

Online appendix for the paper
*Web-STAR: A Visual Web-Based IDE for a Story
Comprehension System*

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Appendix A Cognitive Walkthrough Tasks

Introduction

Thank you participating in this research. The Web-STAR IDE is a web-based IDE that facilitates the use of the STAR system for automated story comprehension. It provides an interface to represent stories and the world knowledge required to comprehend them within the STAR system. Web-STAR also provides a Public Stories Repository for sharing publicly a user's STAR stories and opening a discussion about them.

In short, the IDE takes as input:

- 1) a story with questions in either Natural Language or in symbolic format (STAR syntax)
- 2) world knowledge in the form of rules in either graphical format or in symbolic format

and responds with the comprehension model, i.e., the way the story and its concepts are shaped through time, what holds and what does not at each time-point and answers to the questions posed.

Acceptance statement

By proceeding with the following tasks, you agree that we will capture data (screen capture, recording of your actions, answers to questions) for research purposes only and more specifically for the evaluation of the Web-STAR IDE.

TASK No.: 1

Title: Create an account

Description:

Create a new account to the Web-STAR IDE. Activate the new account and log in to the system.

Goals:

- 1) Create an account

Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Create a new account by filling in your details
- 3) Activate your account
- 4) Log in to the Web-STAR IDE
- 5) Log out

TASK No.: 2

Title: Follow the guided tour

Description:

Follow the guided tour to learn the basic functionality of the system.

Goals:

- 1) Learn the various areas of the IDE, its main features and the options available

Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Log in to the Web-STAR IDE
- 3) Start the guided tour and go through it
- 4) Log out

TASK No.: 3a

Title: Write a new story in natural language

Description:

Write a new story in natural language and add questions. Convert the story to STAR syntax. Add the background knowledge using the visual editor. Save the story.

Goals:

- 1) Understand where the different parts of the story should be placed in the IDE
- 2) Understand the structure of a story
- 3) Test the conversion process from natural language to STAR syntax (symbolic format)
- 4) Test the visual editor functionality to add background knowledge

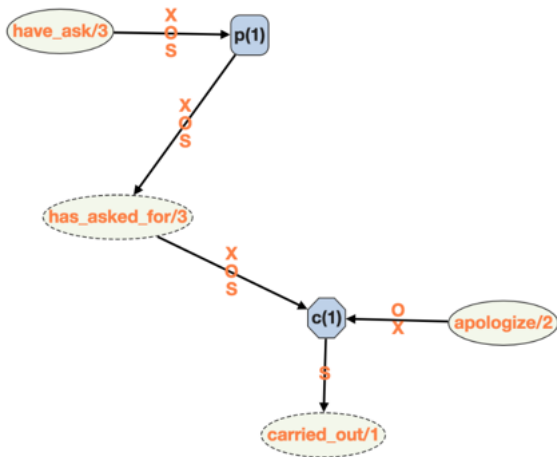
Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Log in to the Web-STAR IDE
- 3) Write the following story in natural language:

Story in Natural Language
Bob called Mary. She did not want to answer the phone. Bob had asked her for a favor. She had agreed to do the favor. She answered the phone. She apologized to Bob. Was Mary embarrassed? Was the favor carried out?

- 4) Convert the story to STAR syntax
- 5) Add the background knowledge for the story using the visual editor:

Web-STAR IDE Cognitive Walkthrough - Evaluation tasks



Fluents: `carried_out`, `has_asking_for`

Actions: `have_ask`, `apologize`

- 6) Convert the background knowledge from visual format to STAR syntax
- 7) Save the story as "cw_task3a_n1"
- 8) Log out

TASK No.: 3b

Title: Write a new story in STAR syntax

Description:

Write a new story in STAR syntax, add questions and save the story. Moreover, add the relevant background knowledge for comprehending the story in STAR syntax.

Goals:

- 1) Understand where the different parts of the story should be placed in the IDE
- 2) Understand the structure of a story
- 3) Test the source code editor functionality to add background knowledge

Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Log in to the Web-STAR IDE
- 3) Write the following story in STAR syntax (symbolic format):

Story in Symbolic Format

```
session(s(0),[],all).
session(s(1),[q(1),q(2)],all).

s(0) :: is_favor(favor1) at always.
s(0) :: is_person(bob) at always.
s(0) :: is_person(mary) at always.
s(0) :: is_phone(phone1) at always.

s(1) :: call(bob,mary) at 3.
s(1) :: -do_want(mary,answer(phone1)) at 4.
s(1) :: have_ask(bob,mary,favor1) at 1.
s(1) :: have_agreed(mary,do(favor1)) at 2.
s(1) :: answer(mary,phone1) at 5.
s(1) :: apologize(mary,bob) at 6.

q(1) ?? is_embarrassed(mary) at 7.
q(2) ?? carried_out(favor1) at 8.
```

- 4) Write the background knowledge needed to comprehend the story above in STAR syntax:

Background knowledge in STAR syntax (symbolic format)

```
fluents([
  do_want(_,_),
  is_embarrassed(_),
  carried_out(_),
  has_asked_for(_,_,_),
  has_agreed_to(_,_),
]).
```

p(01) :: have_ask(X,O,S) implies has_asked_for(X,O,S).

p(02) :: have_agreed(O,do(S)) implies has_agreed_to(O,S).

c(01) :: has_asked_for(X,O,S), has_agreed_to(O,S), apologize(O,X) causes -carried_out(S).

p(03) :: has_asked_for(X,O,S), -carried_out(S) implies is_embarrassed(O).

c(02) :: has_asked_for(X,O,S), has_agreed_to(O,S), -carried_out(S), call(X,O), is_phone(P) causes -do_want(O,answer(P)).

- 5) Convert the background knowledge in visual format
- 6) Save the story as "cw_task3b_star"
- 7) Log out

TASK No.: 4

Title: Load a story and initiate the comprehension process

Description:

Choose a demo story, load it and initiate the comprehension process.

Goals:

- 1) Understand where you can find stories created by others
- 2) Load a story
- 3) Initiate the story comprehension process

Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Log in to the Web-STAR IDE
- 3) Load the story titled “**Penguins**” from the demo stories
- 4) Initiate the story comprehension process (Start Reading)
- 5) Examine the comprehension model in the output area and find the answer the system gave to the multiple choice question posed in the story at session 2

What answer the system gave to the multiple choice question posed in the story at session 2:

- a) accepted choice: [penguin at 9], accepted choice: [bird at 9], rejected choice: [flying at 9]
 - b) rejected choice: [penguin at 9], accepted choice: [bird at 9], accepted choice: [flying at 9]
- 6) Log out

TASK No.: 5a

Title: Modify the background knowledge using the visual format editor

Description:

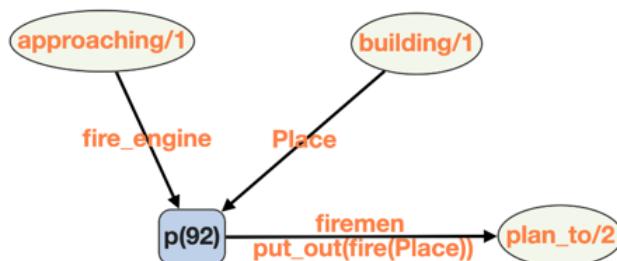
Load a story, add a new background knowledge rule, update an existing one and remove an existing rule. Initiate the story comprehension process.

Goals:

- 1) Understand how you can add a rule to the background knowledge
- 2) Understand how you can delete a rule from the background knowledge
- 3) Understand how you can edit a rule in the background knowledge

Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Log in to the Web-STAR IDE
- 3) Load the story titled “**The house**” from the public story repository
- 4) Add the rule using the Background Knowledge in Visual Format editor:



- 5) Delete the rule **p(8)** using the Background Knowledge in Visual Format editor
- 6) In rule **p(92)** change the argument name from **Place** to **Special_place** using the Background Knowledge in Visual Format editor
- 7) Convert the Background Knowledge in STAR syntax
- 8) Initiate the story comprehension process (Start Reading)
- 9) Examine the comprehension model and find the answer the system gave to the multiple choice question posed in the story at session 2

What answer the system gave to the multiple choice question posed in the story at session 2:

- a. rejected choice: [on_fire(the_house) at 1]
 - b. accepted choice: [on_fire(the_house) at 1]
- 10) Log out

TASK No.: 5b

Title: Modify the background knowledge using the source code editor

Description:

Load a story, add a new background knowledge rule, update an existing one and remove an existing rule. Initiate the story comprehension process.

Goals:

- 1) Understand how you can add a rule to the background knowledge
- 2) Understand how you can delete a rule from the background knowledge
- 3) Understand how you can edit a rule in the background knowledge

Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Log in to the Web-STAR IDE
- 3) Load the story titled “**The house**” from the public story repository
- 4) Add the rule using the background knowledge in STAR syntax source code editor:

p(11) :: approaching(fire_engine), building(Place) implies plan_to(firemen, put_out(fire(Place))).

- 5) Delete the rule **p(8)** using the background knowledge in STAR syntax source code editor
- 6) In rule **p(11)** change the argument name from **Place** to **Special_place** using the background knowledge in STAR syntax source code editor
- 7) Initiate the story comprehension process (Start Reading)
- 8) Examine the comprehension model and find the answer the system gave to the multiple choice question posed in the story at session 1

What answer the system gave to the multiple choice question posed in the story at session 1:

- a) accepted choice: [on_fire(the_house) at 1]
 - b) rejected choice: [on_fire(the_house) at 1]
- 9) Log out

TASK No.: 6

Title: Filter the output of the comprehension process

Description:

Load a story, initiate the story comprehension process and filter the output to present only the concepts that have changes while the story unfolds.

Goals:

- 1) Understand how to filter the comprehension model
- 2) Extract information from the comprehension model

Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Log in to the Web-STAR IDE
- 3) Load the story titled “**The Cat**” from the public story repository
- 4) Initiate the story comprehension process (Start Reading)
- 5) Examine the comprehension model
- 6) Apply a filter to the visual output of the story comprehension process to show only the concepts that have changes
- 7) Log out

TASK No.: 7

Title: Share a story

Description:

Load a story and share it in the public repository.

Goals:

- 1) Share a story with the community

Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Log in to the Web-STAR IDE
- 3) Load the “**Penguins**” demo story from the story browser window
- 4) Share the story with the community
- 5) Log out

TASK No.: 8

Title: Comment on a user's story

Description:

Users must find a story in the public story repository and add a comment on that story.

Goals:

- 1) Understand the ability to comment on a story and start a discussion

Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Log in to the Web-STAR IDE
- 3) Load the “**babl project (Demo 3)**” story from the public repository
- 4) Add a short comment on the story to start or continue the discussion
- 5) Log out

TASK No.: 9

Title: Initiate the collaboration tool

Description:

Initiate the collaboration functionality and send the link to another person. Use the feedback option to send the link to the developers of the IDE.

Goals:

- 1) Use the collaboration tool to work with another user

Steps:

- 1) Navigate your browser to <http://cognition.ouc.ac.cy/webstar>
- 2) Log in to the Web-STAR IDE
- 3) Load any story
- 4) Initiate the collaboration tool
- 5) Send the link through the feedback form of the system
- 6) Log out

Appendix B Web-STAR IDE Evaluation Questionnaire

Web-STAR evaluation Questionnaire

Introduction

Thank you participating in this research. The Web-STAR IDE is a web-based IDE that facilitates the use of the STAR system for automated story comprehension. It provides an interface to represent stories and the world knowledge required to comprehend them within the STAR system. Web-STAR also provides a Public Stories Repository for sharing publicly a user's STAR stories and opening a discussion about them.

In short, the IDE takes as input:

1. a story with questions in either Natural Language or in symbolic format (STAR syntax)
2. world knowledge in the form of rules in either graphical format or in symbolic format

and responds with the comprehension model, i.e., the way the story and its concepts are shaped through time, what holds and what does not at each timepoint and answers to the questions posed.

Acceptance statement

By proceeding with the following tasks, you agree that we will capture data (screen capture, recording of your actions, answers to questions) for research purposes only and more specifically for the evaluation of the Web-STAR IDE.

There are 41 questions in this survey

General (demographics)

Please type your experiment ID *

Please write your answer here:

Please select your gender *

Please choose **only one** of the following:

- Female
 Male

Please select your age group *

Choose one of the following answers

Please choose **only one** of the following:

- 18-24 years old
 25-34 years old
 35-44 years old
 45-54 years old
 55-64 years old
 65-74 years old

75 years or older

[]What is the highest degree or level of school you have completed? *

Choose one of the following answers

Please choose **only one** of the following:

- Less than a high school diploma
- High school degree or equivalent (e.g. GED)
- Some college, no degree
- Associate degree (e.g. AA, AS)
- Bachelor's degree (e.g. BA, BS)
- Master's degree (e.g. MA, MS, MEd)
- Professional degree (e.g. MD, DDS, DVM)
- Doctorate (e.g. PhD, EdD)
-

If you're currently enrolled in school, please indicate the highest degree you have *received*

[]What is your current employment status? *

Choose one of the following answers

Please choose **only one** of the following:

- Employed full time (40 or more hours per week)
- Employed part time (up to 39 hours per week)
- Unemployed and currently looking for work
- Unemployed and not currently looking for work
- Student
- Retired
- Homemaker
- Self-employed
- Unable to work
-

[]Your degree is relevant to: *

Check all that apply

Please choose **all** that apply:

- Computer Science
- Psychology
- Philosophy
- Storytelling or Narratology
- Linguistics

Law

Other:

General (development specific)

[]Have you ever used an Integrated Development Environment (IDE) before for software development or programming? *

Please choose **only one** of the following:

- Yes
 No

[]Please specify what applies for each of the following IDEs: *

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '7 [B01]' (Have you ever used an Integrated Development Environment (IDE) before for software development or programming?)

Please choose the appropriate response for each item:

	1: I have never heard about it	2: I have heard about it but I have never used it	3: I have heard about it	4: I have used it before	5: It is one of the IDEs I mostly use
Microsoft Visual Studio	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NetBeans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eclipse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cloud9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Codiad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ICEcoder	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Codeanywhere	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eclipse Che	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[]Please specify what applies for each of the following programming languages: *

Please choose the appropriate response for each item:

	1: I have never heard about it	2: I have heard about it but I have never used it	3: I have heard about it	4: I have used it before	5: It is one of the programming languages I use frequently
c	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c++	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
JAVA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
javascript	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PHP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Python	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prolog	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lisp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[]Are you familiar with the notion of automated story understanding by machines? *

Please choose **only one** of the following:

- Yes
- No

[]Have you ever used a story understanding system? *

Please choose **only one** of the following:

- Yes
- No

[]Have you ever used the STAR story understanding system? *

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '11 [B05]' (Have you ever used a story understanding system?)

Please choose **only one** of the following:

- Yes
- No

Task 3a

[] Please answer the degree at which you agree or disagree with the following statements: *

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Does not apply
It is easy to write the story in natural language.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The automatic conversion of the story from natural language to STAR syntax is easy .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to add the background knowledge of the story using the visual editor.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The automatic conversion of the background knowledge in visual format to STAR syntax is easy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to save the story.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The feedback messages from the system while performing the task are helpful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[] I have used the online help facility to perform this task. *

Please choose **only one** of the following:

- Yes
 No

[] Please answer the degree at which you agree or disagree with the following statements: *

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '16 [TSK03a2]' (I have used the online help facility to perform this task.)

Please choose the appropriate response for each item:

Task 3b

[] Please answer the degree at which you agree or disagree with the following statements: *

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Does not apply
It is easy to write the story in STAR syntax.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is more efficient to write the story in natural language and then convert it to STAR syntax than writing the story directly using the STAR syntax.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to add the background knowledge in the source code editor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to convert the background knowledge from STAR syntax to visual format.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easier to understand the background knowledge rules in visual format than in STAR syntax.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to save the story.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The feedback messages from the system while performing the task are helpful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[] I have used the online help facility to perform this task. *

Please choose **only one** of the following:

- Yes
- No

[] Please answer the degree at which you agree or

System Usability Scale

[] Please answer the degree at which you agree or disagree with the following statements: *

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I think that I would like to use the Web-STAR IDE frequently.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I found the Web-STAR IDE unnecessarily complex.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I thought the Web-STAR IDE was easy to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think that I would need the support of a technical person to be able to use the Web-STAR IDE.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I found the various functions in the Web-STAR IDE were well integrated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I thought there was too much inconsistency in the Web-STAR IDE.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would imagine that most people would learn to use the Web-STAR IDE very quickly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I found the Web-STAR IDE very awkward to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt very confident using the Web-STAR IDE.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I needed to learn a lot of things before I could get going with the Web-STAR IDE.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thank you for participating.

Submit your survey.

Thank you for completing this survey.