

Creativity in awareness communication

Masanori Okada, Naoshi Uchihira, Kunihiro Hiraishi, and Susumu Kunifuji

Abstract— When discovering and solving problems, it is common to verbally express the outcome of the process. Even when a problem in need of solving exists, it is rare to propose solutions in writing from the start; typically, people begin by searching for and collecting information and ideas. When possible, people may write down their thoughts and observations at the site of the problem or use cameras or other equipment to record them. Organizing and labeling these thoughts and observations as “objects” and then arranging them appropriately is likely to facilitate the production of logical writing that assists in problem solving. In this study, we engaged groups in problem solving and cooperative fieldwork. This cooperative work led to the emergence of secondary awareness, an outcome we verified using several tests. Conducting fieldwork and organizing related observations in groups involved the use of multiple sensory organs, and the communication required during this process likely led to the emergence of secondary awareness.

Index Terms—Emergence of Awareness Through Communication, Visualization Thought Processes, Horizontal and Vertical Cooperative Work, Secondary Awareness

I. INTRODUCTION

IT distinguishes the three main types of creativity: combinational, exploratory, and transformational[1]. In short, the three forms of creativity are

- 1) Making unfamiliar combinations of familiar ideas
- 2) Exploring conceptual spaces
- 3) Transforming the space

In this paper, we gather awareness and relevant information in fieldwork as divergent thinking. We use the definition of awareness is the ability to make forced-choice decisions above a chance level of performance[2].

In higher education, problem-based/project-based learning (PBL)[3] is usually conducted as active learning. In the case of problem solving exercises conducted in the classroom, brainstorming is often used to generate ideas, and the KJ method[4][5][6] is often used for convergent thinking. KJ is the abbreviation for Kawakita Jiro, and the KJ method was originally invented by him.

It is reported that a mini nomadic university in the form of PBL provide text notes and photographs are used as a means of information gathering to explore the conceptual space[6]. And the GUNGEN-PHOTO has been developed to perform KJ method including photographs on a computer display[7].

In [8], Gregerson tried the following. Instead of brainstorming to find answers he would ask new questions to stimulate idea generation.

In this research, we tried the following: Participants in our mini nomadic university, not only wrote down or took photos of the primary insights, but also discussed them on the spot with their peers. In other words, I came to the conclusion that it would be possible to draw out secondary awareness by discussing them on the spot with their colleagues.

Typically, when a person becomes aware of an unresolved problem, it is necessary to study precedents and context. Collecting necessary data at the site of the problem using one or

more of the five senses should facilitate appropriate problem-solving. This study focuses on the outcomes of incorporating cooperative mechanisms into the collection of observations. Graduate students conducted fieldwork in groups, not simply collecting data individually but instead communicating with and helping one another during the process. They also attended lectures about the research topic prior to fieldwork. We regarded both activities as instances of communication and co-operation. We hypothesized that a certain type of cooperative work—that is, collecting observations while communicating—would have a qualitative and corrective effect. Furthermore, we hypothesized that because communication arises during problem identification, collection of observations as a group, idea convergence using the KJ method, and presentation of idea diagrams, it is possible that awareness communication emerges in multiple situations. The remainder of this paper is organized as follows. Section II examines the relationship between observation collection during fieldwork and the generation of writing from a linguistic perspective. Section III provides an overview of the mini nomadic university[6],[9] used in the demonstration experiments and the changes in observation collection methods. Section IV describes both the preliminary and demonstration experiments and discusses their results. Section V presents the conclusion.

II. AWARENESS COLLECTION USING LANGUAGE

People are capable of using language to express their observations in written form, thereby communicating them to others as intentions (Figure 1). These observations can be recognized by the senses in various forms, including speech, written words, still images, and moving images. Sketches and models can be recorded by photographing them, and even body movements can be recorded as a moving image. Observations recorded as written words can thus be transformed into various formats, which can then be grouped, labeled, and if necessary, tagged with who/what/where/when/why/how categories to facilitate their further utilization.

We refer to these bundles of labeled observations as “objects” (Figure 2). Describing the relationships between these “

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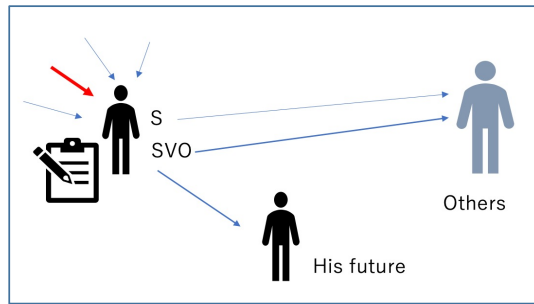


Fig. 1. convey one's observation to others



Fig. 2. Observation labeled as "object"

objects" in grammatically correct language enables people to logically communicate facts and ideas. Hockett [10] lists 13 "design features" necessary for all languages. The present study assumes that human communication began orally, and that the following four of Hockett's 13 conditions are required for discussion:

- 1) Discreteness (oral communication)
- 2) Grammar (oral and written communication)
- 3) Productivity (oral and written communication)
- 4) Displacement (oral and written communication)

Discreteness is necessary to recognize sounds as words and write them down. Grammar at the very least allows the relationship between subject and predicate to clearly communicate. Productiveness refers to the ability to assemble words according to grammatical rules and produce sentences. Displacement is the ability to express past, future, or imagined events. These are characteristic features of human language, and in this study, they are necessary for the discussion of emergence. Discreteness and grammar in particular have been observed in communication between nonhuman animals. Our aim in this study is to elucidate the mechanisms by which organizing observations discretely recorded during fieldwork and communicating them to others using grammatical, logical sentences leads to the emergence of new ideas.



Fig. 3. Presentation to community members

III. FROM COLLECTING OBSERVATIONS TO PROPOSING A SOLUTION

Collecting observations is essential during the early stages of problem-solving exercises. The mini nomadic university[6] operated primarily by Susumu Kunifuji, a coauthor of this paper, since 2008 is an example of a problem-solving site. This "university" is a workshop at which participants identify potential in the community surrounding the graduate school (Nomi, Ishikawa Prefecture) and propose and discuss solutions to community problems. Graduate students, supporting faculty, and community members participating in the event follow the general schedule outlined below:

- 1) On the first day, students engage in Fieldwork 1 for half a day, guided by city workers or local experts. Sometimes, they listen to a lecture in a classroom and then engage in Fieldwork 1.
- 2) Students collect observations on the first and second days of fieldwork, summarize ideas using the KJ method, and turn them into a diagram on poster paper (Figure 2).
- 3) On the final day, students give a presentation to community members or faculty (Figure 3).

Through 2016, observations were collected using written notes and photographs. In 2017, a smart voice messaging system [11],[12],[13] was also used to record vocalized observations as text. In 2018 and 2019, the awareness through communication that emerged during this process, termed "awareness communication," was monitored [12],[13].

IV. THE EMERGENCE OF AWARENESS THROUGH COMMUNICATION

"Emergence" refers to the appearance of new characteristics that cannot be predicted or explained by prior conditions. "Emergence of awareness through communication" refers to the emergence of awareness that cannot easily be explained as the awareness of individual observers that is, new awareness that arises through communication between observers gathered in the same place. During the preliminary and demonstration experiments, participants performed cooperative work that involved the following types of communication.

- Horizontal communication conversation between students during fieldwork

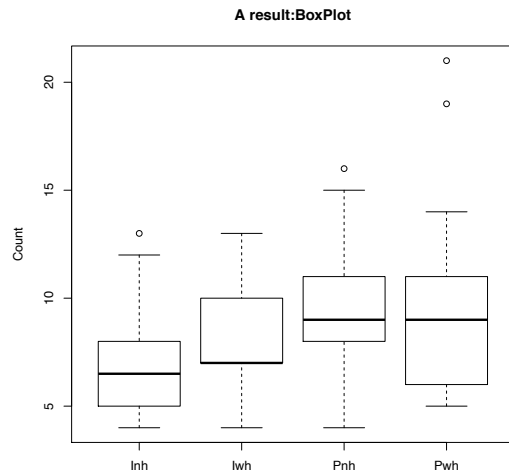


Fig. 4. Results of preliminary experiments

- Vertical communication advice from experts given prior to fieldwork and the Q&A session
- The relationship between the preliminary and demonstration experiments is as follows [12],[13]:
- Collaborative work in the preliminary experiment involved participants collecting observations that arose while cooperating and counting them without redundancy.
- Collaborative work in the demonstration experiment involved participants collecting observations that arose while cooperating and we could confirm instances of emergence of awareness.

A. Preliminary experiments

Students were shown photographs of natural settings and tourist destinations in Japan and asked to write down their observations. These observations were then counted. Participants were first, second, and third-year students from Kanazawa Gakuin University. In figure 4,

- Inh: individual, no hints (n=18);
- Iwh: individual, with hints (n=17);
- Pnh: paired, no hints (n=17);
- Pwh: paired with hints (n=17)

“No hints” indicates observations made by students on their own. “With hints” indicates observations made by students after being given hints by their instructor.

The number of observations made by pairs of students who were given hints had a higher degree of quantitative significance compared with the other categories by a t-test ($t = 2.072$, $p = 0.04829$). In other words, horizontal cooperation with hint group (Pwh) may facilitate the generation of observations.

B. Demonstration experiment

During the demonstration experiment, the students cooperatively collected as many observations as possible. Students formed pairs (Student A and Student B) and, as a rule, collected observations using a single smartphone. As a result, they stood close together and observed the same phenomena. In general, during fieldwork Student B did not necessarily respond to Student A’s observations and questions.

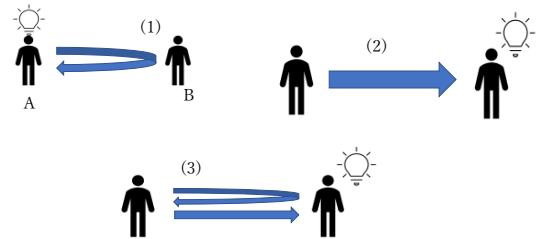


Fig. 5. interactions and their emergence

The following rules were then imposed.

- Student A should make an effort to ask Student B questions
- Student B should respond to Student A
- Student A should in turn respond to Student B

However, we did not enforce these rules because in some instances the students were taking pictures, or Student A was recording voice memos.

We refer to the observations made by either Student A or Student B using one or more of their five senses or through their individual thought process as “primary awareness.” We refer to observations gained as a result of communication between Student A and Student B after they attained primary awareness as “secondary awareness.” We posed the following hypothesis: Secondary awareness emerges from communication between two individuals who have attained primary awareness.

That is, we anticipated the following patterns.

- (1) Student B responds to a question from Student A, and Student A realizes something
- (2) Student A asks Student B a question, and Student B realizes something
- (3) Student B responds to a question from Student A, Student A responds in turn, and then Student B realizes something

We verified the emergence of the following types of secondary awareness. Patterns (1) and (2) are introduced as qualitative examples of the outcomes of horizontal and vertical cooperative work.

- (1) After getting an observation from their partner, the student makes an additional observation of their own.
 - Student A: What do you like the best about Mokuyurin ?
 - Student B: The woodcrafts. I like how they smell.
 - Student A: Oh, the smell? I liked the book cover before, so yes, I do think the toys would be nice for children.
- (2) Getting impressions from one’s partner
 - Student A: What was your impression of the Tourism Association?
 - Student B: It was a bit hazy at first, but once I understood the relationship between Kinken-gu and

Shirayamahime Shrines, then it was like all sorts of things became very clear

C. Discussion

The mini nomadic university mentioned in Section III provides the following example of the problem solving process, from fieldwork through the organization of observations.

- (1) On the first day, students accompany local experts to carry out preliminary fieldwork. In years when it is not possible to conduct preliminary fieldwork, students listen to a lecture about the fieldwork location and then conduct fieldwork.
- (2) After returning to a classroom at the university, the students write their observations on cards, which they then group and label with headings.
- (3) Students create a diagram showing the relationships between these “objects.”
- (4) Students give presentations to community members or fellow participants in the mini nomadic university.

Step (1) is an example of vertical cooperative work. Steps (2) and (3) can be described as visualization of ideas. Step (4) is the first point at which horizontal cooperative work also occurs as part of the group activity. In particular, the smart voice messaging system is utilized to record the emergence of awareness communication during fieldwork.

V. CONCLUSION

Observations from fieldwork were converted to text, still images, or moving images and labeled with headings. This equates to the separation of onsite phenomena from observations. The process of rendering these observations discrete, recording them as “objects,” and diagramming their relationships can be understood as preparation for logically explaining them. In addition, by engaging in cooperative work, participants used one or more of their five senses to turn their observations into logical ideas, which in a sense is equivalent to distributed processing. The awareness communication of participants leads to the emergence of secondary awareness. That is, vertical collaborative work determines the general direction while horizontal collaborative work leads to the emergence of secondary awareness.

Collecting awareness with a smart voice messaging system means a transformation voice into text. It is possible for new idea to emerge during awareness communication.

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