

The Nature of Pattern Illustrating: The Theory and The Process of Pattern Illustrating

Kaori Harasawa *1
Natsumi Miyazaki *2
Rika Sakuraba *2
Takashi Iba *1

*1 Faculty of Policy Management, Keio University

*2 Faculty of Environment and Information Studies, Keio University

Abstract

This paper is a challenge to theorize the methods for drawing illustrations for a pattern language. In the paper we will trace the history of visual representations used in patterns, and show the necessity of a methodology. This paper is a succession of our paper presented in PLoP 2012 [1], and will show the issues that our previous pattern language holds. As our new effort for creating a method for pattern illustrations, we will introduce the Patten Illustrating Theory and the process which would help people better understand the theory.

1. Visuals Help Readers Understand and Remember the Pattern Better

Pattern Languages, though originally proposed by Christopher Alexander in the field of architecture, have recently shown expansion in the fields it covers. Today pattern languages are being written in fields including but not limited to software design, education, and organizational design. As these fields spread, more and more ways of expressing patterns have arisen. This is not just limited to the pattern format, but methods for visual representations of patterns such as photos and charts have also evolved.

These supplementary visuals take a large role in conveying the message of a pattern. Not only do they help readers understand the pattern better, but they also become iconic and make the pattern better rememberable. Though its importance is widely recognized, less discussion are made about

the visual aids themselves. Our challenge in this paper is to organize its history and importance, and then provide a new methodology for presenting an effective visual aid.

In this paper, we define *visual aids* as any form of visuals that supplement the meaning of a pattern including photos, sketches, diagrams, charts, etc. To lay the basics of our arguments, we will start by briefly reviewing the history and recent movements of visual aids for patterns.

1-1. History of Visual Aids

The history of visual aids starts with the start of the history of pattern languages.

In Christopher Alexander's original work with pattern languages we can see the very first forms of visual aids. In his 1977 book *A Pattern Language* [2], he uses two forms of visual aids to better explain the patterns in the book.

One is the photo. Most of the patterns in the book is supplemented with a photo at its beginning. Some show an example of a place with the pattern solution applied. For example pattern no.90 BEER HALL is accompanied by an actual photo of a beer hall (Figure 1). For more abstract patterns, he also uses photos to share the feeling of being lively which a pattern has. For example pattern no.1 INDEPENDENT REGIONS is represented by a photo of a bird flying in the sky in effort to show the liveliness a town would have with the pattern applied (Figure 2).

Alexander also utilizes diagrams in his patterns to explain its contents better. These include graphs, floor plans, or rough sketches of buildings. These help us understand the pattern in a more material way and would clarify the ambiguity that words would have. For example, in pattern no.52 NETWORK OF PATHS AND CARS, its heading photo is of a crosswalk with people and cars going by. Further on in the pattern, its contents are supplemented with sketched maps of an imaginary town which shows its roads connecting to each other and networking - information hard to share with just plain photos (Figure 3).



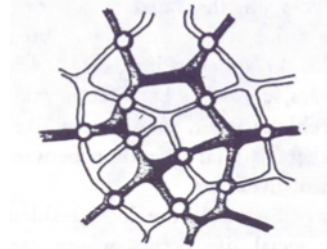
Figure 1. BEER HALL



Figure 2. INDEPENDENT REGIONS



Figure 3. NETWORK OF PATH AND CARS



When pattern languages were later introduced in the field of software design, source-codes and screen transition diagrams were used visual aids (Figure 4). This change comes from the shift in the traits in the object being designed. Before, the object of design was architecture, and therefore pictures were enough to serve the purpose. However, software design works with non-material, intangible things that are uncaptureable with photos. Instead, designers needed a more logical, abstract form of expressing the visuals of a pattern. The source codes and diagrams became the solution to meet these needs.

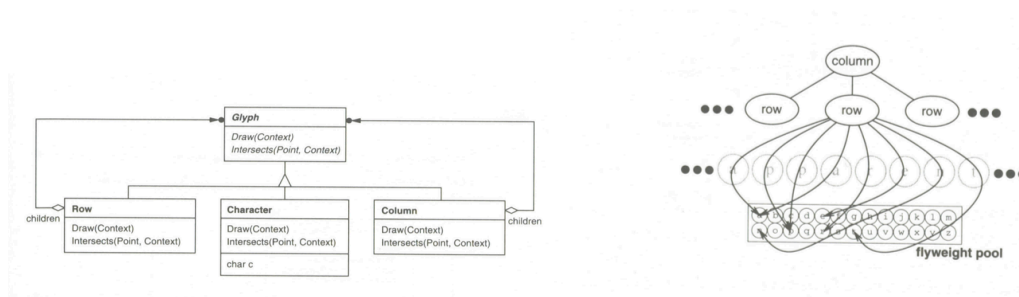


Figure 4. Screen Transition Diagrams in Design Patterns [3].

1-2. Recent Movements in Visual Aids

More recently, a second shift has come in the pattern community where patterns started to choose human actions as the object of design. Many patterns have been written for human-based behaviors including but not limited to education and organizational design. The following examples are good to represent what is the pattern language for human actions: Learning Patterns [4], Presentation Patterns [5], Collaboration Patterns [6], Change Making Patterns [7], Personal Culture Patterns [8], Global Life Patterns [9], Educational Patterns [10] and Survival Language [11]. In previous forms of pattern languages, there was a clear distinction between the designed and the designer. Architecture and Software codes could both be thought as an object separate from the humans who created it. However, with these new types of patterns, there exists a *self-referential structure* where the one who designs can also be the one being designed. [12]. In this paper, we would like to name these pattern languages altogether as *Pattern Languages for Human Actions*.

It is notable that most of the pattern languages for human actions have employed illustrations of (human and non-human) characters as visual aids to symbolize the patterns instead of photos or diagrams (Figure 5). Because of these artworks, the readers of a pattern are able to better understand

and remember the meaning of the pattern. Indeed, the cute illustrations used in the pattern languages list above have been well received both in the pattern community and by general readers.¹

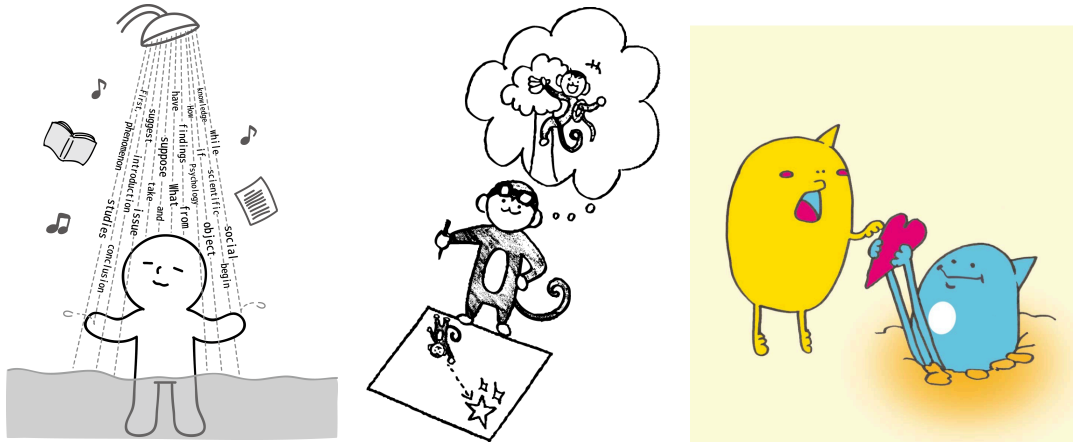


Figure 5. Illustrations as visual aids: in Learning Patterns, Change Making Patterns, and Personal Culture Patterns.

There are two important points when discussing these artworks: First, there should be character(s) who can express human movements, and express feelings through body language and facial expressions. Second, the illustration should be symbolic, appealing to the right brain. From now on we would like to define artworks which satisfy these two conditions as *Pattern Illustrations*.

With the increase in number of pattern language for human actions the number of *pattern illustrations* can be predicted to also increase. However, discussions about the pattern illustrations themselves are rare and not yet sufficient. We have no appropriate methods about drawing *pattern illustrations*. From these conditions we felt the need for an organized method to draw *pattern illustrations*.

¹ We've got the *Best Illustration Award* in 18th European Conference on Pattern Languages of Programs (EuroPLoP 2013), and also we designed the official T-shirt for 20th International Conference on Pattern Language of Programs (PLoP 2013).

1-3. Previous Discussions on Pattern Illustrations

In a previous work, we have already made a discussion on the drawing process of a pattern illustration [1]. In this 2012 paper, some patterns for pattern illustrating were introduced. The first few lines of the paper read:

In this paper, we propose a pattern language for pattern illustrating to represent patterns symbolically and share the feelings of being lively.

Our point in this previous paper was that, if you extract the main idea from the description of the solution or the consequence, you could draw an illustration which would make a pattern more attractive and understandable. However, in our later experiences with pattern illustrations, we found there to be two weak points in the above idea.

First, we found it ineffective to draw the illustrations directly based on the description of the solution or the consequence. Doing so would likely guide the readers to follow the solution as it is drawn, giving the idea of the existence of a single correct answer. This is the exact opposite of what a pattern should accomplish: a pattern should be versatile in its outcome and should not force readers down a single path. However, for patterns that show especially concrete solutions, similarly concrete artwork is better, because the reader of the pattern might understand the meaning of the pattern more clearly.

Second, in the paper, we stated the merits of having pattern illustrations. Quoting collectively: “more understandable”, “more attractive”, “more symbolic”, “can share the feelings of being lively”. We noticed these merits were given from the point of a pattern reader, and thus is only part of the deck. We would like to advocate that pattern illustrations must be beneficial for the pattern writer and also the pattern itself.

2. Necessity of Pattern Illustration

As we mentioned earlier, in this paper, we define *Pattern Illustrations* as artwork accompanying patterns which include moving and emotion-expressing characters, and make the pattern symbolic and memorable. In this chapter, we would explain the necessity of *pattern illustrations* from these two points.

1. The pattern illustration should include character(s) who can express human movements, and express feelings through body language and facial expressions.

As a main premise, the aim of *pattern languages for human actions* is to support people to take good *actions*. The readers must be able to imagine, based on the illustration, how they might act similarly. When reading about a pattern that you haven't experienced before, it is difficult to imagine how it would actually play out. But if there are illustrated human characters acting out the pattern, it is easier to create a scene in your mind about how you might apply the pattern. For the same reason, pattern illustrations including human characters are also useful to recognize a pattern that you already have but haven't named. The visualization might help you recognize your own experience in the pattern. Therefore, the character(s) in the illustration must be human (or something close) who can represent the designer (and the designed). Any character that can meet the conditions of a human - moving freely and exposing feelings - may be substituted.

This point of the pattern illustration is to support people in imagining how to apply the pattern and therefore contribute to the understandability of the pattern.

2. The Pattern illustrations should be *symbolic*, appealing to right brain than the left.

There might be a common belief that *pattern illustrations* are only a supplementary element, and the understanding of a pattern mainly relies on the written statements. But, as we all know, words have a linear characteristic, and are therefore understood in the left brain [13]. Because of this, if a pattern contains a lot of words or detailed description, very few will take time to thoroughly read the whole pattern. However, if a pattern contains minimal words or a rough description, readers can be easily misled [14]. On the other hand, visual aids including *pattern illustrations* have nonlinear and a whole characteristic, which makes it understandable by the right brain [13]. In this sense, pattern illustrations would explain the meaning of the pattern more inclusively and support the reader's understanding of the pattern by using the right brain.

Symbolic pattern illustrations can improve not only the understandability of the pattern but also its memorability by chunking the main message of the pattern into a single image.

3. Two Important Concepts for Understanding the Pattern Illustration

We have looked at the importance of *pattern illustrations* for *pattern languages for human actions*. Now we will describe how *pattern illustrations* can be drawn. In order to proceed with the discussion, we would like to introduce two important concepts: The idea of the *Living Structure* of a Pattern and a new idea which we will call *Center Words*.

3-1. The Living Structure of a Pattern

Alexander, in *The Nature of Order* [15], introduces a concept called the *Living Structure*.

The key idea in this book is that life is structural. It is a quality which comes about because of the existence of a discernible structure in the wholeness - and therefore explains what we perceive as the quality of buildings and artifacts. The structure is something I shall later define as "living structure."

Alexander also says that a pattern has the *quality without a name* in itself in his 1979 book *The Timeless Way of Building* [16]. With this taken in consideration, we can extend the idea of *living structure* to apply to the patterns themselves too. To convey accurately the message of a pattern, the *living structure of the pattern must be grasped and created first*.

3-2. Center Words

To create the *living structure* of a pattern, we must introduce a new concept called *Center Words*. This is a concept we have created based on Alexander's idea of *centers* introduced in the *Nature of Order* [15].

...there are visible within that thing, a huge number of entities, at different scales, formed very much in the ways I have described, and that the totality of these entities with the way they are nested constitute the wholeness of that thing

The *entities* mentioned here is what Alexander calls *centers*. Said simply, the centers become the components of the *living structure* of a thing. If we consider a pattern as having the living structure, then there must be components that act within the pattern as *centers*. These are what we will name *center words*.

Center Words are the words within the pattern which hold strong meanings that you think are critical to represent the essence of the pattern. Normally, multiple center words exist in the description of the pattern, and when drawing a *pattern illustration*, these words are extracted out to form the image of the living structure of the pattern in our heads.

3-3. Classification of Center Words

Based on our experience we have figured that these *Center Words* can be categorized into 13 groups. This categorization was done by the following process. First we looked through each of the 108 patterns in the pattern languages we have created in our lab, the *Learning Patterns* [4], *Presentation Patterns* [5], and the *Collaboration Patterns* [6], in search for words which we felt had important meanings (the *center words*). The nearly 500 *center words* that arose were then categorized through the *KJ Method* [17] in according to the roles they play when the words create an image within us.

As shown in Figure 6, there are two global categories: *Composition Words* and *Element Words*, each containing 6 or 7 subcategories of *center words*. *Composition Words* deal with how objects are placed in the illustration, and *Element Words* deal with the actual subjects that are drawn. Detailed descriptions will follow.

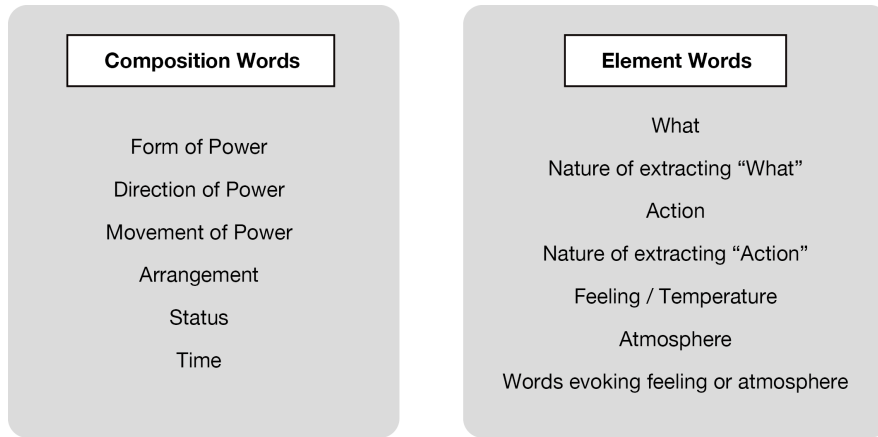


Figure 6. Categories of Center Words

Composition Words

Form of Power: Center words that express the *shape* of movements of power between subjects (Figure 7).

Direction of Power: Center words that express *direction* of power between subjects (Figure 8).

Movement of Power: Center words that express *movements* of power between subjects (Figure 9).

Arrangement: Center words that express the *arrangement* of objects or the direction of power (Figure 10).

Status: Center words that express the *status* of objects (Figure 11).

Time: Center Words that express flow of time (Figure 12).

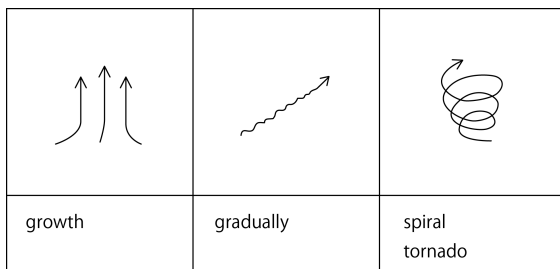


Figure 7 Form of Power

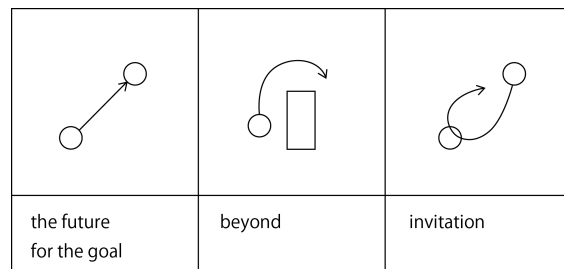


Figure 8. Direction of Power




		
reminders your own	extra	rally

Figure 9. Movement of Power




		
hidden	inside	obstacles

Figure 10. Arrangement




		
togetherness	chaotic	spread

Figure 11. Status

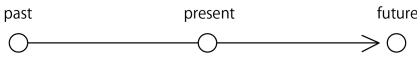

progress, halfway

Figure 12. Time

Element Words

What: An object within the illustration. This can be separated into two cases. One is the case where the *center word* is already concrete from the start and is illustrated directly. The other is the case where a *center word* expressing an intangible idea (ex. “words”, “task”) is drawn as an object. In most cases the *what* is a noun.

Properties that evoke a “What”: These *center words* refer to a property of an object, which can mine out an unwritten *what* (ex: “build” leads “a block”)

Action: Any actions by an object (especially an character). Sometimes these can be drawn alone, but in other cases an accompanying *what* must exist. In most cases the *action* is a verb.

Properties that evoke an “Action”: These *center words* refer to a property of a verb, which can mine out an unwritten *action*.

Feelings / Temperature: These words express feelings of the characters or the temperature that the pattern has.

Atmosphere: Words that express the atmosphere of the illustration. **BGM or mood.**

Properties that evoke feelings or atmosphere: These *center words* refer to a ideas that evoke a *Feeling / Temperature* or the *Atmosphere* of the pattern.

4. The Process of Pattern Illustrating

We have discussed the importance of *Pattern Illustrations*, and introduced the two concepts of *center words* and the *living structure of a pattern*. This chapter will describe the drawing process of a *Pattern Illustration*.

The process of pattern illustrating is largely divided into three steps: 1. Finding Center Words; 2. Creating the Living Structure of a Pattern through the Center Words; 3. Drawing the Pattern Illustration (Figure 13).

4-1. Overview of the Process

We will give a brief about the process of drawing a *pattern illustration*. The process is summarized in Figure 13. The steps described here may be abstract, but a detailed explanation of the process, along with a sample walkthrough will be presented in the next section.

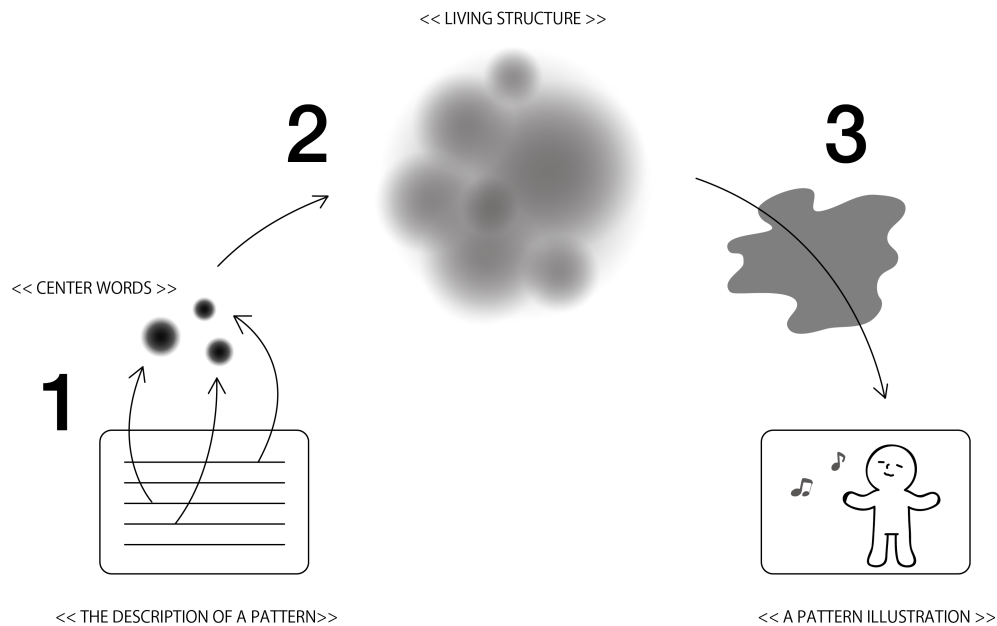


Figure 13. The Process of Pattern Illustrating

1. Finding Center Words

As we have mentioned in section 3-1, center words are words within the pattern which hold strong meanings that you think are critical to represent the essence of the pattern. To start, find and pick up the words or phrases that you think hold strong meaning. Looking at the center words will tease out the essence of the pattern.

2. Creating the Living Structure of a Pattern through Center Words

Based on the *center words* found in step 1, we will now try to approach the *living structure* of the pattern. As stated in section 3-3, there are two types - *composition words* and *elements words* - of *center words*. Each *center word* will give a hint on either the composition of the illustration, or what kinds of things should be drawn based on the composition. In this step, the *center words* are combined in the head (or on paper) to imagine the *living structure* of the pattern, which would become the seed for a *pattern illustration*. Note at this point of the process, only a vague, abstract image of the illustration will be achieved.

3. Drawing the Pattern Illustration

Once you have created the *living structure* of a pattern, then it must be shaped into the form of an illustration. After step 2, you will realize that the written description of the pattern will not directly provide all of the details to draw the illustration. In this step you must make abstract parts concrete, fill in the gaps, and add on details. With this step you are able to complete the pattern illustration which conveying the message of a pattern.

Through these steps, you can drawing the pattern illustration by finding center words and creating the *living structure* of a pattern.

4-2. Detail Explanation of the Process

Though we have explained a rough explanation of the process of drawing a *pattern illustration*, specifics and details of the process still remains unclear and relies heavily on practice. This section

is our challenge to better describe the process by providing a detailed example. We will show the drawing process of the *Language Shower* pattern from the *Learning Patterns* [4]. Though the following description may seem proceduralized and linear, the actual process will iterate between the description of the pattern and each drawing step in order to end up with an illustration that has the right shade of meaning. By doing this process, you could follow the sequence we mentioned on the top of this chapter. You could represent the message of a pattern by drawing pattern illustrations (Figure 14).

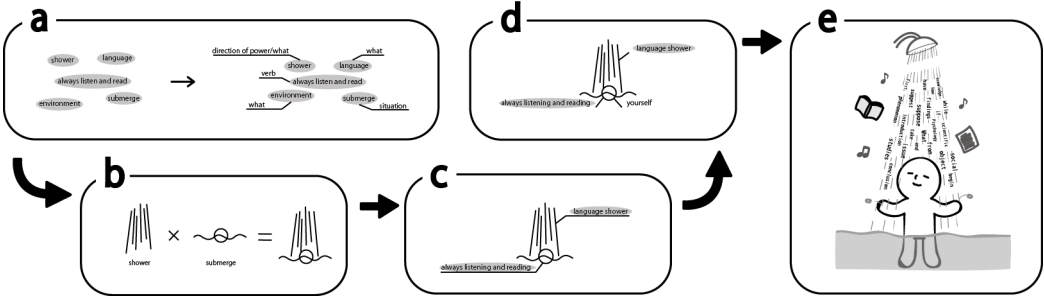


Figure 14. The whole process of drawing the pattern illustration of “Language Shower.”

First we will quote the pattern below.

Language Shower

Submerge yourself in the environment where you inevitably have exposure to the language you want to master.

Context

You want to have a good command of a foreign language.

Problem

To master languages is tough.

- *The sense of a language is much affected by the nature and culture where it is used.*
- *The stock of expressions enables you to convey what you want to say.*
- *It takes a long time to master a language.*

Solution

Set up your environment where you always listen and read in the target language.

If you want to master a foreign language, set up your environment, for example, using mobile media, and to continue listening to and reading it.

Then, make rules to use the language every day, for example, just listen to an online radio broadcast or audio book in the background. Making a physical record of your learning activities as Tangible Piles (No.12) is a good way to maintain your motivation.

a. Finding and Categorizing Center Words

First, we will pick up the words or phrases that we think has strong meanings. These are shown underlined in the quoted pattern below.

Language Shower

Submerge yourself in the environment where you inevitably have exposure to the language you want to master.

Context

You want to have a good command of a foreign language.

Problem

To master languages is tough.

- *The sense of a language is much affected by the nature and culture where it is used.*
- *The stock of expressions enables you to convey what you want to say.*
- *It takes a long time to master a language.*

Solution

Set up your environment where you always listen and read in the target language.

If you want to master a foreign language, set up your environment, for example, using mobile media, and to continue listening to and reading it.

Then, make rules to use the language every day, for example, just listen to an online radio broadcast or audio book in the background. Making a physical record of your learning activities as Tangible Piles (No.12) is a good way to maintain your motivation.

Secondly, we will categorize the found *center words* based on the categories shown in section 3-3. This is done by first judging whether they have the role of *composition words* or *element words*, and then putting them into the precise category (Figure 15).

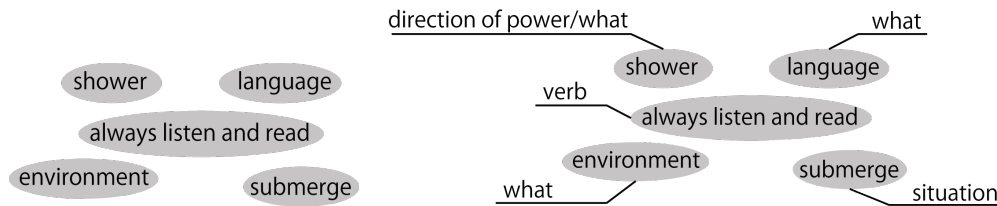


Figure 15. Finding and Categorizing Center Words

b. Structure Imaging

Draw a sketch diagram of the *composition words*. We should be drawing the images that comes to our mind when we hear the word. The most important thing here is to draw them freely, however it would be better to have it simple by only using simple shapes and lines. At this step, it is more important to be aware of what kind of structure the pattern is made up of, rather than drawing them in detail.

We must note that there may be several *composition words* within a single pattern. In this case, we must combine them into a composite diagram (Figure 16).

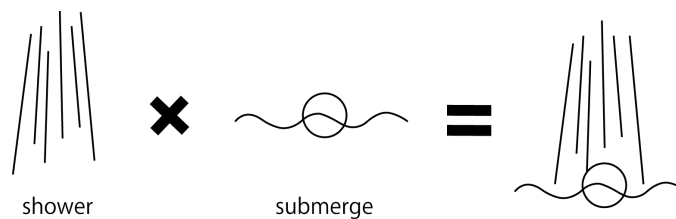


Figure 16. Structure Imaging

c. Fill in elements

Next, we will fill in the *elements words* into the diagram created in step b. Underline or mark the center words so it would be easier to refer at later step (Figure 17).

5. Conclusion and Future Work

In this paper we have explained what *Pattern Illustrations* are, and introduced an approach to draw such illustrations. To quickly review, a *Pattern Illustration* is an illustration which captures the contents of a pattern through a moving, emotion-expressing character to make the pattern better understandable and memorable. In effort to theorize the drawing process of *Pattern Illustrations*, we introduced the idea of *center words* and the *living structure of patterns*. Then the process of drawing a *Pattern Illustration* was explained in detail.

Although we dealt many matters, these were a coherent attempt pursuing what a good *Pattern illustration* is and a search for a implemental method for drawing them.

This paper introduced just our ideas of the drawing process of *Pattern Illustrations*. As future work we plan to make a pattern language for pattern illustrating which will show tips to help anyone who is attempting to draw *Pattern Illustrations*.

Acknowledgements

We would like to express our sincere gratitude to our shepherd, Jason Che-han Yip for his elaborated support to improve our paper. Without his support, this work would not have been possible. Our greatest thanks goes to Taichi Isaku for much support and discussion on pattern illustrations. We would like to thank Mika Terao, Takuya Honda, Yuji Harashima and Shota Seshimo for giving good suggestion about the concept of center words and the living structure of a pattern. And also our appreciation goes to Norihiko Kimura for supporting our research activities with his kind apprehension.

References

- [1] Harasawa, K., Arao, R., and Iba, T. 2012. "A Pattern Language for Pattern Illustrating", 19th International Conference on Pattern Languages of Programs (PLoP2012).
- [2] Alexander, C., Ishikawa, S., Silverstein, M. 1977. *A Pattern Language: Towns, Buildings, Construction*, Oxford University Press.

- [3] Gamma, E., Helm, R., Johnson, R., Vissides, J. 1994. *Design Patterns Elements of Reusable Object-Oriented Software*, Addison-Wesley Professional.
- [4] Iba, T., Miyake, T., Naruse, M., and Yotsumoto, N. 2009. "Learning Patterns: A Pattern Language for Active Learners". The 16th International Conference on Pattern Languages of Programs (PLoP 2009).
- [5] Iba, T., Matsumoto, A., and Harasawa, K. 2012. "Presentation Patterns - A Pattern Language for Creative Presentations," in 17th European Conference on Pattern Language of Programs (EuroPLoP2012)
- [6] Iba, T., and Isaku, T., 2013. "Collaboration Patterns - A Pattern Language for Creative Collaborations," in 18th European Conference on Pattern Language of Programs (EuroPLoP2013)
- [7] Shimomukai, E., Nakamura, S., and Iba, T. 2012. "Change Making Patterns: A Pattern Language for Fostering Social Entrepreneurship". 19th Conference on Pattern Languages of Programs (PLoP 2012).
- [8] Nakada, M., Kamada, A., and Iba, T. 2013. "Personal Culture Patterns A Pattern Language for Living with Continuous Self-fulfillments". 18th European Conference on Pattern Languages of Programs (EuroPLoP 2013).
- [9] Matsuzuka, K., Isaku, T., Nishina, S., and Iba, T. 2013. "Global Life Patterns: A methodology for designing a personal global life," in 4th International Conference on Collaborative Innovation Networks (COINs2013)
- [10] Shibuya, T., Seshimo, S., Harashima, Y., Kubota, T., and Iba, T. 2013. "Educational Patterns for Generative Participant - Designing for Creative Learning," in 20th International Conference on Pattern Language of Programs (PLoP2013)
- [11] Furukawazono, T., Seshimo, S., Muramatsu, D., and Iba, T. 2013. "Survival Language: A Pattern Language for Surviving Earthquakes," in 20th International Conference on Pattern Language of Programs (PLoP2013)
- [12] Iba, T. 2011. "Pattern language 3.0: Methodological advances in sharing design knowledge". The Third International Conference on Collaborative Innovation Networks (COINs 2011).
- [13] Pink, D. 2006. *A Whole New Mind: moving from the Information Age to the Conceptual Age*. Penguin Group.

[14] Meszaros, G. and Doble, J., (1997) “A Pattern Language for Pattern Writing,” in *The Pattern Languages of Programs Design 3*, R.C. Martin, D. Riehle, F. Buschmann (eds), Addison-Wesley Professional, pp.529 - 574

[15] Alexander, C. 2002. *The Nature of Order: An Essay on the Art of Building and the Nature of the Universe*, The Center for Environmental Structure.

[16] Alexander, C. 1979. *The Timeless Way of Building*, Oxford University Press.

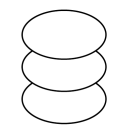
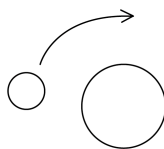
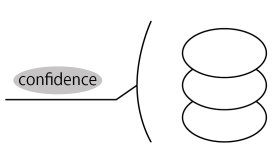
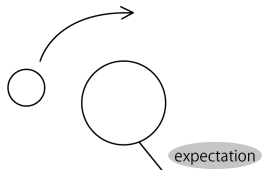
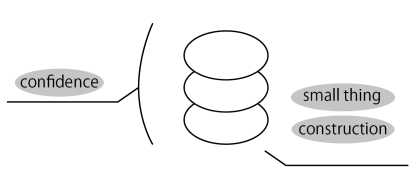
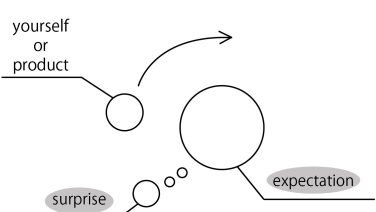
[17] Jiro,K. 1967. *Hassou Hou [The Abduction Method: For Creativity Development]*, in japanese, Chuo-Koron.

Appendix:

Examples of the Process of Pattern Illustrating

To explain the process of the pattern illustrating in chapter4, we would like to introduce more examples: *Construction of Confidence* [5] and *Beyond Experience* [6]. We would like to show the drawing process of these two pattern illustrations along following way (same as section.4-2):

- a. **Finding and Categorizing Center Words**
- b. **Structure Imaging**
- c. **Fill in elements**
- d. **Fill in sub-centers**
- e. **Metaphor Attachment**

	Construction of Confidence	Beyond Expectation
a	<p>construction confidence</p> <p>build up small thing</p> <p>stack</p> <p>↓</p> <p>what construction confidence what</p> <p>arrangement build up small thing nature of extracting "what"</p> <p>arrangement stack</p>	<p>beyond go further</p> <p>expectation surprise</p> <p>↓</p> <p>direction of power beyond go further arrangement</p> <p>what expectation surprise feeling</p>
b	 <p>build up / stack</p>	 <p>beyond / go further</p>
c	 <p>confidence</p>	 <p>expectation</p>
d	 <p>confidence</p> <p>small thing</p> <p>construction</p>	 <p>yourself or product</p> <p>surprise</p> <p>expectation</p>
e	