Understanding Functions of Pattern Language with Vygotsky's Psychology

Signs, the Zone of Proximal Development, and Predicate in Inner Speech

TAKASHI IBA, Faculty of Policy Management, Keio University
AYAKA YOSHIKAWA, Faculty of Environmental Information Studies, Keio University

---

This paper examines learning and dialogue with pattern languages, using psychological theories outlined by Lev Semenovich Vygotsky. Vygotsky, known as "the Mozart of Psychology," is a Soviet psychologist who examined developmental psychology from both experimental and theoretical perspectives. This paper focuses on the function of pattern languages using Vygotskian theories such as Vygotsky's Triangle (subject–sign–object), zone of proximal development, inner speech, and predication. Through this examination, the following ideas are proposed. Patterns in a pattern language support human action much like "signs" in Vygotsky's Triangle. The act of choosing and executing a desired pattern can be understood as development of learning that results from setting one's own zone of proximal development. In this context, the paper examines the effect of patterns in developing people's learning, using students' self-evaluation data as evidence. Furthermore, patterns are written with predication (particularly when written in pro-drop languages), making the patterns feel like the reader's inner speech, which encourages them to incorporate patterns into their learning. The paper focuses on examining theories of Vygotsky, but aims to provide understanding of the function and meaning of pattern languages.

Categories and Subject Descriptors: **[Social and professional topics]**: Professional topics—*Informal education*

General Terms: Human Factors

Additional Key Words and Phrases: pattern language, sign, development, learning, psychology

ACM Reference Format:

Iba, T. and Yoshikawa, A. 2016. Understanding Functions of Pattern Language with Vygotsky's Psychology: Signs, the Zone of Proximal Development, and Predicate in Inner Speech. Proceedings of the 2016 Conference on Pattern Languages of Programs (October 2016), 14 pages.

---

1. INTRODUCTION

During the first half of the twentieth century, the Soviet psychologist Lev Vygotsky, later called "the Mozart of Psychology," made his immense contribution to the field. Through research in developmental psychology, he made many significant contributions including his theory on cultural and biosocial development, known as cultural-historical psychology. His theory that signs and symbols mediate human reasoning is another contribution that remains influential.

In this paper, the function of pattern languages is examined through a Vygotskian perspective. The reader may wonder whether there is validity in examining a theory created more than eighty years ago, in a societal context very different from the present world. However, such doubt can be countered by the simple fact that Vygotsky's theoretical framework remains influential in the study of learning and development and that his works continue to be referenced by researchers in this field.

2. THE FUNCTION OF PATTERN LANGUAGES AS VYGOTSKIAN SIGNS

Vygotsky went beyond the stimulus-response paradigm and proposed that psychic tools (such as words) mediate function. Because psychic tools form as a result of loose societal connections, the workings of the mind are not closed to individuals, but instead are mediated socially. This indicates that education can affect individuals' learning and psychological development. Vygotsky's view of the mediatory relationship between the workings of the mind and societal intermediaries remains true in modern psychology. The description above is represented by "Vygotsky's Triangle" (Figure 1), which shows that we as "subjects" relate to "objects" through "signs," which mediate our actions (Vygotsky, 1987). We do not directly influence the world with our

---

Author's address: Takashi Iba, Endo 5322, Fujisawa, Kanagawa, Japan, 252-0882; email: iba@sfc.keio.ac.jp; Ayaka Yoshikawa, Endo 5322, Fujisawa, Kanagawa, Japan, 252-0882; email: t14595ay@sfc.keio.ac.jp.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission. A preliminary version of this paper was presented in a writers' workshop at the 23rd Conference on Pattern Languages of Programs (PLoP). PLoP '16, OCTOBER 24–26, Monticello, Illinois, USA. Copyright 2016 is held by the author(s). HILLSIDE 978-1-941652-04-6

own hands, but do so through artificial tools, or "signs."[1] These signs are not created by individuals, but rather are formed by society as a whole.

Using this framework, we can say that pattern languages function as "signs" (psychic tools) that mediate the relationship between subject and object (Figure 2).[2] First of all, pattern language functions as signs that through their use help people recognize the world. This is consistent with our understanding of pattern languages as "eyeglasses of recognition" (Figure 3). The pattern name, which expresses a pattern's overall message in a simple phrase, is necessary not only as a sign for communication, but for one's thinking. Moreover, another function of pattern language lies in enhancing a person's motivation to try an action suggested in the solution part of each pattern. Therefore, patterns can encourage a person's future action.

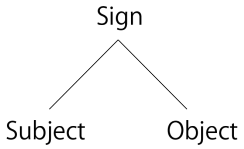


Fig. 1. Vygotsky's Triangle

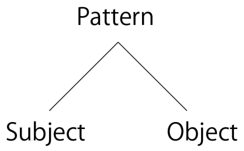


Fig. 2. Pattern Languages functioning as "signs" (psychic tools)

In *The History of the Development of Mental Functions*, Vygotsky (1997) uses the "Buridan's ass" paradox to describe the function of "signs." This paradox is named after the fourteenth-century French philosopher and scientist, Jean Buridan. Although Buridan did not come up with the paradox, it continues to be called by his name.

The anecdote is as follows. A hungry ass is placed equally between two very similar stacks of hay. In this situation, the ass is bound to die of hunger because the inducement placed on the ass is equally strong and pulling in opposite directions. In other words, the ass dies of hunger due to its inability to make a rational decision. Through this example, Vygotsky shows his criticism toward a mere stimulus-response way of thinking and also rejects *a priori*-based philosophical thinking.

What Vygotsky instead proposed is the idea that humans deal with such paradoxes by bringing in "signs" unrelated to the given situation. Flipping a coin to make a decision is an example. The flip of the coin functions as a "sign" or a mental trigger that helps the decision-making process. According to Vygotsky's way of thinking, the flip of the coin introduces a completely new framework from the Buridan example. By flipping the coin, the person is setting an action-stimulating factor and is using it to control his or her course of action. Therefore, people can obtain aid from artificial stimuli when making their decisions.

---

[1] There is another outstanding philosopher who studied the relation between language and thought: Charles Sanders Peirce, the father of pragmatism and semiotics. Only a few papers consider the relation between Vygotsky and Peirce (Edwards, 2007; Miller, 2011). Although, in our view, Peirce's philosophy is quite important for positioning pattern language in philosophy, this paper focuses only on Vygotsky's theory to avoid complications. See our other paper (Iba & Yoshikawa, 2016) discussing the relationship between pragmatism and pattern language.

[2] Noble and Biddle (2002) present considerations about design pattern as sign from Saussure's viewpoint.

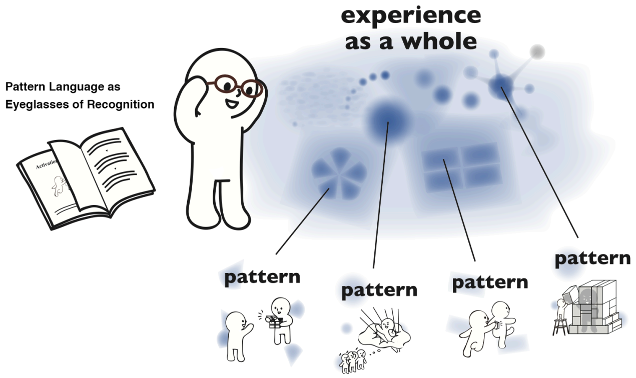


Fig. 3. Pattern Language as Eyeglasses of Recognition

Vygotsky also refers to William James's analysis of voluntary acts, using the example of a person waking up in the morning: When a person awakes from sleep, s/he experiences conflicting emotions of knowing s/he must wake up while also wanting to sleep longer. In other words, a conflict of motives appears simultaneously in the mind. In such a situation, a person may decide to count "one, two, three" and wake up at the count of three. If so, the person is setting a stimulus (the counting), and acts in response to it, thereby successfully controlling his/her own actions.

According to Vygotsky, creation and use of stimuli to encourage one's own action is a way to distinguish higher-level from basic actions. He observed that use of both artificial stimuli and stimuli given in a particular situation is a distinct characteristic of human psychology. Such artificial stimuli are what Vygotsky called "signs." Signs are automatic stimuli that humans bring into their minds and use as auxiliary motives. According to his definition, signs are various stimuli that a person induces with the intent to control the course of action for him/herself or others.

Signs function similarly to "tools," but are not the same. Vygotsky distinguishes them in the following statements: "the tool's function is to serve as the conductor of human influence on the object of activity.… it must lead to changes in the object. The sign, on the other hand, changes nothing in the object of a psychological operation. It is a means of internal activity aimed at mastering oneself" (1978, p. 55). Simply put, the tool is externally oriented, whereas the sign is internally oriented. According to Vygotsky, the most exemplary form of a "sign" is words. Words mediate humans' higher mental functions and enable people to control their mentality and act upon it. Pattern languages also function as mediators of words and are "signs" that encourage people to act based on mental inputs.

3. THE ZONE OF PROXIMAL DEVELOPMENT

Perhaps the most well-known Vygotskian theory is the "zone of proximal development" (ZPD; Vygotsky, 2012), which he defines as "*the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers*" (1978, p. 86). This theory is closely related to his argument that a child's development should not be measured only in terms of the knowledge s/he currently has, but also in terms of her/his potential level of development. In this context, we propose that pattern languages can support people's growth in their zones of proximal development. Later, we examine the zone of proximal development theory and its relation to pattern languages in some detail.

As a developmental psychologist, Vygotsky argued that more attention should be given to what learners can almost do; that is, what learners cannot do on their own, but can with guidance or help from their peers (Figure 4). He uses an example of apples in an orchard to explain that the state of development is determined not only by parts that have already developed, but also by parts in the process of developing. A farmer who owns an apple orchard and wants to see how his orchard is doing would not just count fully ripe apples, but also ripening apples. In the same way, one must consider not only fully developed functions but also functions in the developing process, or the learner's zone of proximal development.

The zone of proximal development is important because it allows us to redefine properly the concept of development. Vygotsky stated that ancient psychology and common knowledge tend strongly to see "imitation" as something that can be done simply and functionally; something that anyone can do.

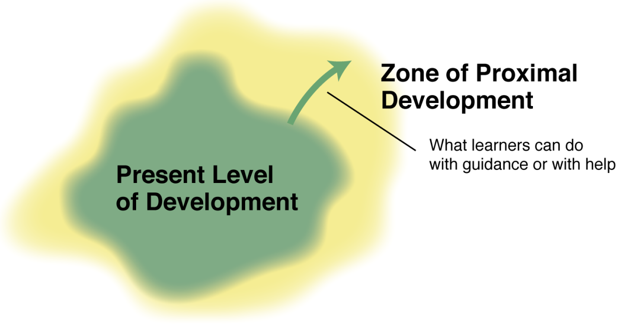

Zone of Proximal Development
What learners can do with guidance or with help
Present Level of Development

Fig. 4. Zone of Proximal Development

However, children can imitate actions only within the range of their present abilities. Therefore, to imitate an action, there must be some sort of transition from what the learner cannot do to what s/he can do. Thus, children can always do more if they have guidance. However, this does not mean that they will be able to do everything; it must be within the child's range of potential ability. Therefore, Vygotsky (2012) concluded that the possibility of learning is dependent on the child's zone of proximal development and insisted that teaching is only effective when the teacher can anticipate the child's potential development.

Vygotsky's theory of the zone of proximal development has been applied to pedagogy in schools. The theory's ideas have been used in designing education focused on the students' zone of proximal development and guiding that development. The theory has also influenced the discussion of what teachers' roles are in an educational setting.

With this background, this paper examines the function of pattern language as a way to support growth in one's zone of proximal development. Pattern language aims to enable learners to choose and practice patterns on their own, without having to get help from others (teachers). Consequently, pattern languages have the potential to expand one's zone of proximal development internally.

According to Vygotsky (2012), the zone of proximal development differs from person to person. Children the same age will be at different development stages due to their zones of proximal development being unique and differing from those of their peers. Therefore, it is reasonable that when a pattern language is shared with a group of people, each person has a different combination of patterns that s/he has/has not experienced or would like to experience in the future. Furthermore, it is crucial for a person to choose desired patterns based on present situations to maintain a continuous cycle of learning.[3]

Here, we show some cases, the better to understand and visualize the zone of development through examples of applying *Learning Patterns* into students' daily learning. Learning Patterns consist of 40 patterns to enhance creative learning by providing an opportunity for learners to reflect on their learning styles, to discover or rediscover good habits, and to obtain new insights into how they can become better learners (Iba *et al*., 2009; Iba & Miyake, 2010; Iba & Sakamoto, 2011; Iba & Iba Lab, 2014a). We have organized dialogue workshops in which participants used Learning Patterns to reflect on their experiences, talk about them with others, and make plans for future actions based on them (Iba, 2015).

In this workshop, participants are first asked to look at Learning Patterns and recall their past experiences with them. Secondly, they are asked to choose five new patterns that they wish to master in the near future. Then, participants are free to mingle and talk with other participants, who each have their own combination of patterns they have/have not experienced and patterns they would like to experience in the future. When they find another participant who has already experienced a pattern they want to master, they listen to the other participant's story to get an idea of how they too can experience it (Figure 5).

---

[3] Another type of dialogue to apply patterns into daily life is "Pattern Concierge." See Mori *et al.* (2016).

Fig. 5. Dialogue Workshop with Learning Patterns at Keio University, 2016

For the analysis, here we propose a way of visualizing the entire experience with a radar-chart, which we call a "Pattern-Experience Chart." As shown in Figure 6, Learning Patterns consists of many groups of three patterns that are similar in direction. A pattern-experience chart is drawn based on groups of patterns (Figure 7).

Figure 8 is a pattern-experience chart presenting Learning Pattern experiences of a university freshman. This chart was created based on the student's self-evaluation of her/his experience of the Learning Patterns. The green area shows the patterns s/he has experienced, and the yellow area shows which patterns s/he wants to gain. The yellow area therefore represents the potential zone of development chosen by the learner. Figure 9 shows other students' with diverse experience shapes and various ranges of each student's potential zone of development. By using pattern language, students individually set their zones of proximal development.

After students practice Learning Patterns over time, how will these charts change? Figure 10 shows the evolved chart of the same student as in Figure 8. The dark green area shows the range of experience when the student was a freshman, and the lighter area shows the expanded zone of experience after 1.5 years.

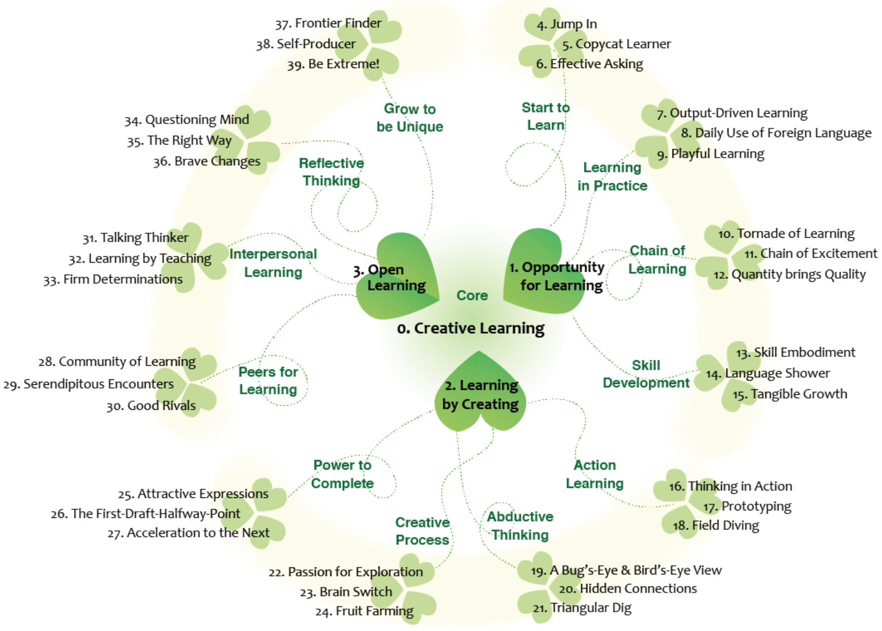

37. Frontier Finder
38. Self-Producer
39. Be Extreme!
4. Jump In
5. Copycat Learner
6. Effective Asking
Grow to be Unique
Start to Learn
34. Questioning Mind
35. The Right Way
36. Brave Changes
7. Output-Driven Learning
8. Daily Use of Foreign Language
9. Playful Learning
Reflective Thinking
Learning in Practice
31. Talking Thinker
32. Learning by Teaching
33. Firm Determinations
Interpersonal Learning
3. Open Learning
1. Opportunity for Learning
Chain of Learning
10. Tornade of Learning
11. Chain of Excitement
12. Quantity brings Quality
Core
0. Creative Learning
28. Community of Learning
29. Serendipitous Encounters
30. Good Rivals
Peers for Learning
2. Learning by Creating
Skill Development
13. Skill Embodiment
14. Language Shower
15. Tangible Growth
Power to Complete
Action Learning
25. Attractive Expressions
26. The First-Draft-Halfway-Point
27. Acceleration to the Next
16. Thinking in Action
17. Prototyping
18. Field Diving
Creative Process
Abductive Thinking
22. Passion for Exploration
23. Brain Switch
24. Fruit Farming
19. A Bug's-Eye & Bird's-Eye View
20. Hidden Connections
21. Triangular Dig

Fig. 6. Overview of Learning Patterns, showing groups of patterns

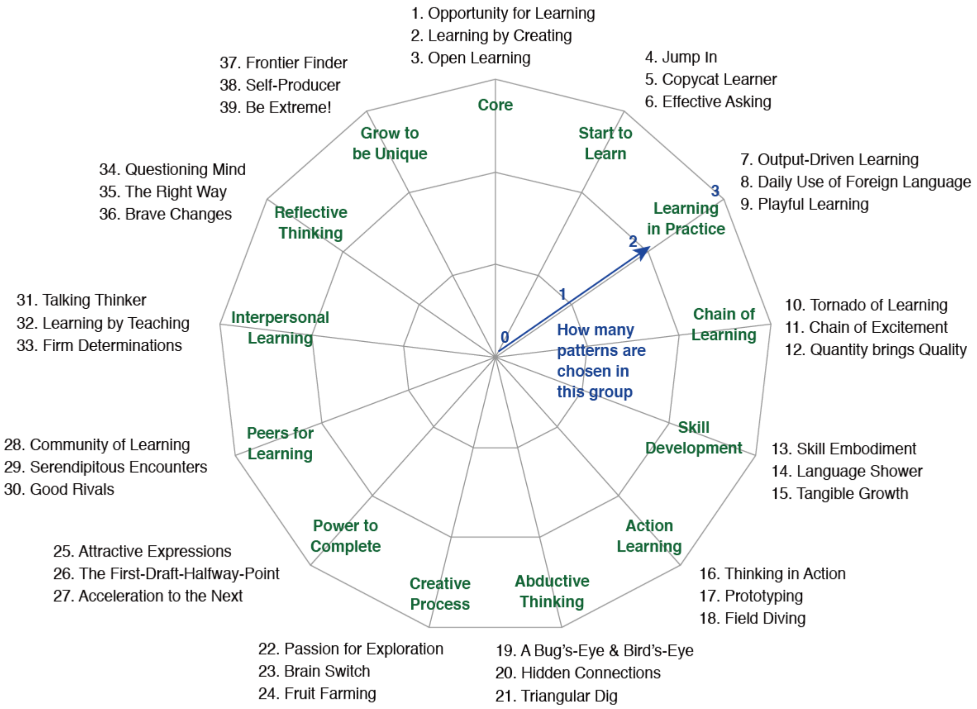

1. Opportunity for Learning
2. Learning by Creating
3. Open Learning
4. Jump In
5. Copycat Learner
6. Effective Asking
7. Output-Driven Learning
8. Daily Use of Foreign Language
9. Playful Learning
10. Tornado of Learning
11. Chain of Excitement
12. Quantity brings Quality
13. Skill Embodiment
14. Language Shower
15. Tangible Growth
16. Thinking in Action
17. Prototyping
18. Field Diving
19. A Bug's-Eye & Bird's-Eye
20. Hidden Connections
21. Triangular Dig
22. Passion for Exploration
23. Brain Switch
24. Fruit Farming
25. Attractive Expressions
26. The First-Draft-Halfway-Point
27. Acceleration to the Next
28. Community of Learning
29. Serendipitous Encounters
30. Good Rivals
31. Talking Thinker
32. Learning by Teaching
33. Firm Determinations
34. Questioning Mind
35. The Right Way
36. Brave Changes
37. Frontier Finder
38. Self-Producer
39. Be Extreme!
Core
Start to Learn
Learning in Practice
Chain of Learning
Skill Development
Action Learning
Abductive Thinking
Creative Process
Power to Complete
Peers for Learning
Interpersonal Learning
Reflective Thinking
Grow to be Unique
0
1
2
3
How many patterns are chosen in this group

Fig. 7. Composition of Pattern-Experience Chart for Learning Patterns

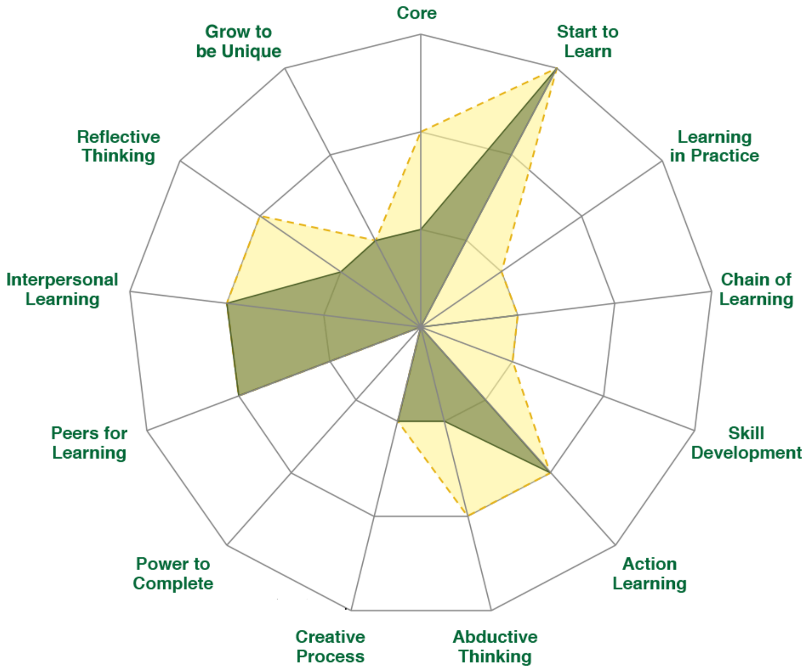


Fig. 8. Example of a Pattern-Experience Chart (College Freshman, Learning Patterns),
where green areas shows patterns already experienced and yellow areas show patterns the student wants to experience

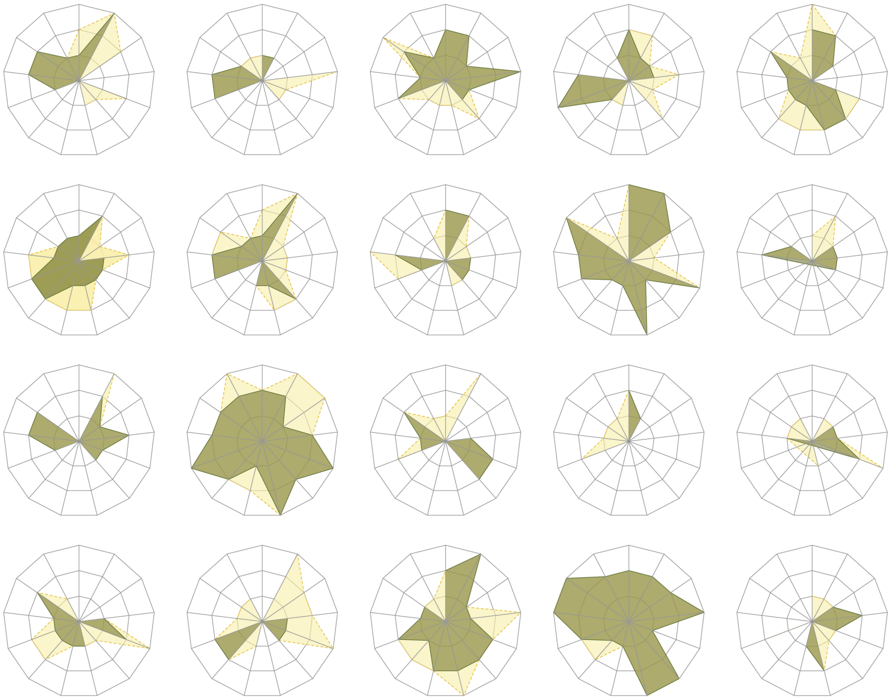


Fig. 9. Other Examples of Pattern-Experience Charts (College Freshmen, Learning Patterns)

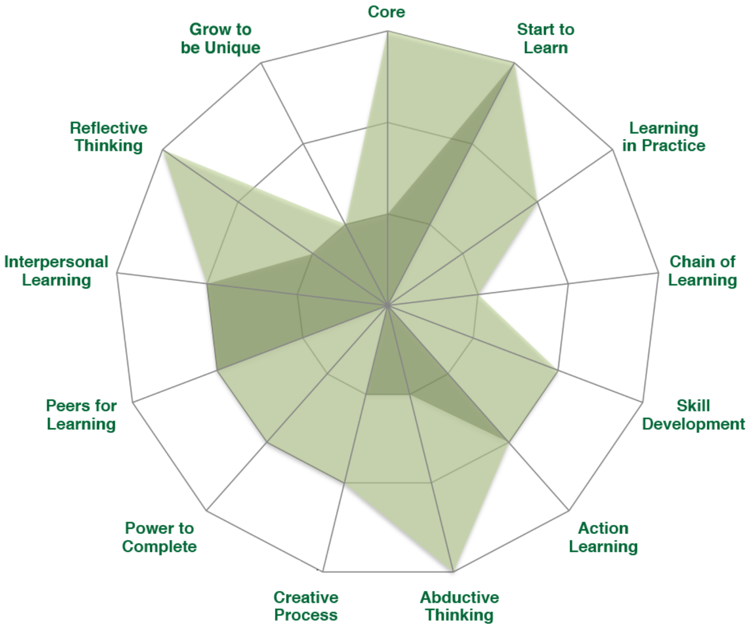


Fig. 10. Example of a Pattern-Experience Chart (College Freshman and 1.5 years later, Learning Patterns), where darker areas show the student's initial range of experience and lighter areas shows the same student's range of experience 1.5 years later

Figure 11 shows pattern-experience charts of students in the Iba laboratory, arranged by number of years since the first experience check when they were freshmen. Although each is unique, the trend is that the green zone (experienced) expands year by year. Figure 12 shows the expansion of two different students’ experiences from when they were freshman, three years later, and then five years later.[4]

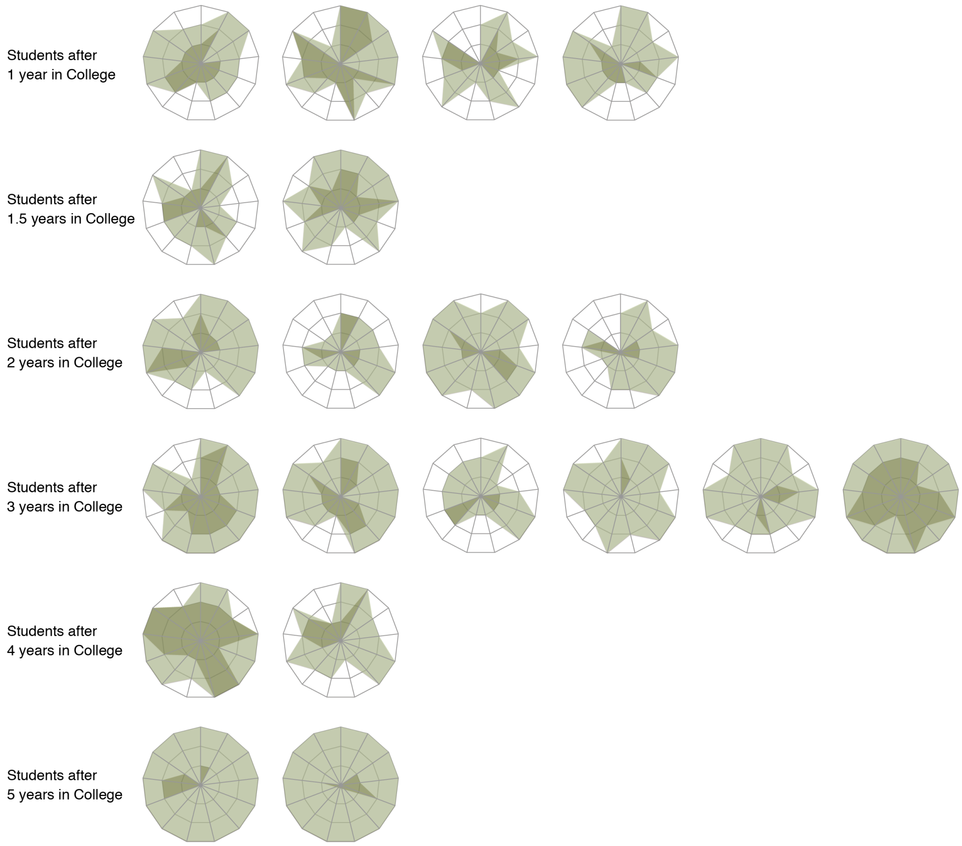


Fig. 11. Growth of Pattern-Experience Charts (Learning Patterns)

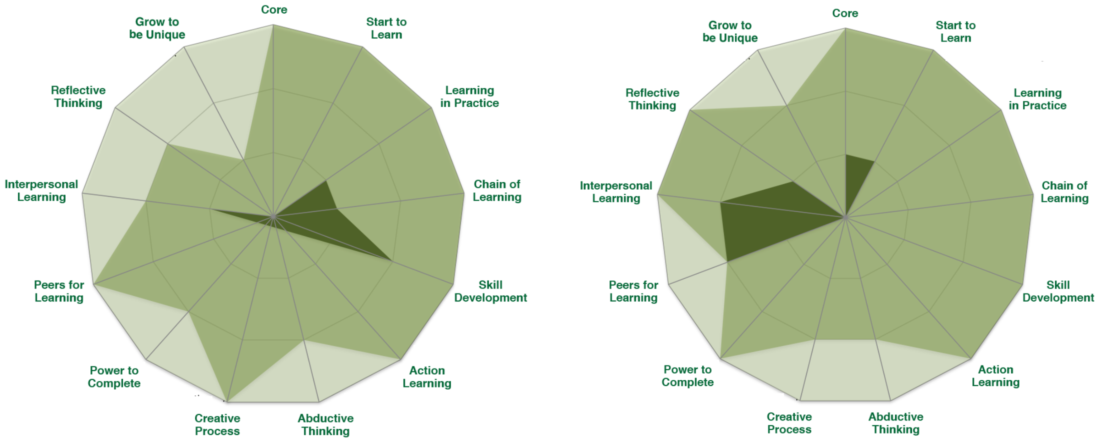


Fig. 12. Growth of Pattern-Experience Chart (Freshman, 3 years later, and 5 years later; Learning Patterns)

---

[4] It is possible to make a comprehensive chart that shows learning and evolution within a group of people (or even society). We currently do not have enough data to gain good insight on their evolution, but we believe that this is possible and something to work on in the future.

Examples so far show growth of learning experiences regarding Learning Patterns, but we can grasp the shape of experiences using other pattern languages as well. Figure 13 shows a pattern-experience chart with *Collaboration Patterns* (Iba & Isaku, 2013; Iba & Iba Lab, 2014b). At the beginning of each semester, each student in the Iba Lab creates a plan for learning and collaboration in projects, using Learning Patterns and Collaboration Patterns. The yellow area represents the zone of patterns that s/he would like to experience in the upcoming semester, and the orange area represents already experienced zones. Figure 14 shows examples of students in the Iba Lab. Through this process, students are designing their own learning in their zone of proximal development, something made possible because they can refer to these patterns.

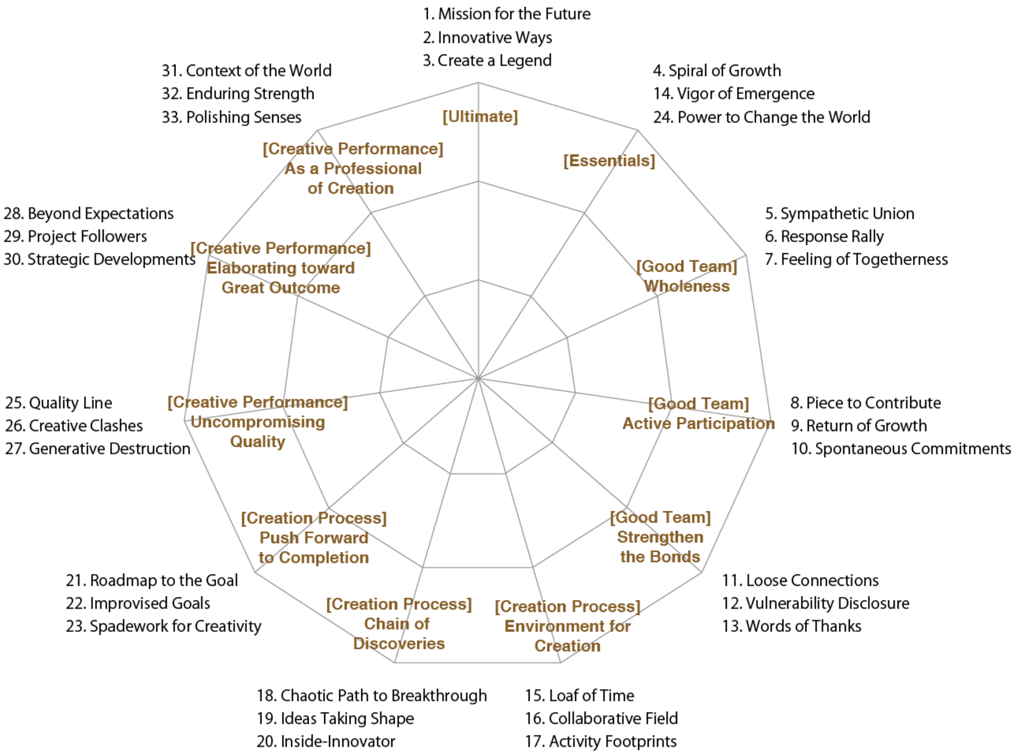

1. Mission for the Future
2. Innovative Ways
3. Create a Legend
[Ultimate]
4. Spiral of Growth
14. Vigor of Emergence
24. Power to Change the World
[Essentials]
5. Sympathetic Union
6. Response Rally
7. Feeling of Togetherness
[Good Team] Wholeness
8. Piece to Contribute
9. Return of Growth
10. Spontaneous Commitments
[Good Team] Active Participation
11. Loose Connections
12. Vulnerability Disclosure
13. Words of Thanks
[Good Team] Strengthen the Bonds
15. Loaf of Time
16. Collaborative Field
17. Activity Footprints
[Creation Process] Environment for Creation
18. Chaotic Path to Breakthrough
19. Ideas Taking Shape
20. Inside-Innovator
[Creation Process] Chain of Discoveries
21. Roadmap to the Goal
22. Improvised Goals
23. Spadework for Creativity
[Creation Process] Push Forward to Completion
25. Quality Line
26. Creative Clashes
27. Generative Destruction
[Creative Performance] Uncompromising Quality
28. Beyond Expectations
29. Project Followers
30. Strategic Developments
[Creative Performance] Elaborating toward Great Outcome
31. Context of the World
32. Enduring Strength
33. Polishing Senses
[Creative Performance] As a Professional of Creation

Fig. 13. Composition of Pattern-Experience Chart for Collaboration Patterns

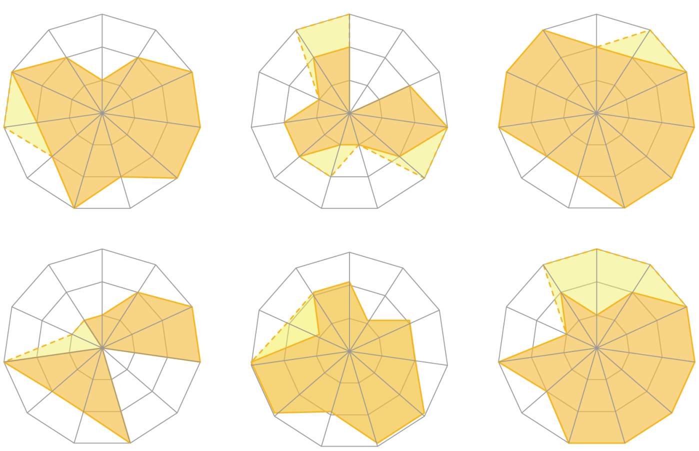


Fig. 14. Examples of Pattern-Experience Chart
(Patterns Already Experienced and Patterns Planning to Experience in Upcoming Semester; Collaboration Patterns)

4. PATTERNS WRITTEN IN THE FORM OF INNER SPEECH AND THE PREDICATE

In *Thought and Language*, Vygotsky (2012) examines the relationship between thought and language, and discusses “inner speech.” Inner speech is formulated within the mind, but not actually expressed. Inner speech may include thoughts like, “(I) should go eat lunch after work is over” or “What should (I) do tomorrow?”

Vygotsky states that inner speech is completely in a predicate form. In other words, human thoughts exclude pronouns (subjects) and are instead centered on the predicate. Therefore, inner speech is not going to be something like “After I finish my work, I am going to get myself some lunch.” The sentence’s subject is naturally omitted in a person’s mind, because there is no need to specify the subject when “talking to oneself” through inner speech.

This characteristic is important when considering pattern languages, because when persons read a pattern and think about the action they will take in the near future, the pattern will be replayed in their minds as inner speech. Thus, when thinking about how to put a pattern into action, the reader forms an inner speech in which the pronoun is omitted.

On the other hand, sentences that are written out have syntax because written language does not have an interlocutor, and thus sentences must provide details about who or what the subject is. In written language, interlocutors are in various situations, so there is not a common subject that can be used for every situation. This is why written language must be more specific and is more structurally complicated than spoken language.

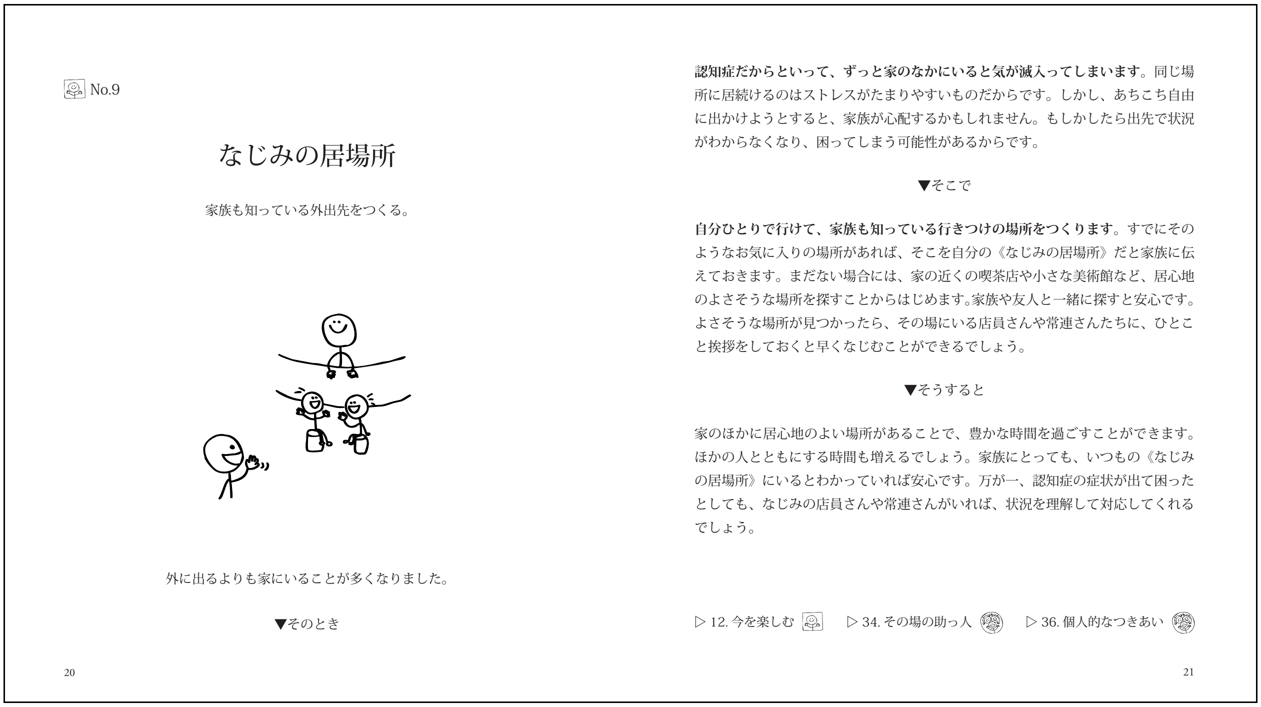
Interestingly, sentences in some languages, such as Japanese, can exist at all times without specification of pronouns, even when written. This is because Japanese is a pro-drop language that allows sentences to lack an explicit pronoun, without even changing the verb form.[5] Therefore, when writing patterns in Japanese, we can completely omit the pronoun, just as we do when we form inner speech. The original Japanese version of the patterns we have been writing are all written without specifying a pronoun.

Figure 15 shows the Japanese version of a pattern called “Favorite Place” (No. 13) from *Words for a Journey* patterns (Iba *et al*., 2015a, 2015b, 2015c, 2016). This pattern consists of 15 sentences in Japanese: one sentence of Introduction, one of Context, four of Problem, five of Solution, four of Consequence. All these sentences were intentionally written without indicating the pronoun, or the subject, to the reader. That is, the word, “you” is never mentioned in the pattern. On the contrary, the English version (Figure 16) has 13 sentences in the pattern, but the word “you” appears as the subject six times, and three of the sentences are imperative. Although the pro-drop characteristic is inevitably lost when patterns are translated into English, Japanese versions are completely pronoun-less in all sections (introduction, context, problem, solution, and consequence) (Figure 17).

By avoiding the subject pronoun “you,” pattern descriptions can be written in inner-speech style. Using “you” in a pattern description implies that someone within the sentence is giving advice to the reader. On the contrary, in the Japanese description without “you,” the reader does not have to suppose that someone is giving advice. We do this with the intent to make patterns read like the inner speech of readers themselves, instead of advice from the pattern writer. So, when writing patterns in Japanese, the solution is written without a pronoun, making it easier for readers to feel as if the words came from their inner speech.

---

[5] Note that the Japanese language drops pronouns even though verbs do not change forms based on pronouns, as is also true of the Korean language. Spanish and Italian are also pro-drop languages, but the omitted pronoun is assumed by the reader recognizing changes in verb form. Russian is also similar to this type of language.



No.9

なじみの居場所

家族も知っている外出先をつくる。

外に出るよりも家にいることが多くなりました。

▼そのとき

20

認知症だからといって、ずっと家のなかにいると気が滅入ってしまいます。同じ場所に居続けるのはストレスがたまりやすいものだからです。しかし、あちこち自由に出かけようとすると、家族が心配するかもしれません。もしかしたら出先で状況がわからなくなり、困ってしまう可能性があるからです。

▼そこで

自分ひとりで行けて、家族も知っている行きつけの場所をつくります。すでにそのようなお気に入りの場所があれば、そこを自分の《なじみの居場所》だと家族に伝えておきます。まだない場合には、家の近くの喫茶店や小さな美術館など、居心地のよさそうな場所を探すことからはじめます。家族や友人と一緒に探すと安心です。よさそうな場所が見つかったら、その場にいる店員さんや常連さんたちに、ひとこと挨拶をしておくと早くなじむことができるでしょう。

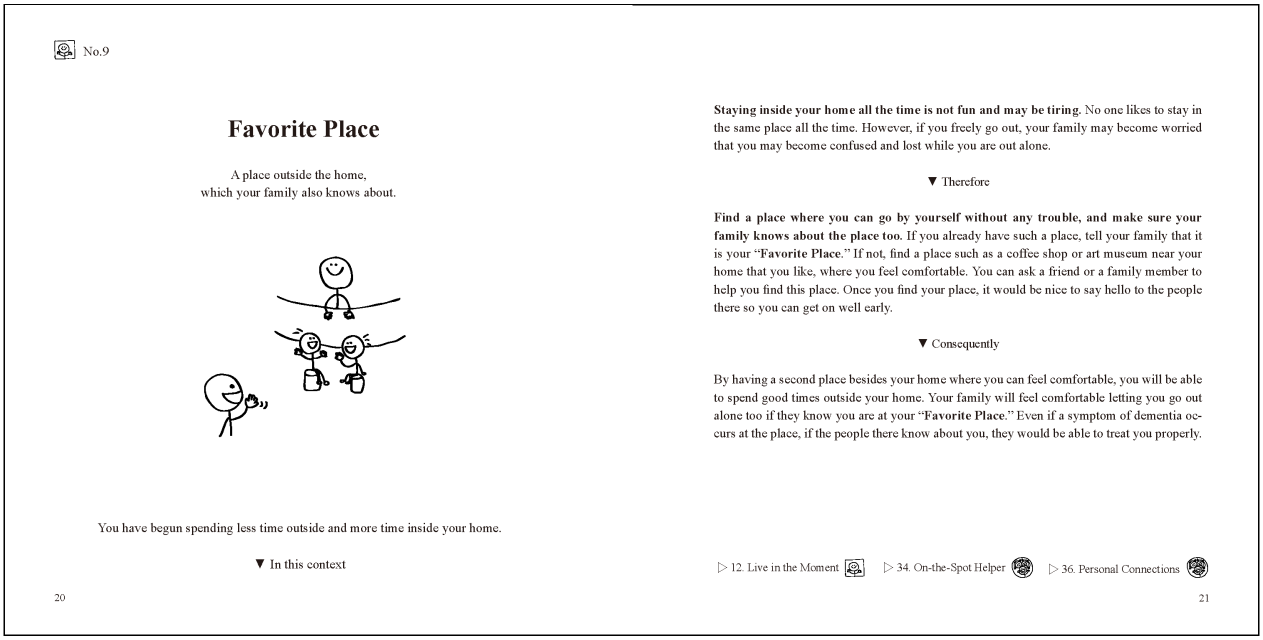
▼そうすると

家のほかに居心地のよい場所があることで、豊かな時間を過ごすことができます。ほかの人とともにする時間も増えるでしょう。家族にとっても、いつもの《なじみの居場所》にいるとわかっていれば安心です。万が一、認知症の症状が出て困ったとしても、なじみの店員さんや常連さんがいれば、状況を理解して対応してくれるでしょう。

▷ 12. 今を楽しむ　▷ 34. その場の助っ人　▷ 36. 個人的なつきあい

21

Fig. 15. Pattern “Favorite Place” written in Japanese (Iba *et al*., 2015a).



No.9

Favorite Place

A place outside the home,
which your family also knows about.

You have begun spending less time outside and more time inside your home.

▼ In this context

20

Staying inside your home all the time is not fun and may be tiring. No one likes to stay in the same place all the time. However, if you freely go out, your family may become worried that you may become confused and lost while you are out alone.

▼ Therefore

Find a place where you can go by yourself without any trouble, and make sure your family knows about the place too. If you already have such a place, tell your family that it is your “**Favorite Place**.” If not, find a place such as a coffee shop or art museum near your home that you like, where you feel comfortable. You can ask a friend or a family member to help you find this place. Once you find your place, it would be nice to say hello to the people there so you can get on well early.

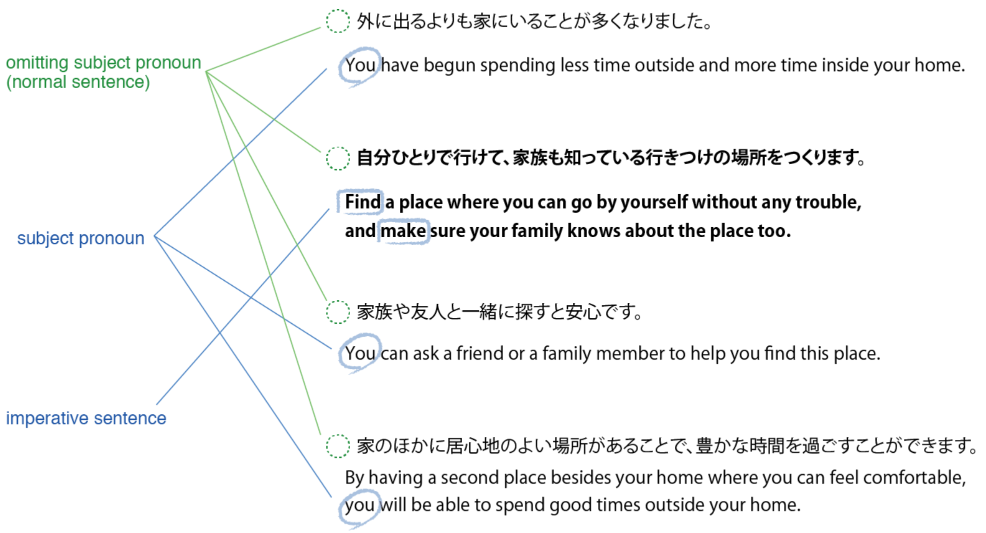
▼ Consequently

By having a second place besides your home where you can feel comfortable, you will be able to spend good times outside your home. Your family will feel comfortable letting you go out alone too if they know you are at your “**Favorite Place**.” Even if a symptom of dementia occurs at the place, if the people there know about you, they would be able to treat you properly.

▷ 12. Live in the Moment　▷ 34. On-the-Spot Helper　▷ 36. Personal Connections

21

Fig. 16. Pattern “Favorite Place” written in English (Iba *et al*., 2015b)



外に出るよりも家にいることが多くなりました。

You have begun spending less time outside and more time inside your home.

自分ひとりで行けて、家族も知っている行きつけの場所をつくります。

Find a place where you can go by yourself without any trouble, and make sure your family knows about the place too.

家族や友人と一緒に探すと安心です。

You can ask a friend or a family member to help you find this place.

家のほかに居心地のよい場所があることで、豊かな時間を過ごすことができます。

By having a second place besides your home where you can feel comfortable, you will be able to spend good times outside your home.

Fig. 17. Comparison between Japanese sentences and English sentences in the “Favorite Place” pattern

In addition, the Solution statement of patterns in Japanese is not written as imperative, but as normal sentences without a pronoun (Figure 17). The Japanese language does not differentiate its present tense and future tense verbs. Therefore, the reader can choose the tense as they see fit in their situation. For instance, if they have already been enacting the Solution, they can read the sentence in the present tense; if they have never done the pattern, they will read the Solution in the future tense. Thus, readers can understand the Solution sentence of the pattern as either a statement of what that person is currently doing (present tense) or something the person will do in the future (future tense).

In addition, Vygotsky (2012) also discusses pure predication in external speech. When communicating by external speech, the speaker does not need to specify the subject pronoun if the listener is aware of the conversation’s context. The dialogue workshops in which participants discuss their life experiences using patterns is an example (Figure 18). During one-on-one conversations, the speaker omits the subject pronoun once the context has been shared and mutually understood by speaker and listener. Once the subject can be omitted, the conversation is reduced to predicates, since there is no longer a need to specify the subject pronoun. Therefore, the speaker talks only about his/her experiences, and the listener assumes that the subject is the speaker.

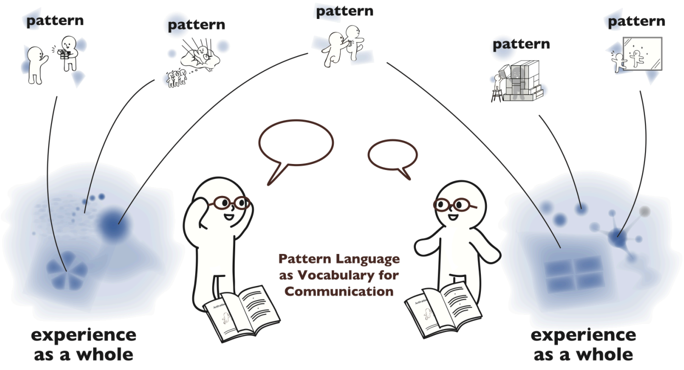


Fig. 18. Predication Appears in Dialogue about Experiences with Pattern Language

5. CONCLUSION

In this paper, we explored the function of pattern language with Vygotsky's psychology, especially signs as psychic tools, the Zone of Proximal Development, and inner-speech and predication. In this consideration, differences among languages are included. We anticipate that this paper will evoke future discussions on the function of pattern language within psychology.

ACKNOWLEDGEMENTS

We appreciate the shepherd of our paper, Jenny Quillien, for her commitment and consideration to giving us valuable feedback. We also thank participants of the writers' workshop, Christian Kohls, Helene Finidori, Jiwon Kim, Yuma Akado, Alice Sasabe, and Tomoki Kaneko for having a good discussion to improve this paper.

REFERENCES

Edwards, A. (2007) "An Interesting Resemblance: Vygotsky, Mead, and American Pragmatism," *The Cambridge Companion to Vygotsky*, Daniels, H., Cole, M., and Wertsch, J. V. (eds).

Iba, T., Miyake, T., Naruse, M., and Yotsumoto, N. (2009) "Learning Patterns: A Pattern Language for Active Learners," *PLoP'09 Proceedings of the 16th Conference on Pattern Languages of Programs (PLoP2009).*

Iba, T., and Miyake, T. (2010) "Learning Patterns: a pattern language for creative learning II," *AsianPLoP'10 Proceedings of the 1st Asian Conference on Pattern Languages of Programs (AsianPLoP2010)*.

Iba, T., and Sakamoto, M. (2011) "Learning patterns III: a pattern language for creative learning," *PLoP'11 Proceedings of the 18th Conference on Pattern Languages of Programs (PLoP2011).*

Iba, T., and Isaku, T. (2013) "Collaboration Patterns: A Pattern Language for Creative Collaborations," *EuroPLoP'13 Proceedings of the 18th European Conference on Pattern Languages of Programs (EuroPLoP2013).*

Iba, T., and Iba Laboratory. (2014a) *Learning Patterns: A Pattern Language for Creative Learning*, CreativeShift Lab.

Iba, T., and Iba Laboratory. (2014b) *Collaboration Patterns: A Pattern Language for Creative Collaborations*, CreativeShift Lab.

Iba, T. (2014) "Using Pattern Languages as Media for Mining, Analysing, and Visualising Experiences," *International Journal of Organisational Design and Engineering*, Vol. 3,No.3/4, pp.278-301.

Iba, T. (2015) "Pattern Languages as Media for Creative Dialogue: Functional Analysis of Dialogue Workshops," Peter Baumgartner, Richard Sickinger (eds), *PURPLSOC: The Workshop 2014*, pp.212-231

Iba, T., and Okada, M., Iba Laboratory and Dementia Friendly Japan Initiative. (2015a) *Tabino Kotoba: Ninchisho to Tomoni Yoriyoku Ikirrutameno Hinto* [*Words for a Journey: The Art of Being with Dementia*], in Japanese, Maruzen Publishing.

Iba, T., and Okada, M., Iba Laboratory and Dementia Friendly Japan Initiative. (2015b) *Words for a Journey: The Art of Being with Dementia*, CreativeShift Lab.

Iba, T., Kaneko, T., Kamada, A., Tamaki, N. and Okada, M. (2015c) "Words for a Journey: A Pattern Language for Living well with Dementia," *World Conference on Pursuit of Pattern Languages for Societal Change (PURPLSOC2015)*, published in Baumgartner, P., Gruber-Muecke, T., Sickinger, R. (eds.) (2016) *Pursuit of Pattern Languages for Societal Change. Designing Lively Scenarios in Various Fields*. Berlin: epubli, pp.152-176.

Iba, T. Matsumoto, A., Kamada, A., Tamaki, N., Kaneko, T. (2016) "A Pattern Language for Living Well with Dementia: Words for a Journey," *International Journal of Organisational Design and Engineering*, Volume 4, No. 1/2, 2016, pp.85-112.

Takashi Iba, Ayaka Yoshikawa, 2016. "Constructing the Philosophy of Pattern Language: From the Perspective of Pragmatism," *PUARL Conference 2016*, USA

Miller, R. (2011), *Vygotsky in Perspective*, Cambridge University Press.

Mori, H., Kimura, N., Ando, S., and Iba, T. (2016) "Pattern Concierge: Using Push and Pull Patterns to Help Clients Design Their Future," *23rd Conference on Pattern Language of Programs (PLoP2016)*.

Noble, J. and Biddle, R. (2002) "Patterns as Signs," *Proceedings of the 16th European Conference on Object-Oriented Programming (ECOOP '02)*, Boris Magnusson (ed.). Springer-Verlag, London, UK, UK, 368-391.

Vygotsky L. S. (1978) *Mind in Society: The Development of Higher Psychological Processes*, M. Cole *et al*. (eds), Harvard University Press.

Vygotsky L. S. (1987) *The Collected Works of L.S. Vygotsky: Volume 1. Problems of general psychlogy*, Robert W. Rieber and A. S. Carton (eds), Springer Science + Business Media.

Vygotsky L. S. (1997) *The Collected Works of L.S. Vygotsky: Volume 4. The History of the Development of Higher Mental Functions*, Robert W. Rieber (ed), Springer Science + Business Media.

Vygotsky L. S. (2012) *Thought and Language*, The MIT Press.

Received May 2016; revised September 2016; accepted February 2017