansión - Historia B (Línea Base)

La siguiente es la narrativa completa generada por el LLM monolítico de línea base para el escenario del Asesinato en la Mansión.

The storm howled, a furious beast clawing at the stone walls of Lord Finch's Manor. Rain lashed against the tall, mullioned windows, blurring the already dim landscape. Inside, Inspector Thomas Dubois, a man accustomed to the quiet precision of logic, found himself thrust into a maelstrom of grief, suspicion, and hidden agendas. The hushed announcement, delivered with chilling formality by Mr. Davies, the unflappable butler, had shattered the polite veneer of the evening. Lord Alistair Finch was dead. Murdered, it seemed, in his own study.

Dubois, a guest at the manor, felt the immediate shift from social observer to investigator. He'd been mid-sentence, discussing the finer points of Impressionism with Madame Petrova, the flamboyant art dealer, when

Mr. Davies's grave words cut through the pleasantries. The transition was instantaneous. He glanced at Madame Petrova, her carefully constructed composure already cracking around the edges, and then at Eleanor Finch, Lord Alistair's niece, whose face had gone ashen. He noted Dr. Thorne's expression, a carefully curated mask of professional concern, and the stolid features of Mr. Davies himself, whose usually impassive face seemed even more rigid than usual.

The initial shock reverberated through the drawing room, a space of opulent comfort that now felt suffocating with unspoken dread. Plush velvet sofas and chairs sagged under the weight of the gathering, the warmth from the fireplace failing to thaw the icy grip of fear that had settled over the occupants. The ticking of the grandfather clock in the corner seemed to amplify the strained silence, each tick a hammer blow against the tension. Dubois, with his innate ability to dissect human behavior, saw the immediate layers of deception and vulnerability. The setting, the people, the crime – all were now pieces on a chessboard, and he, the Inspector, had been unexpectedly summoned to play.

"I must insist everyone remain here," Dubois said, his voice calm but firm, cutting through the murmur of whispered condolences and frantic whispers of fear. He turned to Mr. Davies. "Take me to the study."

Mr. Davies, his face a mask of dutiful efficiency, inclined his head. He led Dubois through the drawing room, past the worried glances of the assembled guests, and into the dimly lit hallway. The heavy oak door of the study loomed before them.

The scene within the study was stark, a tableau of violence frozen in time. Lord Alistair Finch lay sprawled face down near his desk, a dark stain spreading across his back, a grim testament to the killer's work. The air was thick with the metallic tang of blood, mingling with the familiar scent of old paper and pipe tobacco. The room was a chaotic contrast to the meticulously organized life Lord Finch had led. Papers were scattered near the edge of the mahogany desk, suggesting a hasty struggle or a frantic search. The heavy leather armchair lay overturned, a silent witness to a possible confrontation. The floor-to-ceiling bookshelves, filled with leather-bound volumes on obscure subjects, stood undisturbed, silent sentinels. The antique globe, its decorative metal finial missing, stood forlornly in a corner, as if gazing upon the tragic scene. The tall window, latched securely from the inside, offered no easy escape. The dying embers in the fireplace cast long, dancing shadows across the room, adding to the already oppressive atmosphere.

Dubois, accustomed to such scenes, moved with a quiet precision. He knelt beside the body, his gaze scanning the scene with a meticulous eye. He noted the angle of the body, the placement of the scattered papers, the slight displacement of the desk. He examined the wound, noting its location, the likely weapon. He saw the folded document on the desk – Lord Alistair's last will and testament, the ink still wet, indicating it had been perused recently. He observed the art negotiation papers, detailing a potentially lucrative sale. The missing finial on the globe, however, stood out.

"The window," he said, his voice low. "Sealed from the inside. No signs of forced entry." He rose, turning to Mr. Davies. "Did anyone enter the study tonight, other than yourself and myself, since the body was discovered?"

Mr. Davies's expression remained unchanging. "No, Inspector. I found Lord Alistair during my rounds. The door was locked. I summoned Dr. Thorne, then summoned the guests." His voice was flat, devoid of emotion.

Dubois nodded slowly, acknowledging the cold efficiency of the butler's account. "And the last time Lord Finch was seen alive?"

"He was with Madame Petrova," Mr. Davies replied, his gaze fixed ahead. "They were discussing business, I believe."

Dubois turned his attention to the suspects gathered in the drawing room. The air was thick with apprehension. He addressed the assembled group, his voice echoing slightly in the grand room. "I must, of course, ask for your full cooperation in this matter. We are all, I am certain, deeply saddened by Lord Finch's untimely demise, but it is now imperative that we assist in uncovering the truth."

He began with Eleanor Finch, her face still pale, her eyes red-rimmed. "Miss Finch, you are the beneficiary of your uncle's will, correct?"

Eleanor nodded, her voice barely a whisper. "Yes... I... I didn't know... I wasn't expecting..."

"And you were not aware of any recent changes to the will, Miss Finch?"

Eleanor shook her head vehemently, tears welling in her eyes. "No! I swear! I... I haven't spoken to him in months. We had a falling out."

Dubois filed that information away. A strained relationship and a sudden inheritance often make a compelling motive. He turned to Madame Petrova, her flamboyant attire a stark contrast to the somber atmosphere.

"Madame Petrova, you were in the study with Lord Finch earlier this evening. Can you tell me about your meeting?"

Madame Petrova, her initial shock now replaced by a veneer of cool sophistication, began to recount the details of the negotiation. The potential sale of a piece of art, the specifics of the deal, and the heated debate regarding the artwork. She emphasized her strong alibi: her presence at the negotiations and the fact she had been in the drawing room since returning to the drawing-room. She ended her monologue by stressing the importance of the sale in question. Her entire body language, however, seemed to betray a secret, a hidden ambition.

.And you discussed a particular piece in the manor's collection, Madame?"Dubois pressed, observing her closely.

"Yes, Inspector. 'The Obscure Painting',"Madame Petrova replied, her eyes flickering towards the fireplace and looking into the hallway to the gallery. .A fascinating piece. A scene that captivated me and Lord Finch."

Dubois made a mental note of her interest in the painting and that Madame Petrova was likely the last person to see Lord Finch alive before his demise, other than the killer. The details of that conversation were vital.

He then turned to Dr. Thorne, whose composed demeanor was beginning to reveal a subtle unease. "Doctor, as Lord Finch's personal physician, you must have known him well. Did he have any enemies, any reason to fear for his safety?"

Dr. Thorne hesitated, carefully choosing his words. .Alistair was a complex man, Inspector. He had a passion for art, a sharp business mind, and a rather... complicated family history. He had his disagreements, but I saw no signs of any direct threats."He paused, then added, his voice slightly softer, "He was in relatively good health, all things considered."

Dubois's gaze lingered on the physician. The 'complicated family history,' the hesitations – all were clues, however subtle. He now began to suspect Dr. Thorne knew something, perhaps even more than he was letting on.

Finally, he turned to Mr. Davies, the ever-present, ever-silent butler. "Mr. Davies, you discovered the body. Can you recall anything out of the ordinary tonight?"

Mr. Davies's reply was curt. "Nothing, Inspector. I simply found Lord Finch as I usually do, checking for his well-being."

Dubois decided to change tactics and decided to explore the scene of the crime itself and the surrounding rooms.

He returned to the study, scrutinizing every detail again. He focused on the scattered papers on the desk. He found a small, almost imperceptible,

smudge of ink on one of the negotiation documents. He then examined the overturned armchair. He noted a slight indentation on the carpet, suggesting a struggle, the imprint almost invisible. He looked out the window, the driving rain obscuring the view, the window firmly locked and latched. He considered how the killer might have gained entry.

The absence of any obvious point of entry continued to intrigue him. The locked window, the locked door – it suggested someone inside the room had committed the crime. He returned to the drawing room to speak to the suspects again.

Dubois gathered the suspects again. "Let us revisit your accounts of the evening," he stated, his gaze sweeping over the faces. "Miss Finch, you stated you had a falling out with your uncle."

Eleanor fidgeted. "It's true. We argued over money. He refused to help me out of debt. I needed the money. But I would never..." her voice trailed off, her face contorted with grief.

"The will," Dubois continued. "You were unaware of the changes, or the fact you were the beneficiary?"

Completely, "she confessed, tears streaming down her face. "I had no idea. I couldn't have known."

Dubois watched her closely, noting the genuine sorrow mingling with the relief, the fear. He then turned to Madame Petrova. "Madame, you said you were negotiating a sale of a valuable piece."

Indeed, Inspector. A highly confidential deal, "Madame Petrova affirmed, her voice confident. "The stakes were high. A transaction of great value."

.And your business with Lord Finch concluded before his death?"

"Yes. I left the study, returning to the drawing room. I was discussing the deal, waiting for the verdict."

Dubois turned to Dr. Thorne. "Doctor, you mentioned Lord Finch's complicated family history. Could you elaborate?"

Dr. Thorne hesitated again, as before. ".Alistair, like all the Finches, had secrets. Debts, inheritances, feuds. Nothing that would lead to murder, of course. I saw the will myself, and understood he was indeed a benefactor."

Dubois then turned to Mr. Davies, who stood, as always, impassive. "Mr. Davies, the last time you saw Lord Finch alive?"

"When I delivered him tea," Mr. Davies replied, his voice devoid of emotion. "Then I commenced my usual rounds."

"Where were you when the body was discovered?"

Checking the house,"he stated. "The usual routine. "

Dubois paused, considering the information. The storm continued to rage outside, mirroring the inner turmoil of the suspects. He saw the subtle shifts in their expressions, the guarded glances, the unspoken tensions. He began to connect the pieces, weaving a tapestry of suspicion and deduction. He understood who wanted Lord Finch dead, the killer was in front of him. But he still didn't know the 'how'.

He walked into the gallery, his gaze fixed on "The Obscure Painting" mentioned by Madame Petrova. He studied the painting's details, noting the figure holding a small, yet pointy object. He began to formulate a theory. He returned to the study, his gaze lingering on the overturned armchair. He began to consider the method, the means of the crime.

Dubois decided to explore the kitchen, the heart of the manor's service wing. He examined the knife block, noticing the variety of sizes, all present, seemingly untouched. He moved to the guest bedroom. He carefully examined the contents of the partially unpacked suitcase. He took notes.

He then returned to the drawing room, his gaze sharp and decisive. He had gathered the clues, observed the suspects, and considered all the possibilities. He was ready to reveal the truth.

The storm outside seemed to intensify, mirroring the tension in the room. Dubois stood before the assembled guests, his gaze sweeping over their faces. He took a deep breath, the air heavy with the unspoken. I believe I have solved the mystery of Lord Finch's death."

He paused, allowing the words to hang in the air, the silence broken only by the rhythmic ticking of the grandfather clock. He began to explain his deductions, step-by-step.

"The evidence points to a single conclusion: Lord Alistair Finch was murdered,"Dubois began, his voice low but clear. "The question, of course, is 'who' and 'how.'"

He began by laying out the facts. "The study was locked from the inside. No signs of forced entry. Lord Finch was stabbed in the back, the wound inflicted with a sharp, pointed object. The time of death was estimated to be between 7:00 PM and 8:00 PM, based on the Doctor's professional analysis."

He paused, allowing the information to sink in. He looked at each of the suspects, gauging their reactions. Eleanor Finch was pale, her eyes wide

with fear. Madame Petrova maintained her composure, but her gaze flickered nervously. Dr. Thorne's face was unreadable, his expression carefully controlled. Mr. Davies stood perfectly still, his face a mask of impassivity.

"The key to this case lies in several seemingly insignificant details," Dubois continued. "Firstly, the will. Miss Finch was the sole beneficiary of a revised will. This provided a very strong motive." He looked at Eleanor, who flinched. "However, the circumstances of the crime did not support this theory. The locked room, the lack of visible evidence of forced entry, all of this pointed to someone within the room."

He turned to Madame Petrova. "Madame Petrova, your interest in 'The Obscure Painting' was also key. The painting depicts a figure wielding a sharp, pointed object. Coincidence? Perhaps. But Madame, you were negotiating a major sale with Lord Finch. A potentially lucrative deal that could be jeopardized by his death. You had a motive, too, albeit a complex one."

He then turned to Dr. Thorne. "Doctor, you knew Lord Finch well, and were privy to his deepest secrets. You had a history with the family. You also had access to the study, both through your medical profession and through your relationship with Lord Finch."

He paused, allowing the implications to resonate. Then, he turned to Mr. Davies, his gaze unwavering. "Mr. Davies, you discovered the body. You had access to every room in the house. You knew Lord Finch's routines. And, I believe, you had a motive far more profound than any of the others."

He looked at the butler, watching for any flicker of emotion. Mr. Davies remained perfectly still, his face a mask.

"The weapon used to kill Lord Finch was not a knife," Dubois stated. "It was a specific object, a particular item."

He walked towards the empty pedestal in the gallery. "The missing finial from the globe in the study."

He turned to face the assembled suspects. "The 'how' is as crucial as the 'who'," Dubois continued. "The key to the murder lies in the absence of any obvious point of entry. It was the locked room. The lack of a forced entry. It would mean the murderer was either in the study with Lord Finch, or had gained access to the room when Lord Finch was alone."

He then began to explain the ingenious, yet simple, method of the murder.

"The weapon was small, easily concealed. The finial had been detached from the globe long ago, perhaps damaged, perhaps intended for another purpo-

se. The killer would have been waiting, aware of Lord Finch's routine. He would have positioned himself, perhaps behind the armchair."

Dubois's voice took on a dramatic tone. "The killer struck when the Lord was distracted. A quick, precise blow. A single stab to the back. The killer then concealed his weapon, rearranged the scene to appear as a struggle and, crucially, locked the door from the inside. He then simply left the study, and went about his business."

He walked slowly back to the drawing room, his gaze fixed on Mr. Davies.

"The motive," Dubois continued. "A lifetime of servitude. Loyalty bordering on obsession. A secret. A history of protecting the Finch family from its own foibles. A resentment, perhaps, of Lord Finch's careless behavior. The knowledge that Lord Finch had become deeply troubled, had revised his will – this provided the impetus to commit the crime."

He paused. "But most importantly, the murderer acted out of what he perceived to be an act of justice. He believed, with some conviction, that he was acting in the best interests of Lord Finch. He had to act, to keep the family name intact. He saw the end, and decided to intervene, to end Lord Finch's suffering. He may even have been a benefactor of Lord Finch's generosity, or may have been afraid of what Lord Finch was about to do."

He fixed his gaze on Mr. Davies. "Mr. Davies, the butler, was not just a servant; he was a guardian, a keeper of secrets, and in the end, the executioner."

The silence in the drawing room was deafening. All eyes were now fixed on Mr. Davies, whose face was finally beginning to show a hint of emotion – a flicker of anger, a trace of defiance.

Mr. Davies remained silent, betraying nothing, his expression still a careful mask. He finally spoke, his voice low but steady. "You accuse me, Inspector?"

I do," Dubois confirmed. "The evidence points directly to you."

"The smudge on the document. You'd handled it, you had access. The armchair – moved, slightly, to the point where the killer could strike without warning. The detached finial. The locked door – sealed after the murder. The lack of evidence of a struggle. It all adds up to a single, devastating conclusion: you, Mr. Davies, murdered Lord Alistair Finch."

Dubois took a step closer to the butler, his gaze unwavering. "You knew the layout of the house, its every secret passage and hidden corner. You

knew when Lord Finch would be alone, you knew the location of the globe in the study, and you saw the opportunity. You had no fear of evidence. The finial was easily obtained and wielded. You would have been able to clean up any blood, or evidence, to prevent your discovery."

The weight of the accusation hung heavy in the air. Mr. Davies's shoulders slumped slightly, and the mask of stoicism began to crack.

I loved Lord Finch,"he finally said, his voice barely a whisper. I served him for over forty years. I would have done anything for him."

"And yet, you killed him."

It was for his own good,"Davies said, his voice gaining strength. "He was going to do something foolish, something that would ruin the family. I had to stop him. The will... he was going to disinherit his niece, he would have ruined everything."

He looked up, meeting Dubois's gaze with a flicker of desperation. "You wouldn't understand, Inspector. You don't know the pressures of keeping a family like the Finches together, the endless secrets, the constant threats of scandal. It was all I could do."

Dubois nodded slowly. I understand the pressures, Mr. Davies. But murder is never the answer."

He turned to the other suspects, who were still reeling from the revelation. Eleanor Finch was weeping openly, her face buried in her hands. Madame Petrova looked shocked, her carefully constructed facade finally crumbling. Dr. Thorne, ever the pragmatist, seemed to have anticipated the outcome, his expression a mixture of sadness and resignation.

"You, Mr. Davies," Dubois said again, turning back to the butler. "You are under arrest for the murder of Lord Alistair Finch."

Mr. Davies did not resist as the authorities began to secure him. As they led him away, he cast one last glance around the drawing room, his eyes lingering on the portraits of the stern-faced Finch ancestors, the family he had sworn to protect.

The storm outside began to subside, the rain easing to a gentle drizzle. The grandfather clock in the corner continued its relentless ticking, marking the passage of time, the end of a tragedy, and the beginning of a new chapter for the Finch family.

The case was closed, the truth revealed. Inspector Dubois, ever the observer, had pieced together the puzzle. The storm was over. The killer

revealed. And Lord Finch's Manor would, once again, stand as a monument to secrets and deceit, but also to the enduring power of logic and the relentless pursuit of truth. The end.

Escenario 2: Discusión en el Árbol - Historia A (Sistema Propuesto)

A continuación se presenta la narrativa completa generada por el sistema multi-agente con dirección indirecta para el escenario de Discusión en el Árbol.

The morning sun, a hesitant gold, crept over the valley, painting the slopes in hues of ochre and emerald. A gentle breeze rustled the leaves of the ancient Abuelo Ceibo, its gnarled branches reaching towards the heavens like the arms of a wise elder. In the heart of this verdant embrace, two souls grappled with a conflict as old as the tree itself: the relentless tide of progress versus the enduring embrace of tradition. Mateo, his brow furrowed with the weight of responsibility, stood in his small, tidy house, the scent of freshly brewed coffee mingling with the earthy aroma of his work boots. Elena, her silver hair catching the morning light, knelt in her own quiet home, her weathered hands gently caressing the bark of a young fruit tree, a silent prayer for the protection of the Abuelo Ceibo upon her lips. Their lives, intertwined by the valley's rhythms, were now set on a collision course by a shared inheritance and diverging visions for the future.

Mateo, burdened by the legacy of his father's land, reread the expansion plan, its stark lines and bold figures a constant pressure. He secured the document in his pocket, the weight of his family's future pressing down on him. The old ways, however, were deeply rooted in Elena's heart. She rose from her chair, her movements slow and deliberate, finding solace on her old wooden bench, her journal open before her. The valley's history, etched into the rings of the Abuelo Ceibo, was a chronicle she carried within her. As Mateo prepared for the day's work, pulling on his muddy boots, a silent battle raged within him. He knew what he had to do, but the prospect of disturbing the valley's ancient heart weighed heavily on his soul. Elena, tending to her herb garden, whispered to the plants, "I will remember every leaf, every branch, every scar. Your history is mine, and I will keep it safe." Mateo, kicking at a clod of earth, finally voiced his mixed feelings, muttering to himself as he looked at the Abuelo Ceibo. He knew the tree's old branches might be dangerous, but he also knew the tree was part of him.

The path of their conflict led them, inevitably, to the Abuelo Ceibo. Mateo, his steps measured, approached the towering giant. Elena, her hand outstretched, moved towards it as well, her heart heavy with foreboding. They met beneath the sprawling canopy, the air thick with unspoken tension. Elena, we need to talk. About the tree," Mateo began, his voice strained.

"Mateo, what is there to talk about? You know this tree. It has been here longer than either of us. It is not yours to decide its fate," Elena replied, her voice firm, a plea woven into her words.

"The legal documents are clear. The land belongs to my family. And the branches... they're a danger. They could fall, and someone could get hurt. We need to consider our responsibility here," Mateo countered, his gaze sweeping the vast expanse of the tree.

*"Danger? This tree *is* life, Mateo. It shelters us, it gives us air, it has watched over us for generations. Those documents... they are just words. The true measure of this land is not in lines on a paper, but in the memories we hold. This tree's branches are not a danger; they are a legacy, a promise of life. What do you truly plan to do?" Elena's voice carried the weight of generations.*

Mateo gestured toward the fallen fruit, its flesh exposed to the sun. "Life? Elena, look at this fruit. It's fallen, rotting. This tree isn't providing life, it's becoming a hazard. The new crop will bring prosperity, sustainability for our family, and a future. A future that the tree is now preventing us from building."

Is it only about the fruit, Mateo? Or is it about forgetting all the other fruits it has given? The shade in summer? The homes for the birds? The stories we tell beneath its branches?" Elena pressed, her gaze unwavering.

"This isn't just about the fruit, or the shade, or even the birds. It's about the future. This device, this weather station, is a tool for predicting the best conditions for our crops. It helps us get a better yield, helps us feed our families. The tree's shadow disrupts the data, makes it less accurate," Mateo explained, his voice softening slightly.

Elena, silent, picked up the weather station, examining it with a dismissive glance before turning back to Mateo. "Look, I understand. You care for the tree. I do too, in a way. But there are practical concerns. Tell me, Elena, have you considered what could happen if a branch falls? The responsibility would fall on both of us."

Elena walked towards the axe, her stance a silent challenge. Mateo, seeing the depth of her conviction, stepped forward, positioning himself between

her and the tool. He hesitated, then reached out, touching the rough bark of the Abuelo Ceibo, the gesture a silent plea for understanding. Elena, her eyes filled with a deep understanding of the valley's spirit, reached out and gently touched a wooden bird, a symbol of the tree's life.

Elena, understanding his perspective, picked up Mateo's journal, turning to the drawing of the Abuelo Ceibo. She touched the drawing, then looked up at Mateo, her gaze filled with a shared history. "Do you remember your Abuelo's stories, Mateo? The stories of the tree's resilience, its strength... and its **spirit**?"

"Yes, Elena. I do. That's why I want to find a way to make this work. I remember Abuelo's stories. I remember what the tree means," Mateo affirmed, his heart opening to a different path.

"You remember the stories, yes? But do you **feel** them, Mateo? Feel the heart of the tree, beating in this valley as it always has, for us? Tell me, what does your heart say, looking at this drawing?"

"My heart... My heart says that we can find a way to do both, Elena. To honor the tree, and to secure our future. It says... let's try. Let's really try," as Mateo finally admitted, Elena begins to smile happily.

^EElena, look at the survey map. I brought it, it's in the scroll. The property lines, before the dispute. See if there's a way to adjust the crop line to still allow us the space to expand without hurting the tree. Let's look at the map together," Mateo pleaded, seeking a middle ground.

"The lines on this paper... they are not as important as the lines etched on the bark of this tree, are they, Mateo? Let us look at the map first, but I want you to remember what is truly valuable here. What is truly **ours**," ^EElena countered, her voice still resolute.

Mateo, his gaze softened, proposed a compromise. "See, Elena? Before the dispute, the lines were different. Maybe, just maybe, we can adjust the planting area slightly, using these original lines. We could still get the space we need for the new crop, while respecting the tree. Let's see if it's even possible."

Elena, her expression thoughtful, knelt and unfurled the ancient map, tracing the lines with a reverence that mirrored her connection to the land. "Mateo, let us look at the map **together**. But first, promise me this: Promise me that we will remember the whispers of the wind, the songs of the birds, the very lifeblood this tree provides before deciding on anything."

Mateo, his voice filled with a new understanding, replied, ^EElena, I promise. Before we make **any** decisions, we will listen to the whispers of the

wind and the songs of the birds. I will also remember the lifeblood the tree provides. Now, let's look at the map, **together**. We'll see if there's a way to make this work for both of us."

Under the watchful gaze of the Abuelo Ceibo, they began. Elena reached out and gently placed her hand on the gnarled bark, connecting with the tree's ancient heart. Mateo, his pencil poised, began to trace a potential new crop line, careful to avoid the tree's shadow. *Elena*, let's trace the potential new crop line on the map. I brought my pencil. It's sharp. If we move this line **here**, "he explained, pointing with his pencil, "we might gain the necessary space without jeopardizing the tree. It is just an idea, and it will require a lot of work."

"The future is not only built with lines on a map, Mateo. It is built on the roots that run deep, the history that breathes around us... and the promise we make to each other, to **the tree**."

"You are right, Elena. The future is about more than lines on a map. But the map helps us **see** the roots, the history. It helps us find a compromise. And, yes... I promise the tree. Let's start with that promise. Let's build a future **together**, with the tree."

"Let us not speak of compromise just yet, Mateo. Let us speak of **understanding**. Of seeing with the heart, as well as the eye..*Elena* gently closed the journal, her gaze fixed on the Abuelo Ceibo. "Look at the map, yes. But first, let us walk around the tree. Let us feel its presence, together."

Mateo nodded, a silent agreement passing between them. He carefully placed the pencil and map back in his pocket, the weight of the day's work temporarily forgotten. Side-by-side, they began to circumambulate the ancient giant. The air hummed with the buzz of unseen insects, the scent of damp earth and decaying leaves filling their lungs. Mateo, usually focused on the pragmatics of farming, found himself drawn to the tree's texture. He reached out, his fingers tracing the rough, furrowed bark, feeling the pulse of the tree beneath his fingertips. He noticed the intricate patterns, the deep scars that spoke of storms weathered and seasons endured.

Elena, her hand resting lightly on a low-hanging branch, pointed out a small cavity, a hidden haven for birds. "See, Mateo? The tree provides. It always has. It always will." She gestured to the sky. "The birds, the shade, the very air we breathe... all gifts of the Abuelo Ceibo."

As they continued their slow circuit, Mateo found himself seeing the tree in a new light. He had always viewed it as an obstacle, a hindrance to his plans. Now, he saw it as something more: a living testament to resilience, a

symbol of the valley's enduring spirit. The sun, now higher in the sky, cast long shadows, painting the ground with shifting patterns of light and dark. He thought of his Abuelo's stories, tales of the tree's power to withstand drought and tempest, of its unwavering presence through generations of hardship.

They stopped beneath a particularly gnarled branch, its surface a mosaic of textures and colors. Mateo's gaze followed the branch, considering its precarious position. He thought of the potential danger, the responsibility. He remembered his own fears, the worries about his family's security.

"Perhaps," he began, his voice hesitant, "perhaps there is a way to trim the branches without... without harming the tree's spirit. Without diminishing its gifts."

Elena turned to him, her eyes filled with a glimmer of hope. "We could consult with the elders, Mateo. They know the tree's rhythms. They know how to care for it, how to respect its strength." She paused, then added, "And perhaps... perhaps we could find a way to use the fallen branches. To honor them, rather than simply discarding them."

Mateo considered this, his mind already racing with possibilities. He envisioned the fallen wood being used for something useful, something beautiful. He thought of creating benches for the community, or even sculptures, celebrating the tree's life. His pragmatic nature began to merge with a newfound appreciation for the tree's intrinsic value.

*"Yes, Elena. We could do that. We could find a way. We could make it work." He reached out, his hand again touching the bark. "Let's go back to the map. Let's look at this with new eyes, with a new heart. But first... tell me your vision. What do *you* see for the tree, Elena? Beyond just keeping it alive?"*

Elena smiled, a genuine, heartfelt smile that reached her eyes. "I see... a place of gathering, Mateo. A place where we can still tell stories, where the children can play, where the valley's heart continues to beat. I see a legacy, not just of wood and leaves, but of life, of connection, of the enduring spirit of this land." She raised her hand, pointing towards the sky. "I see the Abuelo Ceibo, standing tall, a guardian watching over us all."

They returned to the map, the sunlight filtering through the leaves, dappling the paper with dancing light. Mateo, armed with a new perspective, carefully re-examined the potential crop lines. This time, his pencil danced across the paper with a newfound sensitivity, avoiding the tree's shadow,

seeking a path that honored both his family's future and the tree's enduring presence.

*"Let's see," he murmured, his voice filled with hope. "Perhaps... if we adjust the planting area *here*, and implement this new terracing technique, we can maximize the yield without encroaching on the Abuelo Ceibo's space. We can also use the fallen branches for the community, to make benches and give them to the kids. We'll honor the tree's life, even in its passing. The elders can help guide us."*

Elena watched him, her heart swelling with a sense of shared purpose. "And we will remember the whispers of the wind, the songs of the birds, and the lifeblood this tree provides," she whispered, her voice a promise.

Together, they began to map out a new future, a future where tradition and progress could coexist, where the legacy of the Abuelo Ceibo would continue to inspire generations to come. The sun, now setting, cast a golden glow over the valley, painting the ancient tree in a warm, embracing light. The air, filled with the scent of earth and hope, carried the promise of a shared path forward. They had found a compromise, yes, but more importantly, they had found each other, united in a shared vision, a testament to the enduring power of understanding and the unwavering spirit of the valley.

Escenario 2: Discusión en el Árbol - Historia B (Línea Base)

A continuación se presenta la narrativa completa generada por el LLM monolítico de línea base para el escenario de Discusión en el Árbol.

The afternoon was a tapestry woven with the threads of sunlight and shadow. It hung heavy and quiet over the fertile valley, the air thick with the scent of freshly turned earth and the gentle hum of bees busy amongst Elena's herbal garden. From his house, Mateo surveyed his fields, the modern, clean tractor gleaming in the sun, a silent testament to his ambition. The meticulous rows of crops stretched towards the horizon, a testament to his tireless work. But his gaze, drawn repeatedly, was pulled toward the immense form that dominated the property line – the Abuelo Ceibo. Its sprawling canopy, a dark silhouette against the sky, seemed to cast a silent judgment.

The pang of economic pressure, a constant companion, gnawed at him. He'd inherited his father's land, a legacy burdened with the promise of a

secure future, a future he felt desperately compelled to secure. The new variety of crop he planned to plant, a more resilient and profitable strain, required more space. The Abuelo Ceibo, a living, breathing impediment, stood directly in the path of progress. He ran a hand through his hair, the weight of responsibility pressing down on him. The tree's aged branches, too, posed a silent threat – a hazard he felt obligated to address. He knew he had to speak with Elena, though the prospect filled him with a reluctant dread.

He walked towards the property line, his boots crunching on the dry grass. The shadow of the Ceibo deepened, cooling the air. He could see the worn stones marking the boundary, almost swallowed by the encroaching grass. As he approached, Elena emerged from her house, her silhouette framed by the doorway. He could see her posture, her shoulders slightly slumped, even from a distance. He knew she understood what was coming.

Elena watched Mateo approach from the shaded porch of her house. A gentle breeze stirred the leaves of the smaller fruit tree beside her, and she took a long sip of her herbal tea, letting the familiar warmth soothe the tightening knot in her stomach. The Abuelo Ceibo stood sentinel, its ancient branches swaying softly, as if in warning. The light shifted, painting the tree in long, dramatic shadows. The afternoon sun, a fiery eye in the sky, seemed to reflect the growing fire of anxiety within her.

She had lived beside the Ceibo her entire life, a life intertwined with its fate. It had witnessed her childhood games, her teenage dreams, the joys and sorrows of her marriage, the births and deaths of her loved ones. For her, the tree wasn't merely wood and leaves; it was a living, breathing entity, a guardian, a repository of history, a symbol of her family's and the valley's resilience. She remembered her grandfather's stories, how the Ceibo was here long before her family, before anyone. To cut it down, even to consider it, was an act of desecration, a betrayal of the spirit of the valley. She steeled herself, her gaze unwavering. She wouldn't let him take it down.

Mateo found her sitting on the weathered wooden bench beneath the shade of the fruit tree, her back ramrod straight. He approached respectfully, trying to sound casual, though his heart hammered against his ribs. "Elena," he began, his voice soft, respectful.

She turned, her eyes, the color of the valley after a spring rain, meeting his. "Mateo." Her voice was equally quiet, holding within it a lifetime of unspoken understanding.

“I need to talk to you about the Ceibo,” he said, stating the obvious.

A shadow passed over her face, a flicker of the grief she anticipated. “I know.”

He explained his plans, the necessity of expansion, the economic pressures he faced. He spoke of the new crop, the hope for a better future for his family, the potential for growth. He framed it as a matter of survival, a pragmatic necessity. He didn’t downplay the importance of the tree, the shadow it cast, the risk of its falling branches, but painted a picture of responsibility and long-term sustainability for the community.

Elena listened, her expression impassive. When he finished, she spoke, her voice calm but firm, laced with centuries of quiet conviction. “The Ceibo provides shelter for the birds, Mateo. Its roots hold the soil, preventing erosion. It is a gathering place for the spirits of our ancestors. It watches over us, protects us.” She gestured to the tree with a hand weathered by time and work. “It is not just a tree, Mateo. It is life. It is the heart of the valley.”

He countered with facts and figures, with the realities of modern farming, the importance of efficiency. He pointed out the potential danger of the aging branches, the risk of someone getting hurt. He spoke of progress and prosperity. He knew, of course, that she viewed such terms with a deep suspicion. He felt a deep, almost familial guilt, knowing he was causing her this distress.

The debate escalated, the tone becoming more strained with each exchanged word. Mateo’s pragmatism clashed with Elena’s reverence. He spoke of the future, of the need to provide, of the burden of responsibility. She spoke of the past, of tradition, of the sacredness of the land. He offered alternatives, a smaller field, a modified plan. She refused, her eyes flashing with a stubborn fire.

“You don’t understand,” Mateo pleaded, his voice rising. “This is about our future, Elena. It’s about providing for our families.”

“And what about the future of the valley?” she countered, her voice resonating with a depth of sorrow. “What about the future of the Ceibo?”

The afternoon sun began its slow descent, casting long shadows that stretched across the land. The air crackled with unspoken tension. The silence between them, once filled with the easy familiarity of neighbors, was now filled with the weight of disagreement.

The conflict ultimately led them to the foot of the Abuelo Ceibo. Its trunk, a colossal pillar of gnarled bark, rose towards the sky, its branches a network

of ancient limbs. The air around the tree was cool and still, imbued with a palpable sense of history. The worn stones marking the property line were almost lost in the thick roots, which stretched out like grasping hands.

“We stand on the edge, Mateo,” Elena said, her voice low, her gaze fixed on the trunk. “On the edge of forgetting what truly matters.”

Mateo stared at the tree, trying to see it as she did, as something other than an obstacle. The setting sun cast the tree in gold. He ran his hand over the rough bark, feeling the deep grooves, the marks of time. He couldn’t deny the tree’s beauty, the profound sense of peace that permeated its presence. He also couldn’t deny his very real fear of what would happen to his family if the new crop failed.

He felt an almost unbearable weight, a responsibility both to his own family and to the legacy of the valley. He felt the pull of the past, the weight of tradition, and the relentless pressure of the future. He could not see a path forward, and felt the profound sadness of their impasse.

“I can’t... I can’t just let it stay,” he finally said, his voice hoarse. “It’s in the way. It’s dangerous. The winds... they will... they might...”

He paused, his gaze sweeping up to the branches overhead, imagining them crashing down. He knew Elena’s heart, he knew her love for the tree, but he couldn’t shake his need to see it gone. He knew the depth of his responsibility, which was both physical and emotional.

As if in answer, a sudden gust of wind rustled through the leaves, and a single, dry branch, weakened by age, snapped from the highest canopy. It tumbled down, landing with a soft thud a few feet away, narrowly missing them.

Elena gasped, clutching at her chest. Mateo flinched. He felt a strange mixture of terror and morbid vindication.

“You see?” Mateo exclaimed, his voice laced with a desperation he hadn’t anticipated. “It’s not safe, Elena! It’s been proven. It’s just a matter of time.”

He looked at Elena, whose face was pale, her eyes wide. The fallen branch lay at their feet, a stark reminder of the precariousness of their situation. In that moment, the argument seemed irrelevant. The weight of responsibility, the pragmatic necessity, and the deep connection to the land were all intertwined in a complex web of fear and tradition.

As they stood together in the encroaching shadows, Elena looked up at the Ceibo. For the first time, she saw not just its strength, but its fragility.

She saw the inevitable passage of time, the toll it had taken on its ancient frame. Perhaps, she thought, some compromise was possible.

"Wait," she said, her voice barely a whisper. She turned and began to walk slowly around the base of the tree, her hand outstretched, tracing the rough bark. She moved with a deliberate slowness, a reverence she had not shown before, even to Mateo.

She stopped at a spot where the roots, exposed by years of wind and erosion, formed a natural hollow. Kneeling, she began to clear away the accumulated leaves and debris. Mateo watched, confused, as she reached deep into the hollow and pulled out a small, weathered box.

He watched, mesmerized. He had no idea what it contained.

Elena carefully opened the box, revealing its contents. Inside lay a collection of old photographs, letters, and a small, leather-bound journal. As she gently retrieved the journal, Mateo walked closer to see.

"This belonged to my grandfather," Elena said, her voice thick with emotion, wiping the dust from the journal's cover. "He kept a record of the valley, of the Ceibo... of everything. He said there was a hidden spring under the roots of the tree, a source of life for the valley. He believed it to be the reason for the tree's longevity, its sacred power."

She opened the journal, its pages brittle and yellowed with age. Her fingers traced the faded ink, the delicate script. She found an entry about the growth of the Abuelo Ceibo. She then turned to the illustration that accompanied the entry, a detailed map depicting the course of the valley, and more specifically, an intricate sketch detailing the location of the hidden spring beneath the Abuelo Ceibo's roots.

With growing excitement, Mateo looked at the drawing. He noticed something.

"Wait... Look," Mateo pointed out, his voice filled with awe. He had also been observing the old drawing of the tree, with a detailed depiction of its root system. On this particular map, Mateo noticed a small marking, barely visible. He saw the sketch, showing the underground spring as a natural basin, with a precise location. His modern mind had always been focused on the economic value of the land, not on the secrets held beneath it. He also saw something else. "That line... that's the underground water line."

"According to my grandfather, the health of the tree is tied to this spring," Elena said. "The spring feeds the roots and the roots feed the valley."

Mateo felt a surge of understanding, a feeling of something important, something that could change everything. "And if we... If we find it, if we harness its power...?" he asked, his voice filled with a newfound hope.

An idea had been born.

They turned their attention back to the tree, to its enormous and extensive root system. They started inspecting the exposed roots, the old, weathered boundary stones. Then, they started removing the loose soil near the root structure, uncovering another weathered stone, almost identical to the boundary markers. They had found the point, following the drawing on the journal. The afternoon sun, finally dipping low, cast long shadows, and the air cooled, but the excitement grew.

They spent the next few days, working side-by-side, digging. Mateo brought in his tractor, but used it with a newfound respect, carefully maneuvering around the roots. Elena shared her knowledge of the land, guiding him. They uncovered more stones, more clues, following the path of the underground spring. They saw the ancient, almost petrified remains of an old canal system, the source of the valley's original irrigation. Their combined effort now transcended the initial conflict, forging a shared understanding.

Finally, they reached their goal. The shovel hit something hard. Working carefully, they cleared away the earth, revealing a small, stone-lined basin. Clear, cold water welled up from the ground, filling the basin. The hidden spring was found.

Mateo looked at Elena, her face illuminated by the setting sun. He realized that his initial plan – cutting down the tree – was not the only solution. He had found a way to expand his cultivation area, without cutting down the Abuelo Ceibo. His modern agriculture would be combined with the deep wisdom of the valley.

It's beautiful,"he said, genuinely moved.

Elena nodded, her eyes shining with tears. "It always was."

The discovery of the spring didn't solve their immediate problems. Mateo still needed more land for his new crop. But now, instead of seeing the Ceibo as an obstacle, he saw it as a source of potential. He began to formulate a new plan.

They agreed to carefully redirect the spring water to his new fields, making sure that it would also nourish the Ceibo. He would expand his cultivation, but around the tree, leaving it as a centerpiece. The expansion would be respectful and sustainable. The old branches, deemed dangerous, would be

carefully trimmed, under the watchful eye of a local arborist. He would also use the old journal of Elena's grandfather to study the land and learn.

They had found a compromise that went beyond simple pragmatism. They had found a connection, a deeper understanding of the valley, and a shared vision for the future.

The Abuelo Ceibo stood tall and proud, its canopy bathed in the soft light of the setting sun. The roots, nourished by the newly discovered spring, seemed to pulse with life. Elena, watching Mateo surveying his new fields, felt a profound sense of peace. The valley would continue to thrive, its traditions and its progress, intertwined, forever.

Escenario 3: Ladrones y Traiciones - Historia A (Sistema Propuesto)

La siguiente es la narrativa completa generada por el sistema multi-agente con dirección indirecta para el escenario de Ladrones y Traiciones.

The humid night air hung over the city; the neon glow of the distant skyline contrasted sharply with the oppressive darkness that enveloped the museum. Inside, Albert, a man of sharp features, marked by perpetual impatience, adjusted the lock picks in his calloused hand. Beside him, Josh, pale under the dim light of the single bathroom bulb, wrung his hands, his gaze darting nervously from Albert to the reinforced steel door. The heist was about to happen, the culmination of weeks of meticulous planning and a desperate gamble that could save Josh's daughter or bury them both.

Albert... are you sure?" Josh finally stammered, his voice barely above a whisper. "The security... they said it was state-of-the-art. And... what if we get caught? Sarah..."

*Albert sneered, his lips curling into a scornful grimace. Relax, Josh. State-of-the-art? Please. That's what *they* want you to think. Now, let's go. The sooner we get in and out, the sooner you can get back to your... Sarah." He emphasized his words with a dismissive wave of his hand; the glint of the lock picks reflected the light.*

Josh swallowed hard; fear was evident in his eyes. Right. Right," he muttered, trying to project a confidence he clearly didn't feel. "Let's... let's hurry, okay? The less time we spend here, the better."

Albert flung open the bathroom door and strode into the hallway, his movements fluid and confident. Josh hesitated, his gaze sweeping the hallway,

*a silent plea for reassurance. He followed Albert, his back pressed against the wall, senses on high alert. He was a shadow, trailing behind Albert, the weight of his daughter's life pressing down on his shoulders. "Don't worry, Josh. I've been through worse," Albert said in a low, rumbling voice, kneeling before the display case. "Now, are you going to stand there gawking or are you going to *help* me get rich?" He inserted a slender lock pick into the display case's lock; the delicate click echoed in the otherwise silent corridor.*

"Just... promise me we'll stick to the plan, Albert," Josh pleaded, his voice slightly cracking. "No improvising, okay? I can't afford any mistakes."

*"Stick to the plan? Josh, *I am* the plan. Now, move it. And try to keep up." Albert's fingers danced over the lock, and the tumblers yielded with practiced ease.*

"Wait... before we go," Josh said, his voice barely audible over the thumping of his own heart. "What about the cameras? Did you disable them all? Cameras? Of course, I disabled them. Do you think I'm an amateur? Are you ready, or do I have to do everything myself?" Albert's voice was laced with thinly veiled impatience.

Right... right, let's go." Josh's voice was flat, devoid of conviction.

The air felt thick with anticipation, the silence broken only by the faint hum of the building's systems. He moved with purpose, his eyes sweeping the hallway, already envisioning the loot.

Josh, lagging behind, stayed glued to the wall, his body tense, all senses sharpened. He was a rabbit in a wolf's den.

Albert's fingers worked with practiced ease, the display case lock surrendering to his skill. He ignored Josh, focused solely on the prize. Relax, Josh," Albert said without turning. "We're in. Try to keep up, and maybe you'll get a cut."

Ignoring Albert's words, Josh's gaze went immediately to the jewelry display case, fixating on the diamond necklace.

Albert, oblivious to Josh's internal struggle, opened the display case and reached for a golden chalice. He examined it for a moment with a cold, appreciative expression. "Don't get distracted, Josh. I'll handle the good stuff. You can start exploring the other display cases."

Josh, his resolve crumbling, took a hesitant step towards the jewels. The weight of his daughter's medical bills, the desperate need for a miracle, warred with the growing unease within him.

Albert, now in the security room, reviewed the camera footage, his eyes narrowed. He found the image of the jewelry display case and began to study it.

"This is it. Just this. Then we leave." Josh whispered to himself, his gaze fixed on the shimmering diamonds.

Albert tried to speak to Josh, but the distance between them rendered his words useless.

Josh had his hands tightly clasped in front of him as he took a step back, whispering to himself, then turned and walked towards the main corridor.

Albert, his gaze scanning the monitors, leaned back in his chair, searching for a weakness, a blind spot.

Josh tried to speak to Albert, but the distance between them rendered his words useless.

Albert... please. Let's go. We can... we can try something different. This is... too much." Josh's voice was barely a whisper, his gaze... Scampering down the empty hallway, searching for a way out, an escape from this nightmare.

Albert leaned forward, his gaze fixed on the monitor, and pressed a button on the control panel. The monitor shifted, displaying a live feed from the main hallway, near the jewelry exhibit. He saw Josh, his back to him, in a posture that conveyed a mix of fear and regret.

Josh, his resolve shattered, turned and walked quickly back to the bathroom. The plan, meticulously crafted, was falling apart.

Albert, his fingers on the keyboard, activated the code decipherer. It was the decisive moment, the point of no return. His future and his freedom were at stake.

Josh inspected the bathroom, wondering where Albert was. The air in the small space felt thick, and the silence amplified his growing anxiety.

Albert, his gaze scanning the camera footage, had lost sight of Josh. He was engrossed in his own perfect plan.

Josh heard a noise, a subtle click, and slammed the bathroom door shut, locking it from the inside. A cold, sharp fear shot through him.

Albert, now impatient, examined the monitors, his gaze sweeping the building.

Josh knelt, searching for a small box with his hand. He took out a knife. His hand was shaking.

Albert leaned forward, his gaze fixed on the monitor. He entered the lock code; the door remained open.

Josh leaned against the door, gripping the knife tightly. He waited, his heart pounding, praying that the sound he heard was Albert. "Albert... Albert, is that you...?"

Albert, his patience exhausted, began searching the cameras for any sign of Josh.

Josh, his resolve crumbling, took a deep breath; the cold water offered a moment of clarity.

Albert, impatient, began searching the cameras.

Josh, his mind racing, began to consider the tunnel entrance, a possible escape route.

Albert, his gaze fixed on the stopwatch, smiled.

Josh, leaning against the cold tile wall, made a decision. He had to find Albert.

Albert's voice echoed in the silence of the security room. "Let's see how long it takes him to realize he's alone."

"Tick-tock, Josh. Time's running out."

Josh, his gaze fixed on the hallway, began to move forward.

Albert adjusted the monitor feed and watched Josh head towards the jewelry exhibit.

Josh examined the area carefully, muttering, "Damn it!" as he realized Albert wasn't there.

Albert pressed a button, activating the exhibit's security lockdown.

Come on, Josh. Don't disappoint me. You have five minutes or I'm leaving you behind. And the treasure." The cold gleam of the diamond necklace called to him, a siren song promising salvation. Josh, his face a mask of conflicting emotions, moved with hesitant determination towards the jewelry exhibit. The security lockdown, Albert's cruel game, had begun. He knew, with chilling certainty, that he was alone.

Albert's voice, an disembodied taunt, echoed in the now silent hallway, a chilling reminder of his abandonment. Come on, Josh. Don't disappoint me. You have five minutes or I'm leaving you behind. And the treasure." The words hung in the air, a death sentence to his hopes and a clear betrayal of the promise they had made.

Josh reached the exhibit; his hands trembled so violently he could barely focus. The glass was now impenetrable, a barrier between him and his daughter's future. He ran his hand over the cold surface; the smooth glass offered no comfort, no hope. The jewels, once a symbol of hope, now mocked his desperation. Five minutes. The stopwatch, a ticking metronome, marked the rhythm of impending doom.

He turned, his gaze sweeping the hallway, searching for any sign of Albert, any indication that this was a cruel joke. But the hallway was empty, bathed in the cold, sterile light of the museum. The only sound was the frantic hammering of his own heart.

He knew he had to leave. He had to run. He had to get out and save himself. But the thought of Sarah, her small face, her faint smile, anchored him to this impossible task. He had promised her he would do anything.

He began to search for another escape route, his gaze fixed on the main entrance. He needed to find Albert. He had to reason with him.

He turned and ran towards the security room, desperate to confront Albert, to plead with him, to salvage something from this disastrous situation. The weight of his daughter's life pressed down on him, threatening to crush him.

He pounded on the heavy metal door, his voice desperate. "Albert! Albert, open up! We need to talk! Albert!"

Inside the security room, Albert watched the scene on the monitors, an expression of mixed amusement and cold calculation on his face. The timer ticked relentlessly. He had pushed Josh to the limit. He had tested his resolve, and now he was about to see the results. He allowed himself a small, satisfied smile.

He paused, considering the situation. He could cut the power and leave Josh, the prize, and... Leaving the police behind. He could leave the museum and start his new life. He could finally be free.

But something stopped him. A flicker of doubt, a lingering sense of... something. He was a thief, yes, but not a killer. A pang of guilt, an unusual emotion, pricked at him as he watched Josh's frantic movements on the monitor.

He took a last look at the timer and slammed his fist on the console, activating the remote control. The display case's security system deactivated, and the doors swung open.

Albert's voice, now urgent, crackled over the communicator. "Josh! Grab the necklace and get out! Now!"

Josh froze, his hand suspended over the security room door. He hesitated, unsure if he had heard correctly. Then, he sprinted towards the display case, propelled by a surge of adrenaline.

*He snatched the necklace; the cold metal sent a shock through him. He turned to run, but then he heard it: the unmistakable sound of approaching sirens. The alarm had gone off, **and a deep hum announced the start of the museum's emergency lockdown protocol.***

*Albert, his face etched with a mix of panic and determination, **was already forcing open the emergency exit, prying it open at the last second.** "Go, Josh! Now! **It's locking in moments!**"*

Josh, the necklace clutched in his hand, turned and ran; his footsteps echoed in the cavernous hallway. He looked back at the display case; a fleeting image of the shimmering jewels burned in his memory. He knew Albert was right. It was time to go. He had to get out, survive.

The museum's security system slammed the metal shutters down, trapping Josh in the hallway.

*Josh tried to open the **emergency door, the same one Albert had disappeared through,** but the system was locked. **He was a second too late.** He turned to Albert for help, but he was gone. He was alone.*

The sirens grew louder. The metal shutters slammed shut with a deafening clang, reverberating through the museum, a final, crushing period to their failed heist. Josh slammed his shoulder against the reinforced steel; the impact rattled him completely. He was trapped. Panic clawed at his throat, threatening to suffocate him. He was alone, abandoned, and the sirens, a ravenous beast, were closing in.

He spun around, frantically searching for another way out, his gaze sweeping the silent hallway. The main entrance, now a metal wall. The display cases, impenetrable fortresses. The emergency exit, his only hope, was blocked by the very security he had planned to outsmart. He was a rat in a cage, and the walls were closing in on him.

*Then, he saw it. A glint of light, reflecting from a small, almost invisible ventilation grate near the ceiling. It was a long shot, but it was *something*. He scrambled, his heart pounding against his ribs, and began to climb the display case. His hands, slick with sweat, fumbled for the smooth glass. He propelled himself upward, muscles screaming in protest, and reached the vent.*

He wrenched it open; the metal grate yielded with a screech, revealing a

narrow, dark passage. He squeezed through, ignoring the sharp edges that scraped his skin. He was in, but where did it lead?

He crawled forward, the darkness swallowing him whole. The air was stale, thick with the smell of dust and forgotten things. He groped his way through the constricted duct; the cold metal a constant reminder of his precarious situation. The sirens grew closer, their wail an unrelenting symphony of impending doom.

He crawled for what felt like an eternity, the silence broken only by his pounding heart and the distant, mournful wail of the sirens. He began to doubt, to wonder if this was even an escape route. He had to believe. He had to keep going. He had to get out. For Sarah.

Finally, he saw a glimmer of light ahead. Hope surged through him, a powerful current propelling him forward. He reached the end of the duct and peered out. He was facing the museum's loading dock, a small, deserted area, bathed in the cold glow of security lights.

He dropped down, landing with a dull thud. His ankle twisted on impact. He ignored the pain, focused solely on escape. He limped towards the back exit, his movements hampered by the injury. He reached for the door, praying it wasn't locked.

It wasn't.

He flung it open and stumbled out into the cool night air. He took a deep, ragged breath, the air filling his lungs, a promise of survival. The sirens were right outside. He could hear the police voices, shouting orders.

He turned and ran, ignoring the pain in his ankle, the burning in his lungs, and his screaming muscles. He ran until he couldn't run anymore. He collapsed in a dark alley, gasping, the diamond necklace clutched tightly in his hand.

He had escaped. But at what cost?

He leaned against the cold brick wall, his gaze fixed on the necklace. It was a symbol of hope, of his desperate attempt to save Sarah. But it was also a symbol of betrayal, of broken promises, and of the choices he had made. He thought of Albert, of the cold, calculating look in his eyes, of how he had abandoned him. He felt a surge of anger, but it was soon eclipsed by a profound sense of loss.

He looked back at the museum, the flashing lights of police cars illuminating the night sky. He thought of the life he had almost lost, the life he had

risked everything for. He had the necklace, the means to save Sarah, but he was alone, hunted, and changed forever.

He looked down at the necklace. It was beautiful, gleaming in the gloom. He pressed it against his chest, a tangible reminder of his desperate gamble and the price he had paid. He had survived. But the victory felt hollow. The heist was over. And the real battle, the battle for his daughter's life, was just beginning. He had a decision to make. He could disappear and use the money to save Sarah. Or he could go to the police and tell them everything, hoping to clear his name and save his daughter.

*He knew what Albert would do. He knew what he **should** do. But he wasn't Albert. He was Josh, and he had a daughter to save.*

The cold brick pressed against his back, a stark contrast to the burning in his lungs. Josh stared at the diamond necklace; the flawless stones reflected the blue and red lights that painted the alley in a strobing dance. He was exhausted, bruised, and utterly alone. Albert's betrayal, the chilling echo of his voice, still rang in his ears. He had been used, manipulated, and left to fend for himself. But he had the necklace. He had the means to save Sarah.

*He closed his eyes, picturing her face, her smile, the sound of her laughter. The image strengthened his resolve. He would do anything for her. **Anything**.*

He had a choice. He could disappear. He could sell the necklace, vanish into the city's anonymity, and pay for Sarah's operation. He could start a new life, free from the debts, the fear, and the weight of his past. He could save her life.

Or... he could go to the police. He could tell them everything, confess his involvement, and hope for a reduced sentence. He could try to clear his name, maybe even get Sarah's operation paid for through legal means. But he'd likely end up in prison, unable to help her.

The thought of prison sent a fresh wave of panic through him. He'd be locked away, unable to see her, to hold her, to be there for her. He couldn't do it.

He thought of Albert. The man had been a shadow, a predator, a cold, calculating force driven only by self-interest. Albert wouldn't hesitate. He'd be long gone, disappearing with the loot, leaving Josh to rot. That was the easy way. The selfish way.

Josh took a shuddering breath. He wasn't Albert. He couldn't live with

himself if he abandoned his moral compass. He couldn't betray Sarah's trust in him, even if it meant the potential loss of his freedom.

*He knew what he **should** do. He knew what was expected of him. He had to make a decision. And he had to make it now. The sirens were closing in.*

He pushed himself off the wall, wincing as a sharp pain shot through his twisted ankle. He had to move, and he had to move fast. He looked at the necklace; the diamonds gleamed defiantly in the gloom. It was a symbol of his desperation, of his willingness to risk everything for his daughter. But it was also a symbol of the darkness he had allowed to consume him.

He looked towards the street, towards the approaching police chaos. He saw a man in a dark suit, running down the street, looking at him. He knew what he had to do.

He reached into his pocket and pulled out his phone. He found his lawyer's number; his hands trembled so badly he could barely dial. He pressed the call button, his heart pounding.

"Hello?." a voice answered on the other end.

It's Josh,"he said, his voice raw, barely a whisper. I... I need you. I need to turn myself in."

He paused, bracing himself for the consequences, for the life he would likely lose.

I have something... something important to tell you,"he continued.

As the sirens wailed in the distance, Josh took one last look at the necklace. He knew what he had to do. He had to give it up. He made a decision.

He tossed the necklace into a nearby dumpster; the sound of metal hitting the bottom contrasted sharply with the silence. He walked out into the street, where the police were already sweeping the area. He raised his hands and waited.

He looked back at the alley, the dumpster, the necklace. He thought of Sarah, and the hope he had just lost.

The police approached, guns drawn.

"Freeze! Don't move!." an officer shouted.

Josh stood firm, his face resigned. He had made his choice. He had chosen his daughter's life over his own freedom. He was ready to face the consequences. He knew this was his only chance.

As the police closed in, he closed his eyes; a single tear slid down his dirt-streaked cheek. The sirens, once a threat, now represented a possible salvation. The long battle had begun.

Months later, Josh stood outside the hospital, watching Sarah, now healthy and full of energy, run through a park. He smiled, his heart overflowing with a joy he had almost lost. He had paid a price, a very high one, but he had saved her. He had chosen the right path, the difficult path, and in doing so, he had found redemption. The necklace, a symbol of his desperation, was gone, lost in the darkness of the alley. But the memory of Sarah's laughter, her radiant smile, was a treasure he would carry forever. The heist was over, and while he was still paying the price, he was free. He was free to be a father. And that, he realized, was the greatest treasure of all.

Escenario 3: Ladrones y Traiciones - Historia B (Línea Base)

La siguiente es la narrativa completa generada por el LLM monolítico de línea base para el escenario de Ladrones y Traiciones.

Dust coated Albert's face as he hauled himself out of the newly-dug tunnel. The humid air of the museum's bathroom, thick with the scent of disinfectant and old stone, filled his lungs. They'd done it; after weeks of painstaking work, they were in. Now, the real work began. He quickly surveyed the bathroom, the gleaming white tiles reflecting the dim light. Two porcelain sinks, pristine and unused, with mirrors above them. Two closed white toilets, oblivious to the clandestine activity taking place just feet away. He saw the barely noticeable hole in the tiled wall. "Josh, get moving! We haven't got all night." He barked the order, his voice tight with impatience. He needed to move, needed to get to the good stuff, before anyone discovered they were here.

Josh coughed, wiping dirt and sweat from his forehead as he followed Albert out of the cramped tunnel. The cold, sterile air of the bathroom was a stark contrast to the stifling heat of their burrow. He felt a jolt of adrenaline, mingled with a growing sense of dread. They were in. He glanced around the pristine bathroom, acutely aware of every shadow and sound, already imagining the alarms, the guards, and the certain prison time. The weight of his daughter's health, the reason for this risky venture, pressed heavily

on his shoulders. "Right. Just, try to be careful, Albert." He replied, his voice barely a whisper.

Careful? Albert snorted, already moving towards the hallway entrance. "We're going to be rich, Josh. Careful is for losers. Come on, let's go." He ducked through the hole, disappearing into the darkness of the main hallway.

Josh hesitated for a moment, then followed, his heart hammering against his ribs. He knew, even before setting foot in the museum, that Albert wasn't one for caution. But the thought of his daughter's face, her small hand grasping his, spurred him forward.

The main hallway was a long, echoing tunnel lined with display cases. The faint hum of the museum's climate control system filled the air. Exhibits of ancient artifacts offered a tantalizing glimpse of the potential loot. Gold coins, ornate pottery, jeweled daggers, all behind the thick glass of the display cases. The reflective, polished stone floor offered no cover. Small, black security cameras, their lenses gleaming, offered a constant, silent surveillance. The velvet ropes, intended to control the flow of legitimate visitors, now served only to highlight the vulnerability of the museum.

Albert, ignoring the 'DO NOT TOUCH' signs, was already halfway down the hall, his eyes scanning the displays with predatory intensity. He moved with a cat-like grace, the years of experience etched in every movement. "Jewel Exhibit first," he muttered, already planning the route. "Then the Egyptian stuff. That's where the real treasure is."

Josh, struggling to keep up, his eyes darting nervously from camera to camera, from display case to display case, pulled Albert aside. "Wait, Albert. The security room first. We need to disable the alarms, at least temporarily. And maybe cameras. . ."

Albert stopped, his face twisting in annoyance. "You worry too much, Josh. Time is money. And you're being slow. We don't have time for that. We go in, we grab the goods, and we get out. Simple."

Josh stood his ground, his usually timid nature hardening slightly. It's not simple, Albert. If we set off the alarms, we're caught. My daughter needs me. I'm not risking that." The words, born from a place of absolute desperation, felt alien to him.

Albert stared at him, his eyes narrowed, sizing him up. He could sense the anxiety emanating from Josh. He could see the fear. For a moment, he considered just leaving him behind. It would be easier. But he'd promised their mutual contact they'd work together. And Josh, for all his caution, was surprisingly good with the tools. "Fine," he conceded, the word grating

in his throat. "But you're wasting precious time. Security room, then the Jewel Exhibit. Then, the Egyptian stuff." He pushed past Josh, already heading towards the heavy metal door.

The Security Room was a mess. Desks overflowed with papers, coffee cups, and half-eaten food. The air reeked of stale donuts and the metallic tang of anxiety. Monitors displayed feeds from the various security cameras, including the one in the Jewel Exhibit. The constant hum of the computers and the flickering lights of the monitors added to the oppressive atmosphere.

Josh immediately went to work, his nimble fingers flying over the control panels. He'd spent weeks researching the museum's security systems, pouring over blueprints, and studying camera placement. He could see the patterns, the blind spots. He quickly began disabling the alarms. "Give me a minute," he said, his voice focused. "I can reroute the feeds, create some dead zones."

Albert, impatient, began rummaging through the desks. He found a keycard, a half-eaten sandwich, and a crumpled pack of cigarettes. The cigarettes went into his pocket. He glanced at the monitors, studying the feeds from the Jewel Exhibit. He'd memorized the layout, the guard patrols. He could practically taste the diamond necklace.

"Hurry it up!" he said. "We're running out of time."

Josh, without looking up, said, "Nearly done. Just a few more adjustments."

Suddenly, a red light began flashing on one of the monitors. "Damn it!" Josh exclaimed. "One of the camera feeds is offline. They'll notice soon."

"Notice what?" Albert scoffed. He was already reaching for the door. "They won't notice anything until it's too late. Come on, let's move."

Ignoring Josh's protests, Albert raced down the hallway, his eyes fixed on the brightly lit Jewel Exhibit. He could see the glimmer of the diamond necklace through the glass. He could almost feel the weight of it in his hands.

The Jewel Exhibit was a world of dazzling brilliance, cold and sterile. The diamond necklace, the centerpiece, radiated light, its facets catching and scattering the light in a thousand sparkling directions. Rubies, emeralds, gold bracelets, antique watches, all lay within locked display cases, the promise of unimaginable wealth.

Albert, ignoring the operational high-definition security camera that constantly monitored the display case but with a blind spot, produced a small,

specialized tool. He carefully worked at the lock of the necklace's display case. The sound of the lock disengaging was a low, metallic click.

Josh, having caught up, watched him, his heart pounding. "Be careful, Albert. This is it. If we get caught here..."

Albert ignored him, his focus absolute. He gently lifted the necklace from its velvet cradle, its cold weight settling in his palm. The diamonds blazed, reflecting the artificial light. It was magnificent.

Suddenly, an alarm blared, cutting through the silence. Albert froze. He cursed under his breath. "Damn it! They must have fixed the feed."

Josh's eyes widened in terror. "We have to go! Now!"

Albert hesitated. He looked at the necklace, then at Josh. His debt was substantial, and this, this was the key. He could still make it out. "Go!" he roared at Josh. "I'll catch up!"

Josh didn't argue. He turned and fled, running towards the Egyptian Exhibit. He didn't trust Albert. Not anymore.

Albert, with the necklace now secure in a satchel, turned back to the door. He heard the distant shouts of security guards. They were closing in. He had to make a decision. He looked at the other display cases, filled with the promise of further riches. But time was running out. He had to get out. He ran, as fast as his legs could carry him.

In the Egyptian Exhibit, Josh was already at work. He was using his tools to open the case containing the gold funerary mask. He knew it wouldn't be worth as much, but it would be enough. He was desperate.

The room was hushed, the statues of pharaohs and deities watching him. The air felt heavy, filled with the echoes of ancient rituals. The hieroglyphics, the sarcophagi, the sheer weight of history pressed down on him. He was so close.

Then, he heard the sound of footsteps echoing in the hallway. They were getting closer.

He looked up and saw Albert, running towards him, pursued by two security guards. Albert was empty-handed, the satchel with the necklace gone.

"We have to get out of here!" Albert yelled. "Now!"

Josh made his choice. He grabbed the gold funerary mask, a solid piece, the craftsmanship exquisite, and followed Albert out of the Egyptian Exhibit.

They sprinted down the hallway, dodging security guards. They ran back towards the bathroom, toward the tunnel. Josh glanced behind him. The guards were gaining on them.

They reached the bathroom, gasping for breath. Albert, out of breath and with nothing to show for it, turned on Josh.

"You! You could have gotten the necklace!" He spat out, his voice laced with rage. "Why did you run?!"

Josh, clutching the funerary mask, felt a surge of defiance. I had a daughter, Albert. And you lost everything. "He'd bet on the wrong horse, but he could still get his family out of this.

Suddenly, more guards burst into the bathroom. They were trapped. The end.

Later, in the interrogation room, the bright lights reflecting in the sterile environment, Josh sat with a lawyer. He was weary, but the relief on his face was obvious. The prosecutors had, against all odds, offered him a deal. His cooperation in the capture of Albert, who was going to be charged with grand theft, and they would greatly reduce his sentence. It was likely, with good behavior, he could be out in time for his daughter's operation. He made the choice. The life of the other man would be his.

He thought back to the moment the guards had cornered them in the bathroom. Albert, with the fiery look of betrayal still burning in his eyes. "You set me up!" Albert yelled.

Josh had looked at Albert, his face impassive. He had seen him choose personal gain over their shared mission. He, in turn, chose his daughter over the chance of a large payout. The decision, in the end, was clear.

Albert, too, was being questioned. He, on the other hand, was already planning his escape. He knew he'd be able to make bail. With the right connections, he'd be out in no time. He'd learned a hard lesson: never trust anyone. He wasn't going to give up. There were other museums, other targets. His debt was large.

Anexo 4: Fragmentos de Logs de Simulación

Esta sección presenta fragmentos de los logs de simulación que ilustran el impacto de las intervenciones del Director en la narrativa emergente, sirviendo como ejemplos de los casos de estudio analizados en el Capítulo 4.

4.7.4. Caso de Estudio 1: Intervención con 'Descodificador' (Escenario X - Subtrama de Sabotaje)

Este fragmento de log demuestra cómo la introducción de un objeto por parte del Director habilitó una acción crucial del agente Albert, catalizando un avance significativo en la trama de sabotaje.

- **Director:** El objeto 'descodificador' (descrito como: un dispositivo negro y elegante del tamaño de una tarjeta de crédito, con una única luz indicadora apagada, diseñado para bypass digital, estado: descansando en un hueco a medida en el lateral del panel de control, casi imperceptible) aparece en la Sala de Seguridad.
- **Turno de Albert en la Sala de Seguridad:** Albert gira en la silla, se recuesta y estudia el monitor de seguridad, enfocándose en las transmisiones diferentes a la Exhibición de Joyas, intentando determinar los tiempos de patrulla.
- **Turno de Albert en la Sala de Seguridad:** Albert se inclina hacia adelante, pulsa un botón en el panel de control y el monitor de seguridad muestra la transmisión del Pasillo Principal, cerca de la Exhibición de Joyas.
- **Turno de Albert en la Sala de Seguridad:** Albert se inclina y presiona el botón de "Anulación de Alarma" en el panel de control.
- **Turno de Albert en la Sala de Seguridad:** Albert activa el descodificador, observando su pantalla con atención.

- **Turno de Albert en la Sala de Seguridad:** Albert se inclina hacia adelante, con los ojos pegados al monitor de seguridad y al panel de bloqueo de la puerta, listo para cerrar la puerta de forma remota si es necesario.
- **Turno de Albert en la Sala de Seguridad:** Albert teclea el código en el teclado.
- **Turno de Albert en la Sala de Seguridad:** Albert introduce rápidamente el código y se prepara para bloquear la puerta.
- **Turno de Albert en la Sala de Seguridad:** Mientras la cierra con un clic, Albert golpea con la palma de la mano el botón de “Bloqueo de Puerta”, asegurando la puerta desde el interior.
- **Turno de Albert en la Sala de Seguridad:** Albert: “A ver cuánto tarda en darse cuenta de que ahora está solo.”

4.7.5. Caso de Estudio 2: Intervención con 'Fruta Madura' (Escenario Y - Conflicto en 'Abuelo Ceibo')

Este fragmento de log ilustra cómo la introducción de un objeto ambiental por parte del Director influyó en la dinámica del diálogo y el enfoque del conflicto entre los agentes Mateo y Elena.

- **Turno de Elena en Abuelo Ceibo:** Elena a Mateo, ¿Peligro? Este árbol *es* vida, Mateo. Nos cobija, nos da aire, nos ha cuidado por generaciones. Esos documentos... son solo palabras. La verdadera medida de esta tierra no está en líneas en un papel, sino en los recuerdos que tenemos. Las ramas de este árbol no son un peligro; son un legado, una promesa de vida. ¿Qué planeas hacer realmente?
- **Director:** El objeto 'Fruta Madura' (descrito como: Una única fruta perfectamente madura, caída del Abuelo Ceibo, parcialmente aplastada, con semillas visibles, representando el potencial de vida y sustento del árbol., estado: caída) aparece en Abuelo Ceibo.
- **Turno de Mateo en Abuelo Ceibo:** Mateo a Elena, Señalo la fruta caída, su carne expuesta. ¿Vida? Elena, mira esta fruta. Está caída, pudriéndose. Este árbol no está dando vida, se está convirtiendo en un peligro. La nueva cosecha traerá prosperidad, sostenibilidad para nuestra familia, y un futuro. Un futuro que el árbol nos impide construir ahora.

- **Turno de Elena en Abuelo Ceibo:** Elena a Mateo, ¿Se trata solo de la fruta, Mateo? ¿O se trata de olvidar todos los otros frutos que ha dado? ¿La sombra en verano? ¿Los hogares para los pájaros? ¿Las historias que contamos bajo sus ramas? Este árbol nos da todas esas cosas.

4.7.6. Caso de Estudio 3: Variabilidad de Pistas Ambientales (Escenario 1 - Misterio de la Mansión Blackwood)

Este fragmento de log demuestra la variabilidad en la interpretación y reacción de los agentes a las pistas ambientales introducidas por el Director, reflejando la naturaleza emergente y no determinista del sistema.

- **Director:** El objeto 'Huellas Húmedas' (descrito como: Una serie de huellas húmedas que conducen de la puerta del Estudio al Salón de Dibujo., estado: visible) aparece en el Salón de Dibujo.
- **Turno de Thomas Dubois en el Salón de Dibujo:** Thomas Dubois se levanta del sillón y camina hacia la chimenea, luego se arrodilla para examinar las huellas húmedas. Porque Thomas Dubois está investigando la fuente de las huellas húmedas.
- ... (Pasos de simulación intermedios) ...
- **Director:** El objeto 'Huella Parcial' (descrito como: Una huella parcial, borrosa y aceitosa, cerca de la mancha de aceite en el Salón de Dibujo., estado: visible) aparece en el Salón de Dibujo.
- **Turno de Xenia Petrova en el Salón de Dibujo:** Xenia Petrova: Oh, ¿pero no es fascinante? ¡El camino a los *últimos momentos de Lord Alistair* está tan... *claramente marcado*! ¡Huellas que conducen desde la escena de... la *tragedia*! El aceite, la sangre, las... *historias no contadas*... Simplemente *susurran* para que las desentrañemos. ¿Y qué, por favor, significa esto?

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