

Enter Three Witches: a writer-focused game engine

To get the best writing, writers must take the helm

```
Enter : First Witch
```

```
First Witch
```

```
    When shall we three meet again
```

```
    In thunder, lightning, or in rain?
```

In 2017 I missed giving the talk [Natural Script Writing with Guile](#) due to sickness. Christine stepped up and made it wonderful. The talk gave an overview of existing game scripting syntax and presented the first well-working version of *Enter Three Witches* – a followup to an example from my 2016 [talk about wisp](#). This is a second followup after 10 years with *Enter Three Witches*, showing how to use it for your own games, both on the commandline and on the web.

This article also provides the documentation for [enter-three-witches](#).

WIP: This is still a **work in progress**. Sections marked as **TODO** are unfinished. You can already try, but until this article is finished, you'll have to figure out the missing pieces by looking at the code of [dryads-wake](#). All the to-be-described features (except for the simplified multi-file-format) are already in practical use there.

*To skip explanations and get to work right away, jump to **How to start?** Writing your first scene.*

```
Enter : First Witch
      Second Witch
      Third Witch
;; this line is a comment
First Witch
  When shall we three meet again
  In ,(color 'cyan) thunder, ,(color #f)
    . ,(color 'yellow) lightning, ,(color #f)
    . or in ,(color 'blue) rain? ,(color #f)

Second Witch :resolute
  When the hurlyburly's done, (we ,( + 1 2))
  When the ,(color 'red) battle's ,(color #f)
    ;; leading period continues the line:
    . lost and won.

Third Witch
  That will be ere the set of
    ;; the .. becomes a plain period:
    . ,(color 'yellow) sun ,(color #f) ..
```

Goals of *Enter Three Witches*:

- Make game scripting read like natural writing
- Enable writers to tinker from the start and till the end
- Be accessible by default
- Make it easy to publish a game on cheap infrastructure
- Solidify the platform of my own games

Non-Goals of *Enter Three Witches* (for now):

- Build a graphical framework to rule the world
- Build a market place or publishing platform for games

Contents

1	Why this? How the writing of Starcraft 1 got so good	4
2	Why like this? Minimize ceremony by starting from theater scripts	5
3	Who can tinker? Keep writers at the helm	9
4	How to start? Write your first scene	9
5	How to convert existing stories? Use the multi-file format for a simpler start	16
6	TODO How to continue? Save and load savegames	18
7	TODO How to stay in control? Use outcomes and analyze your game to keep ahead of complexity	20
8	TODO How to scale up? Split your game into chapters	22
9	TODO How to reach people? Deploy your game	22
10	TODO Where can I go? Beyond gamebooks	23
11	TODO How to ...? Common solutions (FAQ)	23
12	Who uses it? Games built with <i>Enter Three Witches</i>	24
13	TODO How does it compare? Interactive fiction and game engines	24
14	TODO Where next? Future plans for <i>Enter Three Witches</i>	24
15	TODO Who are you? Can I prove my claims?	25
16	TODO Summary	25

1 Why this? How the writing of Starcraft 1 got so good

writers could tinker till the end

Starcraft 1 followed an ingenious strategy: it only used costly and hard to change videos for flavor. All plot was conveyed through either ingame text that could be changed by changing simple text files or briefings that had a voice-line but no added dependencies.

The plot of Starcraft 1 was intense, brutal, and clever, and its characters were powerful and a perfect match to the harsh world they inhabited. The writing was so strong that hearing a sentence like “I’m pretty much the Queen Bitch of the Universe” did not feel cheesy or cheap but showed how the power dynamics had shifted.

Starcraft 2 abandoned that. Its video cut-scenes told the central parts of the plot and when I first watched a cut of those videos to decide whether to buy the game, I was severely disappointed. I almost skipped out on it due to that.

When I finally bought it, I found that the ingame story made up for the weak videos. And as in Starcraft 1, the part of the story told with ingame dialogues could be changed far more easily than the videos. The parts of the story that turned out to be great were the ones that could be polished till the end.

For a recent example: Baldur’s Gate 3 has some awesome writing and it managed to capture me emotionally on a level few games reached before. My emotional investment was similar to that when I played Suikoden – and back then I was around 15 and easier to impress.

Baldur's Gate 3 has fully voiced dialogues, but the speakers recorded continuously and text in all parts of the game got changed until and even after release.

What these have in common: **writers could tinker till the end.**

If you want to enable the best writing, then the writing must be what you can change at all times and writers must be the ones who can experiment the most.

Enter Three Witches tries to enable exactly that: let writers take the helm. Writing directs the plot and holds everything together. *Enter Three Witches* does not build on locations that ask for some text to show. Instead it builds on dialogue that can be enriched where and when needed.

Does it work out? Read on, then give it a try.

2 Why like this? Minimize ceremony by starting from theater scripts

Code encodes intent. Since it is written not only for humans but also for machines, it always sprouts some ceremony: structures and patterns that are only needed by the machine but rather obfuscate than clarify the intent.

To minimize that ceremony, *Enter Three Witches* started from an investigation how dialogue is encoded for humans. Specifically: how people digitized Shakespeare's plays in *plain text*.

There are two main approaches:

- **Speaker-prefix:** The Speaker (sometimes capitalized) starts the line with continuation indented (1993 version from Project Gutenberg), and

- **Speaker-heading:** The Speaker (sometimes capitalized) starts the paragraph that ends on an empty line. (2025 version from Project Gutenberg)

Both introduce people with **Enter**.

Example for Speaker-prefix:

Enter BERTRAM, the COUNTESS OF ROUSILLON, HELENA, ..., all in black

COUNTESS. In delivering my son from me, I bury a second husband.

BERTRAM. And I in going, madam, weep o'er my father's death anew;
but I must attend his Majesty's command, to whom I am now in
ward, evermore in subjection.

Example for Speaker-heading:

Thunder and Lightning. Enter three Witches.

FIRST WITCH.

When shall we three meet again?
In thunder, lightning, or in rain?

SECOND WITCH.

When the hurlyburly's done,
When the battle's lost and won.

THIRD WITCH.

That will be ere the set of sun.

The modern „traditional style“ format uses centered speaker names instead, but centering code on a fixed size page feels so alien to programming that I discarded that. Included here for completeness' sake.

Example of the traditional style from the Dramatists Guild (From Tennessee Williams' Not About Nightingales):

BOSS

(removes cover from basket)

Speak of biscuits and what turns up but a nice batch of
homemade cookies! Have one young lady - Jim boy!

(Jim takes two.)

You can see reminiscences from the first two examples in the final format of *Enter Three Witches*:

```
Enter : First Witch ;; introduce with Enter
      Second Witch ;; continue with indentation
      Third Witch
```

```
First Witch ;; speaker starts the paragraph
  When shall we three meet again
  In thunder, lightning, or in rain?
```

```
Second Witch
  When the hurlyburly's done,
  When the battle's lost and won.
```

```
Third Witch
  That will be ere the set of sun.
```

A personal note: my kids told me that this does not read like code. They didn't realize that their words were the highest praise for the project. Because that's part of the point: make the code read like natural language (without limiting its power), so you can use your existing feeling for text. If it looks good in the code, it likely looks good in the game.

The second format — Speaker-heading — is available by importing it via the simplified **multi-file format**.

Since we're also writing for computers, reading like text written for humans is an important part, but not a sufficient system to write games.

3 Who can tinker? Keep writers at the helm

The clear syntax makes it easy to create the text to be shown, but a game is more than linear text. You need to ask questions and show a different story based on the results. Or track effects of decisions and make them affect the game. Or start a minigame.

To enable controlling those aspects, a system for game scripts can provide specialized commands, but then writers who want to go beyond the expected have to request features to be added or must change very different parts of the game, so most writers would be blocked and would have to wait for others before they could go beyond these limits.

Enter Three Witches avoids that by embedding its syntax into Scheme, one of the most flexible programming languages.¹ It puts all capabilities of a full programming language into your hands without being overwhelming, because you only need to touch advanced capabilities when you really need them.

This way there's no need to wait: the writer controls what happens and when it happens, and everything that can be done via code can be done by writers. And is used just like the helpers already provided by *Enter Three Witches*. That gives you independence from the framework.

Everything is driven by the writing and writers can tinker from the start up to the very end.

To enable you to tinker *with confidence*, plot analysis tools give safety against breaking the plot. They build on the easy code introspection of Scheme to show how changes affect the overall picture of the plot.

4 How to start? Write your first scene

This section helps you setup *enter-three-witches* (on GNU Linux) and explains how to write a branching story similar to a game book.

¹Put in academic wording, it's an EDSL: an embedded domain specific language.

4.1 Installing and creating a setup for development

Requirements:

- GNU Linux (Guix is easiest, but others work, too)
- Mercurial: <https://mercurial-scm.org>
- Guile 3.0.10+: <https://gnu.org/s/guile>

Install the template from hg.sr.ht/~arnebab/enter:

```
hg clone https://hg.sr.ht/~arnebab/enter && \  
cd enter && \  
./game.w
```

TODO: remove more parts from dryads-wake from the template.

4.2 Showing a theater script incrementally

To show a linear story, just create a file with `.w` as suffix, e.g. `script.w`.
Fill it with text like the following:

```
Enter : The Narrator
```

```
The Narrator
```

```
Welcome to the dark forest.
```

```
This is where dreams
```

```
,(slower) may come to pass. ,(faster)
```

```
;; Print shows a line of description
```

```
Print
```

```
" " ;; empty line
```

```
(The sound of rustling leaves fades.)
```

""

;; Say is spoken text without speaker

Say

Your path leads into shadow.

Execute the script with

`./game.w --run script.w`

and watch as the text is shown letter by letter:

The Narrator

Welcome to the dark forest.

This is where dreams

may come to pass.

(The sound of rustling leaves fades.)

The path leads into shadow.

4.2.1 Syntax: what to write, how it looks

*This section describes the regular syntax. The **multi-file format** is a simpler but less powerful alternative to convert existing stories.*

Enter introduces speakers. It **must** be at the start and all speakers must be introduced together at the start.

A speaker name introduces a block of lines to speak letter by letter.

Comma and an opening parenthesis like **,(faster)** call a command that ends with the closing parenthesis. For this to work, you must have a space before the comma **(,)**.

;; starts a comment until the end of the line.

`Print` shows lines without a speaker.

`""` is an empty word. `""` alone on a line is an empty line.

`Say` continues spoken lines after `Print` without showing the speaker again.

Some useful commands:

- `,(color 'red)` – switch to color. Available colors: `'black 'blue 'yellow 'red 'cyan 'magenta 'green 'white 'purple 'brown`
- `,(color #f)` – reset color.
- `,(slower) ,(faster)= ,(set-speed-extremely-fast!) ,(set-speed-very-fast!) ,(set-speed-fast!) ,(set-speed-normal!) ,(set-speed-slow!) ,(set-speed-very-slow!)`
- `,(play-sound "path-to/file.opus" "description")`

4.2.2 Background: how it works

`Enter` is a macro that creates macros: the speakers. The colon (`:`) after `Enter` is equivalent to putting the name in the next line with indentation.

The lines to speak are treated as data, split into letters and printed letter by letter, except if you use `,` to interpret something as code.

Code (usually within `,(...)`) is executed when it is processed, so `,(play-sound ...)` plays the sound when it would be shown if it were a word.

If code returns text (a `string`), that text is shown letter by letter. If it returns `#f`, nothing is shown and it skips right to the next word.

Enter Three Witches builds on [Wisp](#), a Scheme frontend that skips most parentheses. To understand it as programming language, see the book [Naming and Logic: programming essentials with Wisp](#).

4.3 Asking questions and branching stories

To ask a question, use **Choose**:

Choose

```
: question 1
  answer 1
  second line
: question 2
  answer 2
```

To write branching stories, **define** plot fragments as indented text. Each fragment is self-contained, so speakers have to **Enter** at the start of it.

define : deeper

```
Enter : The Narrator
The Narrator
  You step deeper into the forest.
  After several steps,
  gloom envelops you
  and the ground under your feet
  becomes softer.
thank-you ;; continue in thank-you
```

define : wait-or-deepen

```
Enter : The Narrator

The Narrator
  Where do you want to go?
```

Choose

```
: deeper into the forest
  As you continue, the shadows darken.
```

```

    ,(deeper) ;; continue in deeper
: wait and watch
    ,(wait-and-watch) ;; continue in wait-and-watch

define : wait-and-watch
Enter : The Narrator
The Narrator
    As you're watching the forest,
    the sun sets,
    the light fades.
    and you smell water.
thank-you ;; continue in thank-you

define : thank-you
Enter : The Developer
The Developer
    Thank you!

```

`wait-or-deepen`

Write this into a file like `branch.w` and call it with

```
./game.w --run branch.w
```

to choose your path through the story.

Fragment names can contain all letters except for parentheses, comma, quote, double quote and hash. It is common to use lowercase words connected by dashes.

You can use any level of indentation inside fragments, but you have to stay consistent. `define` for fragments must be at the beginning of the line (no indentation).

Fragments can contain single empty lines, but no double empty lines. A double empty line always ends the fragment. A line with a comment is not empty.

You can call fragments defined earlier or later in the file by either using them in dialogue via `,(fragment-name)` or by writing the fragment instead of a speaker.

At the end of the file, call the fragment that starts the plot without indentation.

4.4 Structuring the plot in set-pieces

To keep your plot manageable, you can organize the fragments into *set pieces*: branch out narrative fragments as branches and tie these branches back together into a small number of transitions between larger set-pieces of the plot.

The code above shows a single set piece starting at `wait-or-deepen` and ending at `thank-you`, because both `deepen` and `wait-and-watch` lead to `thank-you`:

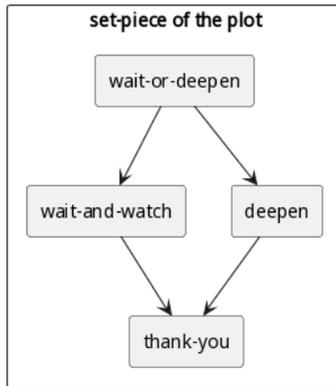


Figure 1: Diagram of plot fragemnts in a set-piece structure.

5 How to convert existing stories? Use the multi-file format for a simpler start

The simplified multi-file format follows the Speaker-heading pattern: The first paragraph introduces the Speakers, then each paragraph starts with a line containing only the speaker and ends with an empty line. The final paragraph is a list of questions and target files. If the target file is `exit`, the game ends.

Example with two files: `welcome` and `about`.

`welcome` with the speakers "Robert" and "Arne":

Robert

Arne

Robert

It would be nice to be able to turn stories into playable websites

Arne

I hope this works for you!

Read again?

`welcome`

Read about?

`about`

Exit?

`exit`

`about` with the speaker "Textfile Format":

Textfiles Format

Textfiles Format

A simplified format

to write stories for

Enter Three Witches

Back to welcome?
welcome

Put both into a folder and then convert them with `enter/textfiles-to-game.w`.
If the folder is `tests/textfile-input/`:

```
enter/textfiles-to-game.w tests/textfile-input/
```

This creates the file `textfiles-game.w` that you can execute as `game`.

```
./textfiles-game.w
```

It gives output like the following:

Robert

It would be nice to be able to turn stories into playable websites.

Arne

I hope this works for you!

- 1 Read again?
- 2 Read about?
- 3 Exit?

You can customize the created game by editing `enter/textfiles-to-game-head` and `enter/textfiles-to-game-footer.w`.

6 TODO How to continue? Save and load savegames

6.1 Adding state

To enable people to play your story in smaller parts and take breaks in between, or to make it easy to release a story in episodes, you need savegames.

Saving a game and loading it later needs a name to identify the save. And tracking that name depends on passing a state to fragments:

```
define : into-the-void state
  Choose
    : Move alone into the silent night
      ,(into-the-night state)
    : Cower in fear
      Your adventure ends here

define : into-the-night state
  Enter : Nothing
  Nothing
    Fear dissipates
    reality dissolves
    darkness looms
    in welcoming warmth.

;; create the state
define state : game-state-init!
;; start the game with the created state
into-the-void state
```

Write this into a file like `state.w` and call it with

```
./game.w --run state.w
```

The state must always be passed along. If a fragment ends without calling another fragment, it can return the state with `. state` or by ending with a call to a fragment that returns the state. The calling fragment can update its state with `set! state new_state`.

`Choose` can return a state, too. If you set the state to the one returned from `Choose`, each answer must return a state.

To check the state during writing, you can display it (but only after `Enter`):

```
define : investigate state
  Enter : Narrator
  display state ;; displays the state
  newline ;; adds a newline
  set! state ;; set state to the state returned from
  ↪ Choose
  Choose
    : Trace over the cracks in the table
      ,(trace-the-cracks state) ;; returns from fragment
    : Open the drawer
      It's empty, except for a name
      scribbled into old dust.
      Craigh. Who may that be?
      . state
  Narrator
    Suddenly You hear footsteps.
    Get out!
    . state ;; state returned

define : trace-the-cracks state
  Enter : Narrator
  Narrator
    They run deep in the polished stone
    in the shape of claw-marks from a feral beast,
    but which beast can cut stone?
```

```
. state ;; state returned
```

```
;; newly created state is used directly  
investigate : game-state-init!
```

6.2 TODO Creating savegames with name and secret

(ask for the name, print the name and the secret, load from name and secret)

6.3 TODO Defining scenes as savepoints

```
define-scene
```

7 TODO How to stay in control? Use outcomes and analyze your game to keep ahead of complexity

You can now tell a path through a story with decisions, but all consequences are immediate. But a story is more interesting if there are long-term consequences.

Enter three witches provides three ways to keep state: outcomes, character attributes, and wounds. All three are passed via the name `state` between fragments.

Outcomes are named facts like `insulted-the-miller` or `restarted-the-genera`. You can set them and check later whether they were set.

Character attributes are values attached to names of people. They come with a ruleset which allows checking whether some action succeeds, and they can improve with usage or by increasing it manually.

(in a game, many people want to see the effect of their choices ⇒ outcomes, skills, and wounds) (show analyze plot and outcomes)

7.1 Adding outcomes

You can add outcomes to the state, remove them, and check for their presence.

To protect against typos, you should define them before you first use them, then you get warnings when you try to run the game with a non-defined outcome.

```
;; TODO: define-outcome, add it, test for it, remove it.  
;; TODO: outcomes as set: remove nonexistent has no effect,  
↪ add twice has no added effect.
```

7.2 Analyze the game

Outcomes make it easy to react to player decisions. Seeing that their decisions have an effect is one of the major motivations for playing games. But they make your story more complex, so most outcomes should be used soon. Therefore *Enter Three Witches* provides analysis tooling to check visually which outcomes you added but did not use in a later scene.

```
;; TODO: analyze plot
```

Make sure to use most outcomes in every branch of the the set-piece in which you introduce them. Only carry a limited number of consequences into the next set-piece to keep the complexity of the plot manageable.

8 TODO How to scale up? Split your game into chapters

8.1 TODO Split your game into chapter-files

(multiple files in chapters, each use `define-module`, each import the `outcomes` and `fragments` from the chapters they use)

9 TODO How to reach people? Deploy your game

9.1 TODO Turning game.w into your game

(add imports to files, import the files, put into `chapter/`)

9.2 TODO Running on the commandline

9.2.1 Publishing a repository

9.2.2 Publishing an `appliance`

(from a local `guix` setup, via a `codeberg` pipeline, via `docker`)

9.3 TODO Offering a Webservice

9.3.1 TODO With `nginx` for SSL, load-balancing, and failover

(smallest `ionos` server for 300 simultaneous users 2€/month, 600 for 3€)

10 TODO Where can I go? Beyond gamebooks

10.1 TODO Adding challenges with game rules, luck, and long-term consequences

(long-term consequences, ...)

10.2 TODO Executing arbitrary code

(..., always validate and cleanup all user-input meticulously before using it for anything)

10.2.1 In the commandline-version

10.2.2 In the webbrowser

11 TODO How to ...? Common solutions (FAQ)

11.1 TODO Translating a game

Creating a good translation of a book is almost like writing that book again. Consequently *Enter Three Witches* also puts translators at the helm: copy the files with the game and translate the file as one consistent text.

You can re-use all the assets and logic from the source language, but what you write aren't disconnected internationalization strings, and if the translated story needs some detour (e.g. because some figure of speech does not work there) or some lines just don't work at all, you can add or remove lines and adapt the context to keep the game working nonetheless.

In practice: if you use a chapter-structure, create a subfolder for the translated scenes and also prefix the scene names used in savegames

(defined with `define-scene`) with the language code. Then go and translate them as if you were writing a new game.

You can then add a language selection in the menu that just calls the entry point fragment from the chosen language. But the language can't be switched mid-game.

11.2 TODO Updating *Enter Three Witches* in your game

(simply do hg pull && hg merge)

12 Who uses it? Games built with *Enter Three Witches*

- [dryads wake](#)
- [dryads sun](#)

13 TODO How does it compare? Interactive fiction and game engines

There is already a wealth of [interactive fiction authoring tools](#) (via ifwiki.org).

(why another?, compare, also compare to game engines, only check FLOSS, commercially published games? Multimedia? Editing support?)

14 TODO Where next? Future plans for *Enter Three Witches*

(accessible graphics and sound for the Web-Version, setup for somewhat safe access via telnet, Deployment to Linux distros, Graphical

Chickadee-Game, integration with ifarchive <https://babel.ifarchive.org/babel.html>, integration in arcade or strategy games, dialogue snippets for ingame banter in world exploration RPG levels, ...)

15 TODO Who are you? Can I prove my claims?

(DrArneBab, PhD, reference the talk [Natural Script Writing with Guile](#) again, also reference the 2016 talk, and a previous try — TextRPG — but say clearly that I don't have industry experience with large-scale games, so the future will show how well this works out on the long run. But at the current state I'm confident enough in the design that I dare to recommend it to others, which is why I now wrote this tutorial. That's also why along with this tutorial I'm releasing version 1.0 of *Enter Three Witches*. I consider it as stable now, so future changes should preserve backwards compatibility.)

16 TODO Summary

17 Parting Notes: Background and Motivation

Some notes that do not fit into the flow of the general article.

You can find some background at <https://archive.fosdem.org/2017/schedule/event/naturalscriptwritingguile/>

That's where it started. Though I ended up not giving the talk myself because I was ill (so cwebber took over).

Though IIRC that misses one essential motivation I have to work on it: I realized that the difference between plotting in Starcraft 1 and Starcraft 2 is that in SC1 they could tinker with the story to the very end and in SC2 their high-quality plot-videos restricted the writers from doing last minute changes.

And I think the part of the game that will be most polished in the end is the one that can be edited at any time. That's why enter-three-witches strictly drives the game from the story and dialogues.

If you decide to port it, also have a look at the outcomes system: <https://hg.sr.ht/~arnebab/dryads-wake/browse/game-helpers.w?rev=tip#L171>

That allows me to analyze branching plots with a simple code walker: <https://hg.sr.ht/~arnebab/dryads-wake/browse/analyze-plot.w?rev=tip#L43>

It generates plot diagrams.

That shows a scene-graph and lists the outcomes I did not yet check against, so I can be sure that player choice matters, because I include a consequence for every decision players take.

Translations are by the way the biggest hurdle with the enter-three-witches syntax. There's no good way to translate that with `gettext` or such. The best bet would be to treat the text as actual prose and translate it in one go.

But I actually think that that's what should be done for game plot text, because it is (and should be) complex prose and not some menu elements that can be translated in isolation.

The syntax for Enter is about the deepest dive I took into macros. The Enter macro generates new macros for the introduced people and those macros quasiquote their arguments and then process them word by word: each word is split into letters and printed with some delay and commands like `,(something)` are executed once the word gets processed. So it should work to also use them to play sound effects or trigger graphic effects exactly when some word is spoken.

`,` is handled by either putting it at the end of words (where it works) or by escaping it as `.`, `-` same for period (`..` \Rightarrow `.`). Those are sometimes needed when you want to unset color with `,(color #f)` and then add a final period.