

# Transforming Web Contents into a Storybook with Dialogues and Animations

Kaoru Sumi

National Institute of Information and  
Communications Technology  
3-5 Hikaridai, Seika-cho, Soraku-gun  
Kyoto 619-0289, Japan  
+81-774-98-6880  
kaoru@nict.go.jp

Katsumi Tanaka

Kyoto University  
Graduate School of Informatics  
Yoshida Honmachi, Sakyo  
Kyoto 606-8501, Japan

## Abstract

This paper describes a medium, called Interactive e-Hon, for helping children to understand contents from the Web. It works by transforming electronic contents into an easily understandable “storybook world.” In this world, easy-to-understand contents are generated by creating 3D animations that include contents and metaphors, and by using a child-parent model with dialogue expression and a question-answering style comprehensible to children

## Categories and Subject Descriptors

J.5 [Art and humanities]: linguistics

**General Terms:** Design

**Keywords:** Information presentation, animation, dialogue, media conversion, agent.

## 1. INTRODUCTION

This paper describes a medium, called *Interactive e-Hon*, for helping children to understand difficult contents. It works by transforming electronic contents into an easily understandable “storybook world.” *Interactive e-Hon* uses animations to help children understand contents. Visual data attract a child’s interest, and the use of concrete examples like metaphors facilitates understanding, because each person learns according to his or her own unique mental model [1][2], formed according to one’s background. For example, if a user poses a question about something, a system that answers with a concrete example in accordance with the user’s specialization would be very helpful.

The barriers for children include difficult expressions, prerequisite background knowledge, and so on. Our goal is to remove these barriers and build bridges to facilitate children’s understanding and curiosity. The system would be understanding support for children, and explanation support for parents to content.

## 2. Interactive e-Hon

Interactive e-Hon transforms the natural language(NL) of electronic contents into a storybook world with animations and dialogue style explanation. Thus, in this storybook world, easy-to-understand contents are created by paraphrasing the original contents with a colloquial style, by creating animations that

include contents and metaphors, and by using a child-parent agents with dialogue expression and a question-answering style comprehensible to children.

Interactive e-Hon is a kind of word translation medium that provides expression through the use of 3D animation and dialogue explanation in order to help children to understand Web contents or other electronic resources. For a given content, an animation plays in synchronization with a dialogue explanation, which is spoken by a voice synthesizer.

Our system presents agents that mediate a user’s understanding through intelligent information presentation. In the proposed model, a parent agent (mother or father) and a child agent have a conversation while watching a “movie” about the contents, and the user (or users in the case of a child and parent together) watches the agents.

Natural language processing(NLP) in our system is based on text information containing semantic tags that follow the Global Document Annotation (GDA)<sup>1</sup> tagging standard, along with other, additional semantic tags. Tags with several semantic meanings for every morpheme, such as “length,” “weight,” “organization,” and so forth, are used. Recently, the Semantic Web and its associated activities have adopted tagged documentation. Tagging is also expected to be applied in the next generation of Web documentation.

For transforming contents into dialogues and animations, we first make a list that includes subjects, objects, predicates, and modifiers from the text information of content. It also means to shorten and divide long and complicated sentences. Then, by collecting these words and connecting them in a friendly, colloquial style, conversational sentences are made. In addition, the system prepares repetition by the conversational partner by changing phrases according to a thesaurus. It prepares explanations through abstraction and concretization based on ontologies and semantic tags, meaning that it adds explanations of background knowledge.

In the list, a subject is treated as a character, and a predicate is treated as the action in an animation. An Object is also treated as a character, and a predicate is treated as the passive action in an animation. One animation and one dialogue are generated by each list, and these are then played at the same time.

---

<sup>1</sup> <http://i-content.org/GDA>

Internet authors can annotate their electronic documents with a common, standard tag set, allowing machines to automatically recognize the semantic and pragmatic structures of the documents.

Many characters and actions have been recorded in our database. A character or an action is a one-to-many relationship. Various character names are linked to characters. Various action names are linked to actions. Actions can be shared among characters in order to prepare a commoditized skeleton of characters

If a user does not know the meaning of the term, “president,” it would be helpful to show a dialogue explanation that “a president is similar to a king in the sense of being the person who governs a nation,” together with an animation of a king.

The explanation is shown according to the results of searching world-view databases. The process of searching is used in explaining the dialogue.

The system’s world-view databases describe the common world, storybooks (which children have in common), insects, flowers, stars, etc. Which world should be used depends on a user’s curiosity, which is acquired from the user’s input in the main menu. The system compares the predicates of the common world-view and the user’s world- view including synonyms, and then, it shows the animation of the metaphor.

### 3. APPLICATION TO WEB CONTENTS

For example, we might try to transform the actual contents of “the origin of the *teddy bear*’s name” from the web into an animation and dialogue (Fig. 1).

The system first makes a list of subjects, objects, predicates, and modifiers from the content’s text information; it then divides sentences. For example, it makes some lines of the list from the long sentence as below:

(Original sentence)

“But, the president refused to shoot the little bear and helped it.”

(List)

- S: President, P: shoot, O: little bear
- S: President, P: refuse, O: to shoot the little bear
- S: President, P: help, O: little bear

The system then generates dialogue lines one by one, putting them in the order of a modifier of a subject, a subject, a modifier of an object, an object, a modifier of a predicate, and a predicate, according to the line units in the list. To the characteristics of



Fig. 1. A sample view from Interactive e-Hon.

storytelling, the system uses past tense and speaks differently depending on whether the parent agent is a mother or a father.

Sometimes the original content uses reverse conjunction, as with “but” or “however” in the following examples: “but... what do you think happens after that?”; “I can’t guess. Tell me the story.” In such cases, the parent and child agents speak by using questions and answers to spice up the dialogue. Also, at the ending of every scene, the system repeats the same meaning with different words by using synonyms.

In generating an animation, the system combines animations of a subject as a character, an object as a passive character, and a predicate as an action, according to the line units in the list.

For example, in the case of original sentence shown above, first,

- president (character) shoot (action)
- little bear (character; passive) is shot (action; passive)

are selected. After that,

- president (character) refuse (action)

is selected. Finally,

- president (character) help (action)
- little bear (character; passive) is helped (action; passive)

are selected. An animation plays in synchronization with a dialogue explanation.

### 4. CONCLUSION

We have introduced Interactive-e-Hon, a system for facilitating children’s understanding of electronic contents by transforming them into a “storybook world.” We have conducted media transformation of actual Web contents. Interactive e-Hon can generate satisfactory explanations of contents through both animations and dialogues that can be readily understood by children [3].

Reference terms and verbal omission of a subject, which are open problems in NLP, still remain as problems in our system. As a tentative solution, we manually embedded word references in the GDA tags. A fully automatic process knowing which words to reference will depend on further progress in NLP.

As future work, we will consider expanding the databases of animations and words, and applying Interactive e-Hon to several other kinds of contents.

### 5. REFERENCES

- [1] Philip N. Johnson-Laird: Mental Models, Cambridge: Cambridge University Press. Cambridge, Mass.: Harvard University Press (1983).
- [2] D. A. Norman, The Psychology of Everyday Things, Basic Books (1988)..
- [3] Kaoru Sumi and Katsumi Tanaka, Interactive e-Hon: Translating Web Contents into a Storybook World, AISB 2005 Symposium on Conversational Informatics, To appear, 2005.