Abstract

We introduce a language generation task grounded in a popular video game environment. \textsc{KNUDGE} (\textsc{KN}owlage \textsc{C}onstrained \textsc{U}ser-NPC \textsc{D}ialogue \textsc{GE}neration) involves generating dialogue trees conditioned on an ontology captured in natural language passages providing quest and entity specifications. \textsc{KNUDGE} is constructed from side quest dialogues drawn directly from game data of Obsidian Entertainment’s \textit{The Outer Worlds}, leading to real-world complexities in generation: (1) dialogues are branching trees as opposed to linear chains of utterances; (2) utterances must remain faithful to the game lore—character personas, backstories, and entity relationships; and (3) a dialogue must accurately reveal new quest-related details to the human player. We report results for supervised and in-context learning techniques, finding there is significant room for future work on creating realistic game-quality dialogues.

1 Introduction

Player interactions with non-player characters (NPCs) in role-playing games (RPGs) often serve to flesh out backstories while allowing the player to progress through engaging quest storylines (Onuczko et al., 2007). A key challenge in authoring NPC dialogues is maintaining enjoyable as well as coherent narratives: utterances must faithfully reflect quest structure and game lore—characters, histories, and entity relationships.

Figure 1 depicts a dialogue turn taken from \textit{The Outer Worlds} (Obsidian Entertainment, 2019), an action RPG renowned for its narrative and dialogue writing. This turn demonstrates how a dialogue relies on the descriptions of entities in the game world while also revealing relevant quest information. The NPC’s utterance not only begins and provides backstory about a new side quest,\(^2\) but also interacts according to a well-formed persona (a worried, overprotective parent) and references an adversary (raptidons) that the player will face later in the quest.

Player interactions with NPCs often take the form of complex utterance trees\(^3\) in which players can choose from a variety of utterance options for their character to speak at each turn. Creating these branching structures according to the many specifications of dialogue writing can be cumbersome and time-consuming for a game designer (Caro-
preso et al., 2012). This motivates the automatic generation of these trees.

To the best of our knowledge, there does not exist a public dataset that meets our desired criteria—namely, a set of real NPC dialogues drawn from game data and paired with granular quest and biographical specifications consistent with a well-formed game ontology. Recent work towards lore-conditioned dialogue (Urbanek et al., 2019; van Stegeren and Mysliwiec, 2021) contain short, self-contained dialogues conditioned on relatively minimal specifications. There exist datasets for knowledge conditioning for task-oriented dialogue agents (Choi et al., 2018; Mazaré et al., 2018; Feng et al., 2020) and story generation (Akoury et al., 2020; Chen and Gimpel, 2022), but none of these works address complex dialogue trees and the interweaving narratives found in deployed RPGs.

We therefore introduce KNUDGE: KNOWledge constrained USER-NPC DIALOGUE GENERATION, a set of dialogue trees derived from an existing video game and paired with granular ontological constraints. We draw the trees directly from the game data of The Outer Worlds. This game’s side quests share overlapping characters and locations, making it an appealing study in the development of automatic dialogue generation tools. For each side quest, we enumerate the relevant NPC dialogues and annotate them at multiple levels of specificity with quest- and ontology-related support facts pulled from fan-written wikis.

Given the ontology specifications, we want to generate fluent NPC dialogue trees that reveal the quest objectives while staying faithful to the specified context and the game lore. We introduce a class of model, termed DialogWriters, that leverage neural language models such as GPT-3 (Brown et al., 2020) to generate an utterance conditioned on an existing partial dialogue tree and ontology passages. To encourage the use of game lore to produce interesting and engaging dialogue, we experiment with adding an explicit module to sub-select relevant facts before generating the next utterance.

We use an evaluation suite that tests for models’ capacity to reflect game ontology constraints in addition to generating fluent and coherent dialogue. Our experiments reveal further room for improvement on aspects such as joint reasoning over multiple facts from ontology, improving knowledge subset selection, and coverage of all quest objectives. We hope that KNUDGE will facilitate further progress on faithful NPC dialogue generation.

Our contributions can be summarized as follows:

- Introducing the task of knowledge-constrained NPC dialogue generation, in which a model must generate trees that reflect a set of game lore and quest-related knowledge specifications stated in NL. These specifications comprise hundreds of constraining statements per dialogue tree, posing a difficult challenge for modern generation models.

- KNUDGE, the first dataset of real video game dialogue trees, annotated with constraining pieces of information down to the individual node. The dataset contains 159 dialogues from 45 side quests that all take place in the shared world of The Outer Worlds. Trees comprise up to 100 character utterance nodes with complex branching and cycles.

- A series of neural LM-based knowledge-constrained dialogue writing baselines, showing that constraining information can be reasonably reflected in a realistic generated tree.

2 Task Definition

We define the task of lore-constrained NPC dialogue generation as the mapping from a set of quest constraint statements $Q$, a set of biographical constraint statements $B$, and a list of participants $P$ to a dialogue tree $D$.

As depicted in Figure 2 (upper), $Q$ comprises statements $[q_1, \ldots, q_m]$ about currently active objectives upon entering the dialogue, about what should occur during the dialogue (e.g., pieces of information the NPC should mention), and about the new active objectives upon leaving it. $B$ comprises background statements $[b_1, \ldots, b_n]$ about game entities that the dialogue must faithfully reflect (Figure 2, middle). $P$ generally contains the player character and one or more NPCs with corresponding biographical statements in $B$.

Dialogue tree $D$ is a directed graph $(N, E)$; each utterance node $n \in N$ is made by some speaker $s \in P$ (Figure 2, bottom). Nodes can have multiple entering and exiting edges, due to the multiple dialogue options at player turns (see Figure 4, right). Dialogue trees have one start node, but can have
Figure 2: Overview of KNUDGE task scenario, in which quest passages from game data and biographical passages about the game lore serve as constraints on generated dialogue candidates. Completion A is inconsistent with the game lore and B is uninformative; C is most desirable because it provides new information about quest objectives (its next location) and reflects information about relevant world entities.

**multiple exit nodes and can contain cycles.**

3 Data

KNUDGE comprises dialogue trees from an existing popular game with NPCs from all 45 side quests in the Outer Worlds base game. Below, we describe our dataset construction procedure: gathering information about each quest (Q) and the Outer Worlds entities that appear or are referenced during the associated dialogues (E) ([§3.1](#3.1)), and then extracting the trees D from the game data semi-automatically ([§3.2](#3.2)). We then describe the quantitative and qualitative nature of the data and compare to other datasets with related I/O specifications ([§3.4](#3.4)).

3.1 Game Ontology

We acquired dialogue files from the Outer Worlds game creators and received permission to release them publicly. As we did not receive quest data files, we relied upon the data from fan wikis, where a quest’s page lists the in-game objectives and associated journal logs.

### 3.1.1 Quest Information

Depicted in Figure 3 (left), a side quest in The Outer Worlds appears in the player’s journal with a high-level synopsis and a sequence of objectives, each of which contains log entries providing additional details. One objective is usually ‘active’ at any one time. Most of the time, a quest objective is activated, and the previously active objective, if it exists, is completed, during some NPC dialogue. E.g., Figure 2 depicts the dialogue that obtains the first of two objectives in a side quest called “A Family Matter.” The objective, “Look for Tucker Needham in Amber Heights,” is active until the player finds and interacts with him; during this dialogue, the previous objective is completed and they receive a new active objective, “Convince Tucker to Return Home.”

To induce a higher granularity of quest-related specifications, we associate with each objective a walkthrough passage from a fan-made wiki (Figure 3, right) which describes the player’s progress while the objective is active. This passage often gives a high-level description of the topics and options that should occur during the dialogue tree, as well as important quest-related items that the NPC should necessarily have said by the dialogue’s end.

Therefore, we associate with each dialogue tree the following constraining passages:

1. The synopsis (1-2 sentences)
2. The in objective(s) which are active when entering the dialog (1 sentence), and the associated game log (1-2 sentences) and walkthrough passage (3-10 sentences).
3. The out objective(s) which are active upon leaving the dialogue, as well as its associated game log. We do not associate its walkthrough passage, since the NPC should only be expected to convey new objective information that the player will actually see in game.

4In The Outer Worlds, utterance nodes are spoken once and are not repeated upon second traversal, unless they are repeat choices by the player at a given decision point. We do not consider repeat choices in this paper’s experiments.

5There may be optional objectives active as well, but these do not lead to subsequent quest stages.

6https://theouterworlds.wiki.fextralife.com/A+Family+Matter

7For the first dialogue in a quest, since there is no active objective, we associate the walkthrough passage describing how to obtain quest.

8The dialogue can lead to multiple new active objectives, some optional. If the dialogue concludes the quest, then no leaving objective is associated.
3.1.2 Biographical Information

The dialogues in an *Outer Worlds* quest are rich with references to other game entities such as characters, groups, and locations. An automatic dialogue generator should operate faithfully with respect to biographical information about these entities, particularly since the player will often be seeing the entities multiple times over the course of the game. As such, we associate with each quest, and in turn each dialogue, a set of biographical passages (7-8 sentences each) about entities appearing or referenced during the quest’s progression. The passage for each entity was extracted from the background sections from its associated page on a fan-made wiki. The passage is the same across all quests in which the entity appears in KNUDGE, and the set of entities is the same for all dialogues in a quest. Notably, while some passages are only a couple sentences long, some NPCs and other entities recur many times in the game and thus have much longer biographies (up to 27 sentences). This can pose a substantial challenge to generation models, as often only part of a long biographical passage will be relevant to a given quest. Examples of full biographical passages for a subset of *Outer Worlds* entities can be found in Appendix B.

3.2 Dialogue Trees

Dialogue trees in *The Outer Worlds* are complex directed graphs, containing many conditional utterance options depending on the state of the game—e.g. whether a particular companion NPC is currently traveling with the player, or whether the player is of high enough level at some skill to pass a “check.” To extract a more tractable, quest-related subgraph, we 1) identified the nodes that start and end the interaction using online playthrough videos as reference, and then 2) traversed the graph from the start node, following only edges without special state-related conditions. Special edges were then added manually depending on whether conditions are relevant to the quest (or mentioned in the walkthrough passage). Example trees can be found in Appendix C.

### Annotating Utterance Nodes with Support Facts

In coordination with data annotation specialists, we got the nodes of the resulting dialogue tree annotated with all relevant support facts from the associated quest and lore constraints. All support annotations are done by native English speakers. Annotators are provided with a set of instructions and a few examples. We follow a heuristic based on counterfactuals: had a given fact not been included in the constraining knowledge, would the utterance be much less likely to occur? An example of this procedure is depicted in Figure 4.

To verify the reproducing of this procedure, we compute a two-way inter-annotator agreement on a subset of dialogues comprising 4% of all the utterances in KNUDGE. We compute exact match (EM) and Jaccard overlap between two sets of annotations. We observe an average EM score of 0.52 and an average Jaccard score of 0.62 across the set.

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9 E.g. if the Player has above 55 points of the Persuade conversational skill, they can convince Tucker Needham to return to his mother in the quest, ‘A Family Matter.’
3.3 Data Sources

Quest data and walkthrough passages were pulled from the *Outer Worlds* wiki of Fextralife,\(^\text{10}\) a gamer-focused site containing fan-made walkthroughs for many popular RPGs. Game entity biographies were collected from Fandom.\(^\text{11}\) Passages were segmented into individual sentences via punctuation boundaries. We identified relevant dialogues and their decision points using playthrough videos by the YouTube user, LordMatrim.\(^\text{12}\)

### Table 1: KNUDGE Dataset Statistics

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<tr>
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<tr>
<td>Edges per dialogue tree</td>
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</tr>
</tbody>
</table>

### Comparison with Related Datasets

While comprising just 159 dialogue trees, KNUDGE is the first dataset to contain such items from an actual RPG, and the first to annotate the items with real game quest specifications.\(^\text{13}\)

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\(\text{10}\)https://www.theouterworlds.wiki.fextralife.com  
\(\text{11}\)https://theouterworlds.fandom.com  
\(\text{12}\)https://www.youtube.com/@l0rdmatrim

\(\text{13}\)We refer readers to van Stegeren and Theune (2020) for a detailed discussion on the difficulties in collecting real game data with both types of specification.
Table 2: Comparison of KNUDGE to related knowledge-constrained generation datasets. Compared to other datasets, KNUDGE contains items from an actual RPG, and the first to annotate the items with real game quest specifications with similar, but notably not the same, input specifications and generation targets. van Stegeren and Mysliwiec (2021) consider a dataset of publicly-available side quest data from the RPG, World of Warcraft, but their generation target is effectively a few-sentence quest description spoken by an NPC conditioned on just a quest name and objective; this does not reflect the complexity and granular specificity that would be required to generate dialogues of the type found in The Outer Worlds. van Stegeren and Theune (2020) compile a set of open source quest and dialogue data from RPGs from recent decades. However, their datasets vary in dialogue and quest coverage, containing complex branching trees without constraining knowledge from one game, while having quest datapoints but not NPC dialogue trees for another game.

The dialogues of LIGHT (Urbanek et al., 2019) are more akin to NPC dialogues, though they comprise few-turn linear chains between two characters in self-contained episodes rather than quest-grounded interactions between a player and an NPC serving multiple game purposes. The biographical constraints of KNUDGE are most similar to that of TVSTORYGEN (Chen and Gimpel, 2022), who also pull articles from fandom wiki pages. However, theirs is a story generation dataset where the target is a longform article describing a TV episode.

### 3.5 Challenges

There are many ways by which a generated dialogue tree should reflect the quest and biographical constraints of a particular RPG ontology. We focus on a specific set of high-level criteria that are reflected in our instructions during human evaluation (§5.5)—namely, that

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Domain</th>
<th>Dataset Size</th>
<th>Avg. Tokens</th>
<th>Narrative Constraints</th>
<th>Biographical Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>STORIUM (Akoury et al., 2020)</td>
<td>Stories</td>
<td>6k</td>
<td>19k</td>
<td>Scene intro, challenge and location descriptions</td>
<td>Character descriptions</td>
</tr>
<tr>
<td>TVSTORYGEN (Chen and Gimpel, 2022)</td>
<td>TV episode recaps</td>
<td>29k</td>
<td>1.8k</td>
<td>Brief episode summary</td>
<td>Fan wiki character bios</td>
</tr>
<tr>
<td>LIGHT (Urbanek et al., 2019)</td>
<td>Linear dialogue chains</td>
<td>11k</td>
<td>234 (13 utt)</td>
<td>Location description</td>
<td>Short persona statements and held objects</td>
</tr>
<tr>
<td>WoW (van Stegeren and Mysliwiec, 2021)</td>
<td>NPC-uttered quest descriptions</td>
<td>24.9k</td>
<td>≈ 60 (estim.)</td>
<td>Quest title and objective</td>
<td>None</td>
</tr>
<tr>
<td>KNUDGE (Ours)</td>
<td>RPG trees</td>
<td>159</td>
<td>377 (29 utt)</td>
<td>RPG in/out objectives and fan wiki quest walk-throughs</td>
<td>Fan wiki entity bios</td>
</tr>
</tbody>
</table>

- The NPC should act according to the contextualizing and summarizing details of the **in objective**, which generally pertains to the setting of the dialogue, the options the Player might have over the course of the interaction, and how the NPC will respond. (See Figure 3, right for examples)
- The generated dialogue tree should contain all pieces of information described in the **out objective**, which will appear in the player’s journal as the next active quest entry.
- The NPC should act according to the persona described in their **biography passage**, which generally provides personality details, history, and relationships with other characters.
- The NPC should **not contradict any biographical facts** in their or other entities’ biographies, else they will detract from the coherence of the interaction.
- The NPC should **make reference** to other entities and their backgrounds whenever it is contextually relevant, so as to add to realism and player engagement. Game lore elements thus serve as both **positive** and **negative constraints** on utterances.

Generating a 30-node (or larger) NPC dialogue tree while taking into account all of these criteria at once is a very difficult task, particularly given the shape of the branching, cycle-heavy tree structure.

The average of 1321 constraining tokens poses a substantial challenge to current NLP models, taking up e.g. a quarter of the 4096-token context
window for OpenAI’s *text-davinci-002* instance of GPT-3 before factoring in other pieces of context such as dialogue history or few-shot examples.

4 Methods

In the following, we describe a set of neural baseline methods for automatically generating candidates for the next utterances given the ontological specifications \((Q, B, P, S, n)\) from §2 and a partial subtree \(S\) for a dialogue item in KNUDGE. We refer to these methods collectively as DialogueWriter models, which propose utterance nodes at a specified new location branching off the subtree. Formally, given some “most recent” node \(n \in S\), a DialogueWriter maps inputs \((Q, B, P, S, n)\) to a list of candidate utterances \([c_1, \ldots, c_n]\) such that there is a directed edge \(n \rightarrow c_i\) (were \(c_i\) to be accepted as a node).

Tree Linearization We consider a set of sequence encoder models based on large, pretrained language models (LMs) that accept as input linear sequences of tokens. We accordingly devise a graph traversal mechanism that converts a dialogue subtree structure into a maximal coverage linear dialogue history. Namely, for “most recent” node \(n\), we greedily identify the longest possible path\(^{14}\) from the start node to \(n\), including cycles but only following a given edge once. This produces utterance history \(H = [u_1, \ldots, u_n]\). An alternative representation can be to enumerate all edges in the tree such as in (Dalvi et al., 2021). However, such techniques might not be suitable in our case since trees can be very large (>100 nodes). Exploration of other tree encoding mechanisms, e.g. via graph encoders (Banerjee and Khapra, 2019; Ouyang et al., 2021) or alternative linearization methods, is left for future work.

4.1 Supervised Learning (SL) Models

We fine-tune a T5 sequence-to-sequence (seq2seq) model (Raffel et al., 2020) via supervised learning (SL) to generate \(c_i\) given the concatenation \([B, Q, P, H]\) (see Appendix D for formatting and example prompts). Given the architecture that we use, T5-large, has a context window of 1024 tokens, this will often require the truncation of context to fit within the encoder’s limits. We truncate from the left of the context, removing components of \(B\) first. We prioritize the biographies of dialogue participants above other segments of \(B\), listing them last (and thus truncating them last) in the entity biographies.\(^{15}\)

**Supervised Knowledge Selection (KS) Model**

We also train a version of the SL baseline that learns to decode support knowledge facts before conditionally generating the utterance \(c_i\). This factorizes the next utterance generation into a two-step decision process: first selecting one or more facts from the provided knowledge constraints (both \(Q\) and \(B\)), and second generating the utterance to reflect the selected facts. We thus make use of our node-level annotations; we train the same T5 model to generate the concatenated sequence \([f_1^{(i)}, \ldots, f_m^{(i)}, c_i]\) for relevant support facts \(f_j^{(i)} \in Q \cup B\).

4.2 In-Context Learning Models

As KNUDGE is relatively small, supervised learning techniques based upon stochastic gradient descent (SGD) might not be effective at learning the difficult, multi-angle knowledge constrained generation task posed by the dataset. As such, we experiment with methods for in-context learning (ICL) with OpenAI’s GPT-3 model (Brown et al., 2020). Instead of curating seq2seq training examples, we inject \(B, Q, P,\) and \(H\) into a formatted prompt that naturally elicits the next utterance as a continuation of \(H\). Figure 5 depicts this process; examples of full prompts are shown in Appendix D.

This model, which uses the *text-davinci-model-002* instance of GPT-3, has a context window of 4096 tokens, 4 times larger than that of T5-large. This allows for the full set of constraining passages (including history) for dialogue to fit into the window for all items in KNUDGE. This creates a zero-shot GPT-3 prompt. When these passages do not fill out the full window, we construct few-shot (or, more typically, one-shot) prompts by adding full dialogs from other quests as exemplars, simulating a scenario in which a game designer has constructed a partial set of quests and is working on a new one. We retrieve ICL exemplars using Okapi-BM25 (Jones et al., 2000) with \([B, Q, P]\) as the query string.

**ICL Knowledge Selection (KS) Model** As with the SL framework, we also devise a version of the ICL DialogWriter that first decodes one or more support facts before generating an utterance. We elicit this behavior from GPT-3 by augmenting all

\(^{14}\)breaking ties randomly

\(^{15}\)We otherwise list entity biographies in alphabetical order.
5 Experiments

5.1 Scenario: Next Utterance Prediction

We strive for an automatic dialogue writing model that a human game writer would find useful as a copilot for suggesting content. Therefore, we focus our evaluation on episodes in which models must predict a next utterance given a gold partial dialogue tree.

To construct items, we iterate through the nodes of each gold dialogue tree in a canonical order such that $n_1$ is the tree’s start node. For each node $n_i$, we create an item with $n_i$ as the generation target. We construct the subtree $S(i)$ comprised of all nodes $[n_1, \ldots, n_{i-1}]$ and all edges between them. We then construct the input/output pair $(Q, B, P, S(i)) \rightarrow n_i$.

5.2 Model Training

We split KNUDE into train, development, and test splits on the basis of quests, such that at test time all input components will be unseen (test set $B$’s comprise some combination of previously seen and totally novel entities).

Supervised Learning To train SL DialogueWriter models, for every target node in the training quest dialogues, we construct 5 training examples using different randomly sampled paths to the node. We train the model for 3 epochs using the default arguments from Hugging Face’s example summarization model training script.

In-Context Learning We construct a BM25 index over the training dialogues and use it to construct an $n \in \{0, 1, 2\}$-shot in-context learning prompt for each item in the test set, where $n$ depends on the remaining space available in the context window. Examples are left-truncated such that the full prompt does not always begin with the start of a new example. Few-shot examples are full start-to-end linearized dialogues containing the most possible nodes from the gold tree.

5.3 Baseline Models

To measure the effect of conditioning on $Q$ and $B$, we tested a set of ablations to the ICL model: a vanilla ICL model that conditions only on the participants $P$ and utterance history $H$, and a quest only model that conditions on $P$, $H$, and $Q$, but not $B$.

To measure the effect of node-level knowledge selection (KS), we compare against a version of the ICL model that selects only one statement instead of many. We randomly sample from each history node’s list of fact annotations to construct the model’s prompt. We also compare against an oracle KS ICL model, which conditions generation on the gold set of knowledge annotations for the reference utterance.

To maintain consistency in the setup, we always maximize the number of in-context examples for all ICL ablations; e.g. the vanilla model’s prompt can have dozens of such examples, as they are quite short and no constraint passages are present in the context window. These ablations might thus be con-
We use several reference-based metrics such as while also generating coherent dialogue.

\[ \text{Reference-based metrics: \text{BLEU-4 (Papineni et al., 2002)} \text{ and BERTScore-F1 (Zhang et al., 2020).}} \]

\[ \text{Discussion: \text{Given an input collection of statements, the model \text{generates an utterance \text{that naturally responds to the history.}}} \]

\[ \text{Evaluation: \text{We consider \text{coherence, incoherence, and incongruity.}}} \]

\[ \text{We use several reference-based metrics such as BLEU-4 (Papineni et al., 2002) and BERTScore-F1 (Zhang et al., 2020).} \]

\[ \text{We evaluate generated next utterance against the following single- and multi-reference sets: 1) the gold utterance \text{\( n_g \)}, 2) the quest objective statements in \text{\( Q \)}, and 3) the entity biographies in \text{\( B \).} \]

\[ \text{In coordination with a data specialist, we also performed a human evaluation study that examined the qualitative performance of the considered ICL methods. Generated utterances were judged on a 4-point Likert scale for each of four criteria:} \]

\[ \text{1. Coherence: does the utterance follow naturally from the utterances in the history? A (4) utterance naturally responds to the history.} \]

\[ \text{2. (Non-)Violation: does the utterance create contradictions with any of the sentences in the biographical or quest passages? A (4) utterance is fully consistent with the input ontology.} \]

\[ \text{3. Biography Usage: does the utterance use any of the biographical utterances in \text{\( B \)? A (4) utterance naturally incorporates one or more pieces of information from the history.} \]

\[ \text{4. Quest Usage: does the utterance progress the dialogue according to the quest statements in \text{\( Q \)? A (4) utterance naturally incorporates one or more such statements.} \]

\[ \text{Considered \text{strong baselines} that explore the tradeoff between the impact of the number of in-context examples and the presence of ontological statements.} \]

\[ \text{5.4 Automatic Evaluation} \]

\[ \text{We use several reference-based metrics such as BLEU-4 (Papineni et al., 2002) and BERTScore-F1 (Zhang et al., 2020).} \]

\[ \text{We evaluate generated next utterance against the following single- and multi-reference sets: 1) the gold utterance \text{\( n_g \)}, 2) the quest objective statements in \text{\( Q \)}, and 3) the entity biographies in \text{\( B \).} \]

\[ \text{While only a partial measure of model effectiveness (as is the case with any automatic evaluation metric), we consider these metrics to be one signal of the DialogueWriter models’ capacity to reflect the desired specification passages while also generating coherent dialogue.} \]

\[ \text{We consider strong baselines that explore the tradeoff between the impact of the number of in-context examples and the presence of ontological statements.} \]

\[ \text{5.5 Human Evaluation} \]

\[ \text{We use the re-scaled version of BERTScore Zhang et al. (2020) which is easier to interpret. The rescaling factor can lead to negative scores.} \]
<table>
<thead>
<tr>
<th>References</th>
<th>Metric</th>
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<th>Regular ICL</th>
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</tr>
<tr>
<td>Biographies B</td>
<td>BertScore</td>
<td>.176</td>
<td>.191</td>
<td>.198</td>
</tr>
<tr>
<td>BLEU</td>
<td>3.35</td>
<td>8.96</td>
<td>5.39</td>
<td>5.87</td>
</tr>
<tr>
<td>Quests Q</td>
<td>BertScore</td>
<td>.183</td>
<td>.196</td>
<td>.210</td>
</tr>
<tr>
<td>BLEU</td>
<td>2.59</td>
<td>6.25</td>
<td>5.48</td>
<td>7.19</td>
</tr>
</tbody>
</table>

Table 3: Automatic evaluation metric results for DialogWriter models against gold utterances and statements in B and Q. Results for B and Q overlap are shown beside the score of the gold utterance.

<table>
<thead>
<tr>
<th>KS ICL</th>
<th>Regular ICL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coherence</td>
<td>3.72</td>
</tr>
<tr>
<td>Violation</td>
<td>3.87</td>
</tr>
<tr>
<td>Using B</td>
<td>1.98</td>
</tr>
<tr>
<td>Using Q</td>
<td>2.57</td>
</tr>
</tbody>
</table>

Table 4: Results of human evaluation for in-context learning (ICL) DialogWriter methods with and without knowledge selection (KS). All knowledge augmentation methods outperform the knowledge-unconditioned Vanilla baseline across all criteria.

We provide the full set of annotator instructions with guidance for other scores in Appendix E.

6 Results and Discussion

Preliminary results under the automatic and human evaluations are shown in Table 3 and Table 4, respectively. Automatic metrics were computed over a previous snapshot of the dataset, comprising about half the total number of quests. Human judgments were initially collected for a small subset of quests and nodes, comprising a set of about 50 nodes. Results over the broader set of test quests are in progress, as are evaluations measuring the performance of the SL baselines. However, the currently considered partial pictures still provide us with useful observations.

We first note that automatic metrics for generation that check for lexical or semantic overlap with a set of references is not directly suited for evaluating generations in KNUDGE; this can be seen from the extremely low performance of the gold utterances themselves under these metrics. We find that deployment-quality, naturally written utterances that incorporate ontological knowledge do not need to (nor do they usually) have high lexical overlap with knowledge statements themselves.

Nevertheless, we can observe that the worst-performing model under both automatic and human evaluation is the Vanilla ICL model, which conditions on no quest or game lore. We also observe that providing KS models with the oracle sets of facts can improve performance under evaluation of coherence and usage of biographical constraints. Both evaluations also convey that the Quest-only ICL DialogueWriter can generate coherent utterances that reflect the quest specifications, perhaps because the input passages are smaller and more directly relevant to the dialogue. However, as we illustrate in Figure 6, this can come at the expense of making lore references; utterances generated by the Quest-only model are less likely to refer to named entities in the game.

6.1 Error Analysis

Figure 6 depicts example outputs by models on a set of our constructed evaluation examples. We highlight cases in which the models succeed at the desiderata that we strive for in KNUDGE: to convey quest and lore specifications naturally through the interaction. However, we see that models, particularly the SL models and the ICL models not conditioned on as much information, are less successful at coherently incorporating the passages into the dialogue. For example, the Full ICL model makes reference to Tucker Needham being a grown man; this is true, but the comment detracts from the engagingness of the storyline, which is designed to have the later twist that Tucker is actually 45 years old. In another example, the Vanilla SL model successfully makes reference to a game entity (the Philosophist religion), but the utterance invents a component of the religion that does not exist—in fact, “The Plan” is an important component of a different religion in the game.

7 Related Work

Storytelling via Dialogues: Castricato et al. (2021) propose techniques to expand a narrative by iteratively constructing a question based on the narrative so far, and then prompting a question-
answering model with the constructed question to predict subsequent sentence. Si et al. (2021) focus on the task of story continuation through dialogue between multiple characters while modeling the inter-character relations. However, such past work does not concern with the notion of grounding knowledge or quest objectives to be covered in the generated dialog.

**Text Generation for Games:** Past work has explored applications of NLG in various gaming applications such as quest generation (van Stegeren and Mysliwiec, 2021), dialogue generation (Si et al., 2021), persona-specific agents in virtual environment (Urbanek et al., 2019), and new textual world generation (Fan et al., 2020; Ammanabrolu et al., 2022). van Stegeren and Theune (2020) propose three sources for building NPC dialogue corpora. However, their proposed datasets do not contain any grounding annotation and are not accompanied by explicit descriptions of entities and characters. Moreover, they do not present any experiments with the proposed datasets. Callison-Burch et al. (2022) explore automatic generation of conversational turns by players of the tabletop RPG, Dungeons and Dragons (D&D), in which NPCs serve a very different role in the gameplay. Older work using NLG for game-related applications relied on templates and rule-based systems (Caropreso et al., 2012; Lukin et al., 2017; Ryan et al., 2016).

Recently, much of the work has focused on using machine learning models (Jansen, 2021; Nick Walton, 2019). van Stegeren and Mysliwiec (2021) generate quest descriptions using a GPT-2 model fine-tuned on a corpus of World of Warcraft game quests. Compared to generating a paragraph of quest description given the quest title, we generate multi-turn dialogues grounded on the game lore. Scheherazade’s Tavern (Aljammaz et al., 2020) augments a pattern-matching-based NPC interaction system with facts the character knows about the game world. FAtiMA Toolkit (Guimarães et al., 2019) is a collection of open-source tools to facilitate the design of virtual agents with social and emotional skills.

**Offline Dialogue Generation:** Dailog Inpainter (Dai et al., 2022) transforms a Wikipedia document text into a two-person dialog with sentences from the document being considered as utterances from the writer while interleaving it with generated utterances from an imagined reader. The synthetic dialogues so generated are used to augment training data to build a document-grounded dialog bot. Simulating user-bot conversation as a means for data augmentation has been explored in various other task-oriented dialogue setups as well (Scheffler and Young, 2002; Volkova et al., 2013; Lin et al., 2020; Acharya et al., 2021). In contrast to such past work, our goal is to generate offline game dialogues conditioned on multiple knowledge sources such as character biographies and quest objectives rather than training a dialog bot to respond to user utterances.

**Other Related Work:** Past work has explored building a dialogue system to steer the conversation towards a topic (Wu et al., 2019) or a given NL sentence (Sevegnani et al., 2021; Gupta et al., 2022) while conversing with a user. Past work in NLG has explored generating outputs with high-level specifications such as an agenda of string items (Kiddon et al., 2016), a set of facts (Orbach and Goldberg, 2020), or author goals (Riedl, 2009). KNUDGE also comprises NL specifications, though they are much richer compared to past work.

**8 Conclusion**

Humans play games to be entertained, and they pay money expecting a high quality experience. When a game requires dialogue to advance a carefully constructed storyline, this should be both engaging as well as faithfully consistent with the larger narrative. Large language models are increasingly capable of powering engaging dialogues with users, and researchers have been exploring how to ensure interesting and coherent responses from such models. To date this research has focused on scenarios developed for the sake of experimentation, rather than actual high quality game data.

In this paper we introduce KNUDGE, a dataset of NPC dialogue trees coupled with a relevant game ontology, drawn from the title The Outer Worlds. In contrast to prior work, KNUDGE is based on content created by a triple-A game development studio, Obsidian Entertainment, thereby exemplifying real-world complexities in Non-Player Character dialogue authoring. We illustrate that large language models are indeed able to generate fluent dialogues that relate to provided game lore. However, straightforward application of such tech-
nologies does not match the quality of professional game writers. We hope that NUDGE aids the development and evaluation of new techniques for faithful game dialogue generation.

Acknowledgements

We would like to thank Hao Fang, Chris Kedzie, Sudha Rao, Matt Gardner, and Val Ramirez for valuable discussions and feedback on this paper. We thank members of Obsidian Entertainment for helpful discussions, and for providing us with permission to use their data.

References


Appendix

A Example Quest Items

Figure 7 and Figure 8 show example quest items with corresponding game data and walkthrough passages segmented into statements.

B Example Entity Biography Passages

Figure 9 and Figure 10 show example entities from The Outer Worlds with corresponding biographical passages.

C Example Dialogues Items

Figure 11 depicts a full example input item conveying quest, biographical, and participant specifications. Figure 12, Figure 13, and Figure 14 depict example dialogue trees.

D Example Prompt Constructions for DialogueWriter Model

Figure 15 shows example seq2seq items used to train/evaluate the T5-based supervised learning DialogueWriters. Figure 16 depicts example prompts shown to GPT-3 based in-context-learning DialogueWriters.

E Human Evaluation Directions

Below, we enumerate the instructions shown to annotators during human evaluation:

**Coherence**: does the utterance follow naturally from the utterances in the history? (1) Utterance is nonsensical or ill-formed. (2) Utterance is contradictory of previous utterances in the history. (4) Utterance naturally responds to the history.

**Violation**: does the utterance create contradictions with any of the sentences in the ontology or objective blurbs? (1) Yes, explicitly contradicts sentences (list the ids). (2-3) (gray area). (4) No, utterance is consistent with the ontology.

**Using the Bio Facts**: does the utterance use of the bio sentences in the ontology? (1) Utterance is fully generic and/or ignores the ontology completely, could have been generated had the bio facts not been included. (2-3) Utterance shows awareness of one or multiple pieces of ontology.

**Using the Objectives**: does the utterance progress the dialog according to the objective sentences in the prompt? (1) Utterance ignores objective, could have been generated had the obj facts not been included. (2-3) Utterance shows awareness of quest objectives, albeit unnaturally or inconsistently. (4) Utterance naturally incorporates one or multiple quest objective statements.
Figure 7: Example Quest Items
Quest Name: Space-Crime Continuum
Synopsis: [0] Lilya Hagen has a lead on some valuable salvage. [1] When the Board abandoned Monarch, [2] several factories and research facilities were left mostly intact. [3] While the majority of those locations have previously been stepped of valuable resources, [4] SubLight agents on Monarch recently discovered a hidden laboratory with a cache of Alta-Vite gas. [5] Lilya needs an independent captain to retrieve the salvage.
Walkthrough: [0] This quest is obtained by taking the job with Lilya Hagen aboard the Groundbreaker after you've gained access to Stellar Bay on Monarch.

Objective 1: Retrieve the Missing Passcode
Game Log: [0] Lilya hasn't heard from her agent in Stellar Bay recently. [1] Retrieve the information he's holding on the salvage location and deliver it to Catherine Malin in Fallbrook.
Walkthrough: [0] Head outside to the fishery docks in Stellar Bay of Monarch and loot the corpse there in the corner. [1] This will provide you with a Bloody Note that has a passcode on it. [2] Take the note to Catherine Malin in Fallbrook.

Objective 2: Meet with Catherine
Game Log: [0] Take the passcode you found on the SubLight agent's body to Catherine in Fallbrook. [1] She'll provide details on how to salvage the Alta-Vite gas.
Walkthrough: [0] Make your way to Fallbrook, visiting Amber Heights for several quests in the process. [1] Talk to Mortimer Bell near the entrance and, [2] if you're doing Space-Crime Continuum, [3] ask him where to find Catherine Malin, [4] and you'll gain Sublight Salvage & Shipping reputation. [5] Go to meet Catherine and tell her you're here to fix the problem. [6] She says you must exploding the gas from Cascadia's lab into one of your ship's fuel tanks. [7] She warns you the town is overrun by Mantisaur and the lab is swarmed with mantisaur. [8] You can mention that Nyoka can kill them or Ellie can drag them. [9] She will tell you technical skills are needed, [10] you can mention Parvati or Vicar Max. [11] You're to take the gas to the Groundbreaker once you obtain it.

Objective 3: Enter the Secret Lab in Cascadia
Game Log: [0] An abandoned lab in Cascadia houses a rich cache of Alta-Vite gas. [1] The password "ANTEDELIUVIAN" should get you inside the hidden lab.
Walkthrough: [0] Head to Cascadia and interact with the terminal near the sealed door containing what you seek (it's inside a building). [1] You need to override the system with the password and the door will reveal a lift that takes you to Rizzo Secret Laboratory. [2] Be sure to look around Cascadia before you head inside, [3] as you can find Zora's Executive Review on another terminal inside Rizzo's. [4] This will allow you to use the terminal at the locked gate to Cascadia.

Objective 4: Signal the Unreliable
Game Log: [0] That Alta-Vite gas is going nowhere without heavy transport. [1] To get the gas offworld, signal ADA from the message terminal inside the Cascadia lab. [2] She'll prepare the ship for the fueling connection.
Walkthrough: [0] Once inside the lab you'll gain 5000 XP, [1] you'll come across a security robot, [2] but you can get by with Lie (60) or have SAM do it for you. [3] To the left of the robots there's a room with a terminal. [4] Use it to signal ADA to land, [5] and your quest will update and grant you 5000 XP.

Objective 5: Setup a Link to the Refueling System
Game Log: [0] Risky as it sounds, the Alta-Vite gas needs to get pumped into the Unreliable's fuel tank. [1] Linking the ship to Cascadia's refueling system will allow you to siphon the goods.
Walkthrough: [0] Continue exploring by taking the route left from the entrance. [1] You'll pass a locked door with some loot inside and come to a room with several Mantisaur. [2] Defeat the mantisaur and climb the ladder then interact with the terminal to align the fuel. [3] After that, initiate Alta-Vite Gas transfer - [4] you'll learn this terminal is not allowed and you have to make it to another one. [5] Earn 5000xp

Objective 6: Siphon the Gas
Game Log: [0] The sooner the Alta-Vite gas is siphoned into the Unreliable's fuel tanks, [1] the quicker you can smuggle it offworld.
Walkthrough: [0] Head to Cascadia and interact with the terminal near the sealed door containing what you seek (it's inside a building). [1] You need to override the system with the password and the door will reveal a lift that takes you to Rizzo Secret Laboratory. [2] She'll prepare the ship for the fueling connection.
Walkthrough: [0] Once inside the lab you'll gain 5000 XP, [1] you'll come across a security robot, [2] but you can get by with Lie (60) or have SAM do it for you. [3] To the left of the robots there's a room with a terminal. [4] Use it to signal ADA to land, [5] and your quest will update and grant you 5000 XP.

Objective 7: Return to Lilya
Game Log: [0] The goods are secured. [1] Lilya Hagen should be pleased. [2] She's stationed at SubLight Headquarters on the Groundbreaker.
Walkthrough: [0] Continue exploring by taking the route left from the entrance. [1] You'll pass a locked door with some loot inside and come to a room with several Mantisaur. [2] Defeat the mantisaur and climb the ladder then interact with the terminal to align the fuel. [3] After that, initiate Alta-Vite Gas transfer - [4] you'll learn this terminal is not allowed and you have to make it to another one. [5] Earn 5000xp

Quest Name: The Ice Palace
Synopsis: [0] Lilya Hagen has another lead on some valuable salvage - an abandoned space station. [1] She gave you an override bypass that should stake her claim over HRS-1084 as the rightful property of SubLight Salvage.
Walkthrough: [0] Speaking with Lilya Hagen after completing Space-Crime Continuum will start this quest. [1] Lilya will tell the Stranger about HRS-1084, [2] an abandoned lab in Cascadia houses a rich cache of Alta-Vite gas. [3] The passwored "ANTEDILUVIAN" should get you inside the hidden lab.

Objective 1: Grant SubLight Remote Access to the Station
Game Log: [0] The override cartridge will hand over control of the station's systems to SubLight, [1] legitimizing Lilya's claim over the salvage. 
Walkthrough: [0] Travel to HRS-1084 station and restore the power. [1] You can pick up UDL Identity Cartridge from a chair in the mess hall. [2] Use the terminal past the mines and set the generator to normal. [3] You will be contacted by ADA shortly after, and you will learn that the UDL has docked with the station and intend to wipe you out. [4] The Corporate Commander will contact you and you can persuade (55) her to not attack you if you have gained Adjutant Akande's trust by completing The Demolished Woman quest. [5] You can also Bribe her with 2550 Bits or Intimidate (65) her to into not making an enemy of SubLight. [6] You can also Lie (65) that you will press the self destruct button. [7] If you used the UDL Identity Cartridge you'll be asked about the automechanicals. [8] Lie or Intimidate (35) to deal with it. [9] Any of these will get them to undock from the station without conflict. [10] Enter the main room on the right hand side from where you first came in. [11] There will also be mines down these stairs. [12] There is a locked door that requires Lockpicking (40) or you can use the Electrical Control Room Keycard. [13] Inside is a terminal you can use to disengage security protocol. [14] Use the terminal in the office. [15] Read the logs to find out about the experiments being done here, [16] and get some alarm bells as you discover the override password for UDL communications is the same one that you used to get into the lab in Cascadia on Monarch. [17] When you're done reading, insert the SubLight Override Cartridge.

Objective 2: Return to Lilya
Game Log: [0] Now that the station has been secured as a holding of SubLight Salvage, [1] Lilya Hagen will be interested in an update. [2] She can be found in SubLight Headquarters on the Groundbreaker.
Walkthrough: [0] Then head back to Lilya on Groundbreaker. [1] You can inform her of the scientists and (if you disabled the mechs) tell her they are now up for grabs (15000xp). [2] Completing the quest will net you 35000 XP and SubLight Salvage & Shipping Reputation as well as 2188 Bit Cartridges. [3] Lilya will ask you if you encountered any resistance at the station, [4] and you can either tell her the truth or Lie (1) to her [5] Either way Lilya will reveal that none of this was about salvage, [6] but instead Aliens. [7] She thinks there is an Alien invasion happening, [8] and she wants you to put a stop to it. [9] You can ask what she means by that, [10] or you can mention Parvati or Vicar Max. [11] She's to take the gas to the Groundbreaker once you obtain it.

Figure 8: Example Quest Items (continued)
The Doom That Came To Roseway

Clive

This corporation, under the leadership of Sanjar Nandi and Graham Bryant subsequently rebranded itself to Monarch Stellar Industries (MSI), in line with the renaming of the planet to ‘Monarch’. The actions of MSI earned them the ire of the Board, who retaliated by effectively placing the moon under indefinite embargo, refusing to allow legal transit either in or out. The Board aggressively spread propaganda about Monarch to convince the rest of the population that it was both uninhabited and uninhabitable. This has greatly hampered MSI’s attempts to be recognized as a legitimate corporation and is a thorn in the side of its CEO, Sanjar Nandi. Monarch also has an ocean which goes around the moon at the “twilight band”. It is where the colonists and Monarch Stellar Industries farm their saltuna.

Tucker Needham

Before the quest A Family Matter, he can be found in Amber Heights. He is dazzled by Graham’s preachings on true unfettered freedom from the corporate way of life and attributes his enthusiasm to his ‘childhood trauma’. He is willing to do anything to remain free, even taking his own death to prevent his mother from continuing to send people to look for him.

Agnes Needham

A Family Matter

She still thinks of him as her ‘little boy’. You can find her by visiting the Slaughterhouse Clive. Space-Crime Continuum

The Chimerists Last Experiment

Mandibles Of Doom

Flowers For Sebastian

The Ice Palace

Mr Picketts Biggest Game

Passion Pills

Mandibles Of Doom

Slaughterhouse

The

Figure 9: Example entity biographies that appear as constraining knowledge in KNUDGE quest dialogs
Which would allow for MSI to take full control of the planet. [3] Graham and Sanjar believed that this provided them with an opportunity to dismantle the corporate Palace after seeing evidence from the jobs. [10] If the scientist gets killed, [11] she makes the Stranger a high-ranking member.

Jobs to mercenaries, [8] this eventually gets the attention of the Stranger. [9] She gets them to do big jobs until she thinks a scientist in Byzantium is helping aliens cared about profit and started to invest in dangerous jobs which (if not caught) would make her very rich. [6] Not wanting to get her hands dirty, [7] Lilya offers these


Sublight Salvage and Shipping Corporation, also known as Sublight Salvage and Shipping or simply SubLight, is a network of “salvagers” with business uses to “transportation” and “waste disposal”. [1] A tangled web of contractors and secretive vice presidents make up their official hierarchy. [2] Haym Blythe, the head of SubLight, is the key to the operation. [3] Sanjar Nandi is afraid of Catherine. [4] According to him, she has certain ambitions for Stellar Bay and Sanjar fears asking her hitsmen to get somebody whacked. [5] Graham Bryant is afraid of Catherine. [6] According to him, she has certain ambitions for Stellar Bay and Sanjar fears asking her


who Goes There


Stellar Bay, [20] or broker peace between the two factions. [21] The Stranger can also have an impact on the leadership of the Iconoclasts - siding with either Graham Bryant or Zora Blackwood. [22] To supplant Graham with Zora, evidence of Graham’s involvement in the Amber Heights massacre must be found and presented to Zora. [23] The Van Noys are the Iconoclasts’ best unit.

The Commuter


Figure 10: Example entity biographies (continued)
The Iconoclasts are a group of survivalists living in the ruins of Amber Heights on Monarch. [1] They hope to one day tear down the corporate establishment that they believe has brought the colony to the brink of death. [2] The Iconoclasts are a group of idealistic revolutionaries that seek to overthrow the corporate establishment that runs the Halcyon Colony. [3] Based in the ruins of the Amber Heights settlement on Monarch, [4] they are a tenacious group, [5] and share some democratic ideals with Monarch Stellar Industries (MSI) against the more repressive actions of the Board. [6] However, the Iconoclast's anti-corporate nature has put them at odds with MSI, a dispute that threatens to spill into all-out warfare. [7] Given that the Iconoclasts are mostly followers of the Philosophist faith, they have been blacklisted and demonized by the Board as dissidents and anarchists. [8] The group is led by Graham Bryant, a staunch Philosophist. [9] Zora Blackwood, the Iconoclasts' chief of medicine, is also considered a de facto leader of the group, [10] as she was alongside Graham when he founded the Iconoclasts, [11] and almost every member of the Iconoclasts owes her their life in some way. [12] The Iconoclasts maintain a tense relationship with MSI. [13] Despite sharing democratic values and a common desire towards egalitarianism for the people of Monarch and the wider Halcyon colony, [14] MSI's "egalitarian corporate structure" has proven to be at odds with some of the Iconoclasts' more radical, anti-capitalist views. [15] Depending on the actions of the Stranger, this tense relationship can either be resolved, [16] or can spill into a drawn-out and bloody war. [17] The Stranger meets the Iconoclasts in Amber Heights just as the tension between them and MSI is reaching boiling point. [18] They can either side with the Iconoclasts and assist them in storming and taking over Stellar Bay, [19] "solve" the Iconoclast problem for Stellar Bay, [20] or broker peace between the two factions. [21] The Stranger can also have an impact on the leadership of the Iconoclasts - siding with either Graham Bryant or Zora Blackwood. [22] To supplant Graham with Zora, evidence of Graham's involvement in the Amber Heights massacre must be found and presented to Zora. [23] The Van Noys are the Iconoclasts' best unit.

Game Lore:

[0] Agnes Needham is a resident of Stellar Bay and the mother of Tucker Needham. [1] Agnes' overprotective style of mothering has led her son, Tucker Needham, to run away from home so he can experience life. [2] Despite Tucker being 42 years old, she still thinks of him as her 'little boy'. [3] You can find her by Stellar Bay's south-east exit, visibly shaken and calling for help. Tucker left Stellar Bay to be truly free by joining the Iconoclasts at Amber Heights. [7] He is dazzled by Graham's preachings on true unfettered freedom from the corporate way of life and attributes his enthusiasm to his 'childhood trauma'. [8] He is willing to do anything to remain free, even faking his own death to prevent his mother from continuing to send people to look for him.

Figure 11: Dialogue from motivating example in Figure 2 with all input constraining passages. Full dialogue tree can be found on the next page.
Figure 13: Example full dialogue tree for dialogue in KNUDGE.

Figure 12: Full dialogue tree in KNUDGE for motivating example in Figure 2.
Figure 14: Example of longer dialogue tree in KNUDGE, containing numerous decision points, cycles and re-entrances.
Figure 15: Example source and target items used to train and evaluate T5-based SL DialogueWriters. The first item exhibits support facts prepended to the target for the SL Knowledge Selection model.
Agnes Needham: And if you find any of them Iconoclasts indoctrinating my boy, you punch them in the mouths! Tell them what I think of them luring

You look for him in Amber Heights, you hear? It's down the road southwest of town. I'm sure he made it that far, I just know it.

Thank you! Oh, I know he'll be safe now that someone's able to fetch him home.

Player: I'll help you find your son.

Agnes Needham: He should've listened to his mama. I promised I'd keep him safe here with me.

He's been pining for an adventure, says he's tired of living cooped up behind the walls. But he doesn't understand how dangerous it is.

Player: Why would Tucker run away?

Agnes Needham: I've got some bits saved up for a rainy day. I'll give you every last one if you just bring my Tucker back to me. I won't even be mad

He ran out into the wilderness a few days ago. I warned him about the raptidons, mantisaurs, and marauders - the toxic sulfur pools,

Player: Calm down. Take a deep breath, then tell me what happened.

Agnes Needham

Mantisaurs are insectoid creatures native to Monarch.

They are aggressive, territorial, and very strong.

It is sensible to deal with them one on one, but it is best to avoid groups of them for your safety.

The mantisaur is the largest breed of Mantisaur.

Monarch

Monarch, previously known as Terra 1, is one of the many moons of the gas giant Olympus and the site of a failed colony.

Terra 1 is the site designated as the primary colonization target of the Halcyon system.

The Halcyon Holdings Corporate Board had intended to completely terraform the moon, which was the most promising of the ones they had been exploring.

However, the terraforming process unexpectedly caused the native species to mutate and grow to significantly larger sizes, rendering them more dangerous and severely crippling the plants and wildlife native to Earth.

Due to the hostile environment which they had created, the board initiated aเกษตรクラウド covering the entirety of Terra 1.

Public notice of the clause's issuance was sent to everyone operating on Terra 1 and led to the evacuation of almost all corporations from the moon.

However, some corporations continued to benefit from the change of the environment to exploit a legal loophole which allowed them to, as the last corporation remaining on the planet, acquire the land from the Board.

This corporation, under the leadership of Senior Hands and Graham Bryant subsequently rebranded itself to Monarch Stellar Industries (MIS), in line with the renaming of the planet to "Monarch".

The actions of MIS earned them the ire of the Board, who were effectively placing the moon under indefinite embargo, refusing to allow legal transit either in or out.

The Board aggressively spread propaganda about Monarch to convince the rest of the population that it was both uninhabitable and uninhabitable.

This has greatly hampered MIS's attempts to be recognized as a legitimate corporation and is a thorn in the side of its CEO, Sanjar Hands.

Monarch also has an ocean which goes around the moon of the "suffrage band".

It is where the colonists and Stellar Industries farmed their saltrite.

Raptidon

Raptidons are giant cat/reptile-like creatures that inhabit various planets in Halcyon. They are creatures native to Monarch.

However, some corporations have illegally imported them to other planets, and the Van Noys were one of them to Import.

Raptidons are of corporate interest due to their potential for producing new chemical by-products which, when refined, can be used to create new corporate approved products.

Stellar Bay

Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws.

Stellar Bay is a company town on the planet Monarch. It is owned and operated by Monarch Stellar Industries.

Stellar Bay is a large industrial zone on the Monarch colony and used to be one of the most important suppliers of this resource.

Sulfur Pits

The Sulfur Pits are a point of interest on the western side of Monarch.

They are located southwest of Terra One Publications and directly northeast of the Gunship Crash Site.

The Sulfur Pits have a large variety of Raptidons and many deceased marauders.

The area consists largely of Sulfur Pits.

When an entity comes in contact with a sulfur pit, they receive the acid effect for the duration of touching the pit.

Tucker Needham

Tucker Needham is a former resident of Stellar Bay who left to join the Iconoclasts.

He is a resident of Stellar Bay and the mother of Tucker Needham.

Agnes Needham

Agnes Needham is a resident of Stellar Bay and the mother of Tucker Needham.

Agnes' overprotective style of mothering has led her son, Tucker Needham, to run away from home so he can experience life.

Tucker was coddled by his mother from a very young age, the latter insisting that danger lurked around every corner on Monarch.

His mother's overprotectiveness extended well into Tucker's adulthood, leading him to seek to be free in any way possible.

When an entity comes in contact with a sulfur pit, they receive the acid effect for the duration of touching the pit.

Tucker Needham

Tucker Needham is a former resident of Stellar Bay who left to join the Iconoclasts.

He is a member of the Iconoclasts living in the ruins of Amber Heights on Monarch.

Tucker Needham survived his travels, his mother thinks he'll be back.

Agnes Needham

Agnes Needs: And if you find any of them Iconoclasts indoctrinating my boy, you punch them in the mouths! Tell them what I think of them luring

You look for him in Amber Heights, you hear? It's down the road southwest of town. I'm sure he made it that far, I just know it.

Thank you! Oh, I know he'll be safe now that someone's able to fetch him home.

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If Tucker Needham survived his travels, his mother thinks he'll be back.

Figure 16: Example In-Context Learning (ICL) prompt for GPT-3 based DialogueWriter
Utterance: Agnes Needham: And if you find any of them Iconoclasts indoctrinating my boy, you punch them in the mouths! Tell them what I think of them.

Utterance: Agnes Needham: Thank you! Oh, I know he'll be safe now that someone's able to fetch him home.

Utterance: Agnes Needham: You look for him in Amber Heights, you hear? It's down the road southwest of town. I'm sure he made it that far, I just...

Utterance: Agnes Needham: I warned him. A raptidon would snap him up first chance it got. I just know one's ripped his arm off and is gnawing on his vile creature!

Utterance: Player: Calm down. Take a deep breath, then tell me what happened.

Utterance: Agnes Needham: I've got some bits saved up for a rainy day. I'll give you every last one if you just bring my Tucker back to me. I won't even be mad at him running off. You tell him, I won't be mad.

Utterance: Player: Why would Tucker run away?

Utterance: Agnes Needham: I'm going to miss him for a long time. He's a part of me now. I promise I'll keep him safe here with me.

Utterance: Agnes Needham: You can find her by Stellar Bay's south-east exit, visibly shaken and calling for help. Tucker Needham fact: the latter insisting that danger lurked around every corner on Monarch. Raptidon fact: Raptidons are giant cat/reptile-like creatures that inhabit various planets in Halcyon. Sulfur Pits fact: The Sulfur Pits are a point of interest on the western side of Monarch. Mantisaur fact: Mantisaurs are insectoid creatures native to Monarch. Monarch fact: rendering them more dangerous and severely crippling the colonization effort. Mantisaur fact: Mantisaurs are aggressive, territorial, and very smart.

Utterance: Agnes Needham: I've got some bits saved up for a rainy day. I'll give you every last one if you just bring my Tucker back to me. I won't even be mad at him running off. You tell him, I won't be mad.

Utterance: Player: Why would Tucker run away?

Utterance: Tucker Needham fact: the latter insisting that danger lurked around every corner on Monarch. Tucker Needham fact: leading him to seek to be free in any way possible. Tucker Needham fact: The city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Agnes Needham fact: Despite Tucker being 42 years old, she still thinks of him as her 'little boy'. Tucker Needham fact: the latter insisting that danger lurked around every corner on Monarch. Raptidon fact: Raptidons are giant cat/reptile-like creatures that inhabit various planets in Halcyon. Sulfur Pits fact: The Sulfur Pits are a point of interest on the western side of Monarch. Mantisaur fact: Mantisaurs are insectoid creatures native to Monarch. Monarch fact: rendering them more dangerous and severely crippling the colonization effort. Mantisaur fact: Mantisaurs are aggressive, territorial, and very smart.

Utterance: Agnes Needham: He ran out into the wilderness a few days ago. I warned him about the raptidons, mantisaurs, and marauders - the toxic sulfur pools, and poisonous plants. But he didn't listen!

Utterance: Agnes Needham: Oh, thank you for stopping! Everyone acts like nothing's wrong. Like my little boy isn't at risk of being eaten by some vile creature!

Utterance: Player: Calm down. Take a deep breath, then tell me what happened.

Utterance: Agnes Needham: I warned him. A raptidon would snap him up first chance it got. I just know one's ripped his arm off and is gnawing on his vile creature!

Utterance: Player: Did you say there was a reward involved with this request?

Utterance: Agnes Needham: I just want him back safe. I'll give you some bits if you just bring him back to me. Oh, I'm so worried.

Utterance: Player: Why would Tucker run away?

Utterance: Tucker Needham fact: the latter insisting that danger lurked around every corner on Monarch. Tucker Needham fact: leading him to seek to be free in any way possible. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Tucker Needham fact: Outside the city walls, the lands were overrun by the native wildlife, as well as marauders and outlaws. Agnes Needham fact: Despite Tucker being 42 years old, she still thinks of him as her 'little boy'. Tucker Needham fact: the latter insisting that danger lurked around every corner on Monarch. Raptidon fact: Raptidons are giant cat/reptile-like creatures that inhabit various planets in Halcyon. Sulfur Pits fact: The Sulfur Pits are a point of interest on the western side of Monarch. Mantisaur fact: Mantisaurs are insectoid creatures native to Monarch. Monarch fact: rendering them more dangerous and severely crippling the colonization effort. Mantisaur fact: Mantisaurs are aggressive, territorial, and very smart.

Utterance: Agnes Needham: Please! Won't you go and find my boy?

Utterance: Agnes Needham: Don't you tell me to calm down! I promised my boy I'd protect him for always. But how can I keep him safe if he's run away?

Utterance: Agnes Needham: He's been pining for an adventure, says he's tired of living cooped up behind the walls. But he doesn't understand how dangerous it is out there.

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Utterance: Agnes Needham: I warned him. A raptidon would snap him up first chance it got. I just know one's ripped his arm off and is gnawing on his sweet little fingers!

Utterance: Agnes Needham: I'm sorry we had to leave Stellar Bay. I... I guess I can't ask you to leave the town walls for free. It is deathly dangerous out there.

Utterance: Agnes Needham: Well, I... I guess I can't ask you to leave the town walls for free. It is deathly dangerous out there.

Utterance: Agnes Needham: Please! Won't you go and find my boy?

Utterance: Agnes Needham: He ran out into the wilderness a few days ago. I warned him about the raptidons, mantisaurs, and marauders - the toxic sulfur pools, and poisonous plants. But he didn't listen!

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Utterance: Agnes Needham: Please! Won't you go and find my boy?

Utterance: Player: Calm down. Take a deep breath, then tell me what happened.

Utterance: Player: Did you say there was a reward involved with this request?

Utterance: Player: Why would Tucker run away?

Utterance: Player: I'll help you find your son.

Utterance: Agnes Needham: Thank you! Oh, I know he'll be safe now that someone's able to fetch his home.

Utterance: Agnes Needham: You look for him in Amber Heights, you hear? It's down the road southwest of town. I'm sure he made it that far, I just...

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Utterance: Agnes Needham: In the ruins of the Amber Heights settlement on Monarch, the Iconoclasts are a group of idealistic revolutionaries that seek to overthrow the corporate establishment that runs the Halcyon Colony. Iconoclasts fact: Based in the ruins of the Amber Heights settlement on Monarch.