

Remembering Giyoo Hatano: Going beyond one Japanese cognitive scientist's work

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Abstract

This paper describes the life work of Dr. Giyoo Hatano, who died of pneumonia quite untimely on January 13, 2006. Dr. Giyoo Hatano's work was carried out around his belief that individuals and society continue to become wiser through interactions between both worlds. He kept trying to integrate the constructivism and the socio-cultural view of development. Many of his published works, particularly his early Japanese publications, were directed not only to researches of cognitive sciences but also to ordinary people, and in that way he encouraged people to advance individually as well as the whole body of society.

Keywords: Constructivism, socio-cultural view, intellectual curiosity, adaptive expertise, motivation for comprehension

Introduction

Dr. Giyoo Hatano has been a long-time friend and advocate of the Japanese and international cognitive science societies. He was instrumental in establishing the society and took on the post of chairman. His continuous efforts for development of the society included editing of annual reports, society magazines, selected books, handbooks, and dictionaries, in addition to his lectures. This paper briefly introduces the research of Dr. Hatano. Although it would be impossible to include every detail from his voluminous and superhumanly vast studies, we will try to trace his work from our perspective as researchers.

The first two authors were his students when he was in his thirties. We were there when his studies began to attract the attention of overseas researchers, and lately the three of us had many opportunities to discuss our studies with him personally. Based on these experiences, we would like to state what we consider to be the foundation of Dr. Hatano's studies. While Dr. Hatano studied many diverse fields, he always took a cognitive scientific approach, one that pursues scientific theories about the process of cognition while recognizing that everyday people display wisdom in their daily lives. We would like to focus on the cognitive sciences, that is, studies about the process in which adaptive expertise, social and cultural constraints, naive biology, and

understanding on how routine procedures change into conceptual and scientific understanding. By tracing the progress of Dr. Hatano's studies, we hope to review research questions left unsolved in cognitive sciences and obtain a clue to determine the direction for further development in the future.

The belief that individuals and society continue to become wiser through interactions between both worlds was his central view of cognitive development. Both the Piaget-oriented, self-internalized world of knowledge and the Vygotsky-oriented world of knowledge, influenced by social and cultural environments and continuously changing, were always fundamental to Dr. Hatano's studies. Many of his published works, particularly the ones published in Japanese in his earlier career, were directed not only to researchers of cognitive sciences but also to ordinary people, and in that way he encouraged people to advance individually, as well as the whole body of society, by reviewing their own cognitive processes commonly from such a viewpoint.

The beginning

Dr. Giyoo Hatano earned his doctorate degree from the University of Tokyo in 1966 with the dissertation titled "*Equilibration in the Acquisition of Conservation*." In this paper, he indicated that earlier studies of the conservation lacked clarification of the process from non-conservation to conservation and attempted to theorize such a process. At the same time, he began to research the influence of intrinsic motivation on understanding, in collaboration with Dr. Kayoko Inagaki. Some of the study's results were summarized in "*Intrinsic Motivation in Development and Education*" (Meiji Press, in Japanese) published in 1971, in which it was noted that intrinsic motivation can be generated with the support of social interactions. This book was based on the study conducted by Dr. Inagaki for her graduate thesis under Dr. Hatano's tutelage. At that time, Dr. Inagaki observed the Hypothesis-Experiment lessons under the guidance of Dr. Hatano's father, Dr. Kanji Hatano. She conducted an experiment to extract the

essences of the lessons and concluded that the students' intellectual interest in observing experimental results is enhanced significantly through discussions based on the hypothesis, and that generalization of results caused by observation can be applied to a wider range of objects. With "Intrinsic Motivation in Cognitive Observation" (Inagaki and Hatano, 1968) summarized in the society magazine and co-authored by Dr. Inagaki and Dr. Hatano, they were awarded the 4th Kido Encouragement Award from the Japanese Association of Educational Psychology. This was the starting point for Dr. Giyoo Hatano, who adopted sophistication of the Piagetian theory as his doctoral thesis and tried to configure his unique theory of development and education from the social and cultural viewpoint based on his studies of the Hypothesis-Experiment-Instruction classrooms.

Balancing international and domestic work

Dr. Hatano showed little interest in exchanges with overseas researchers when he was a graduate student. He had a sudden change of attitude after studying for a year under Dr. Lee Chronbach, who had been invited by Dr. Hiroshi Azuma to conduct the graduate-level education study course at the University of Tokyo. At that point, he determined to do research at the same level as overseas researchers, and he immediately visited Europe to meet advanced researchers belonging to the Piaget school. Dr. Hiroshi Azuma, who made this course possible, had studied overseas at the University of Illinois immediately after World War II, with the support of the United States. Based on his experiences there, he began efforts to internationalize the studies of development and education in Japan while building the base for studies on education directly connected to studies of cognition in Japan. Owing to the efforts of Dr. Azuma, a conference of the International Congress of Psychology was held in Japan in 1973 for the first time in Asia. This international conference at Shinagawa was probably the first time that many Japanese researchers of psychology now in their fifties, including the first two authors, would get to experience the human side of those researchers whose names appeared in textbooks. Dr. Hatano must have enjoyed direct discussions with foreign researchers at this opportunity, while he also served as a helping hand in general affairs and accounting (the first author remembers one time when he was distributing stationery to the office room and saying "I think you ordered three red pencils here").

Dr. Azuma contributed to internationalization of Dr. Hatano's studies in another respect. This was a comparison research of infants between the United States and Japan conducted by Dr. Azuma in collaboration with Dr. Robert D. Hess of the University of Chicago (subsidized by the Japanese Society for the Promotion of Science, 1972 to 1977) (Azuma, 1994). In that study, Dr. Hatano gained experience in jointly working with American researchers of development and education, including Dr. Hess, in all phases of research from establishing a research plan, devising methods for experiments and data analysis,

interpretation of results, and to publishing papers together. Subsequently, the name of Dr. Hatano gradually became famous among overseas researchers.

The year 1973 was another pivotal point in the history of Dr. Giyoo Hatano's studies. In that year, "*Intellectual Curiosity*" by Hatano and Inagaki was published (Chuko Shinsho). With an attractive title, (even Dr. Hatano commented, "it was successful"), the book impressed on common ordinary people the interesting nature of researching "knowledge." In 1976, translation of J. McV. Hunt's "*Intellectual Development and Education of Infants*," which he supervised, and "*Guidance to Educational Psychology*" (Yuhikaku Press), which he co-authored with Dr. Keiko Kuhara, were published. His dual style of providing enlightening books for people in Japan while publishing papers on the cutting edge of the cognitive sciences in overseas academic magazines was being formed in that age.

The abacus studies

The pioneering work that probably established Dr. Hatano's reputation overseas was the paper on the subject of "abacus" that elucidated the cognitive ability of abacus experts and clarified the form of representation to support such expertise (Hatano et al., 1977). It had been nearly five years since the 1973 publication of Chase and Simon's detailed examination of the perception and memory of skilled chess players, so Dr. Hatano's paper provided a "new" subject on the familiar theme to the society of researchers in the United States. The experimental results revealed the state of experts that use consciously configured visual representation, kinetic representation, and symbol processing abilities, a skillful demonstration of the cultural practice of "abacus." The name of Giyoo Hatano and the study of "expertise" on abacus formed a scheme for overseas researchers. Thereafter, his study of abacus developed into the mental abacus held by experts (Hatano and Osawa, 1983) and a related issue of developing the digit span (Hatano and Amaiwa, 1984; 1987).

For Dr. Hatano, "abacus" was not a means to sell himself as a "researcher of Japanese culture." Researchers of cognitive sciences in the United States and Europe do not label de Groot and Chase and Simon as "researchers of Western culture" because they conducted studies on the theme of chess. Quite possibly, the abacus for Dr. Hatano was nothing than a familiar "research material suitable for study of representation" on the same level as chess for de Groot. Yet, "abacus" stands out as a tool used in oriental cultural practice from the viewpoint of Western researchers. As possibly a side effect of this, Giyoo Hatano came to play the role of presenter of "Japanese perspectives" at symposiums of overseas societies after entering the 1980s as an excellent researcher who can also talk about arithmetic education in Japan (e.g., Hatano & Inagaki, 1987a), and Japanese reading and writing (e.g., Hatano, 1982).

Similarly, the study of abacus for Dr. Hatano was not the study of "expertise" from the beginning. He adopted skilled

users of the abacus as subjects because it was necessary to study the expert-level representation of abacus, but “expertise” itself was not the theme. According to Dr. Inagaki, it seems that the research theme he was interested in at that time was rather how conceptual knowledge was configured from procedural knowledge. In that age, various movements were developing in the field of studies of cognitive sciences in the United States, such as the emergence of new themes of everyday cognition and long-term changes in cognition (acquiring expertise), situated nature of problem solving and memory, germs of new studies of learning based on the theory of situated cognition, and so on. Studies of cognitive sciences addressed only the “inside of the mind” of a single subject did not match the age. Many studies were conducted by adopting a larger unit of analysis, and expectations grew that new findings could be gained if the view that “knowledge” exists outside of “mind” was taken more seriously. Contrary to such trends, Dr. Hatano did not change his attitude to place importance on both knowledge construction by individuals and the structuring and restructuring of knowledge by society.

Two courses of expertise

Eventually, Dr. Hatano’s study of the abacus turned into the basis for leading a theoretical discussion on “two courses for acquiring expertise.” Although the mental abacus is a spatial internal representation that not only expands the digit span but also enables random access, it only assures routine performance as long as it is used as a support tool for calculation. In that sense, acquisition of expertise in using the abacus is routine acquisition of expertise. If this is the case, then in comparison, it can be assumed that there are other types of acquisition of expertise. A promising candidate is “adaptive” acquisition of expertise, which configures more conceptual knowledge with a wide range of applications. Routine expertise may be related to daily experiences, whereas adaptive acquisition of expertise may be related to conceptual construction of procedural knowledge through discussions such as those that can be found in the Hypothesis-Experiment classrooms.

This idea was first presented at a symposium (Hatano, 1982a) and then published in a Newsletter of the Laboratory of Comparative Human Cognition (LCHC) published under the editorship of Dr. Michael Cole (Hatano, 1982b) and then referenced in the paper published in 1983 (Hatano and Osawa, 1983) as well as in a chapter of a technical book series on cognitive studies in Japan (Hatano and Inagaki, 1983). In 1986, it was clearly stated that there are “two courses of expertise” (Hatano and Inagaki, 1986); this was the title of a section of a book edited by Azuma and others to introduce Japanese perspectives to international readers. Symposiums on the “adaptive expertise” soon began to be held in overseas academic societies. The association of Giyoo Hatano-abacus-expertise developed independent from the situated cognition movements. It also came to provide a new research theme for researchers of cognitive sciences, particularly those studied learning and education.

The idea that “there is not only simple expertise but also ‘adaptive’ expertise” began to be viewed as a new theme to express a sustainable learning target in the ground swell of “learning sciences,” which developed rapidly in North America and Europe from the latter half of the 1980s.

However, the construct of adaptive expertise is still a concept (Hatano, 2001). There is yet no established theory to clarify the relation between routine acquisition of expertise and adaptive acquisition of expertise. Furthermore, the principle for designing a learning environment that assures the acquisition of adaptive expertise is at the stage the just been proposed. New examination should start from a steady starting point such as clarifying the difference between the concept that Dr. Hatano wanted to call adaptive expertise and conceptual understanding.

Motivation for comprehension

Looking into his slightly earlier work in Japan, we see that Dr. Hatano et al. continued to release a series of topics to intellectual people from the latter half of the 1970s to the latter half of the 1980s. His books titled “*Development of intellectual power – from infancy to old age*” (Hatano and Inagaki, 1977, Iwanami Shinsho), “*Psychology of enervation – Conditions for motivation*” (Hatano and Inagaki, 1981, Chuko Shinsho), “*Intellectual power and learning to learn – What to learn in school*” (Hatano and Inagaki, 1984, Iwanami Shinsho), and “*Psychology of lifelong development*” (Takahashi & Hatano, 1990, Iwanami Shinsho) are published in pocket-book size, so that they can reach a wide range of readers. In each of those books (though they are in fact considerably difficult to understand thoroughly), effective suggestions for educational issues that Japanese society is now facing are explained persuasively with each clarified neatly by studies of cognitive sciences. His view of knowledge construction that is consistent throughout these books has two aspects, “knowledge is constructed through an internal process by individuals,” and “it also incorporates social and cultural knowledge learned from others.” In these books, as well as in his academic papers, Dr. Hatano proposes the following process of knowledge construction.

- Cultures involve many pieces of procedural knowledge that are necessary to live in that culture. Society therefore intensely strives to have its members acquire these pieces. In that aspect, knowledge is basically an object to be transmitted.
- At the same time, individuals are naturally motivated toward deeper understanding, so they may sometimes build up corresponding conceptual knowledge while applying their acquired procedural knowledge. In that sense, knowledge is a product of personal construction.
- By constructing conceptual knowledge, individuals can understand the given procedure at more abstract levels, to be applicable to wider range of problems, to go beyond their particular situations. Based on this understanding, they can then escape from direct dictatorship of culture and can

overcome it. (Extracted and modified from Hatano and Inagaki, 1983)

In this respect, a scheme can be extracted in which the quality of culture influences the effect of education. In other words, the quality of culture (as educational media) as viewed from the standpoint of members on the recipient side (children and students) depends on what pieces of procedural knowledge the culture has and how it transmits them to its members. At the same time, a deeper conceptual understanding by individual members of a culture produces a higher probability that the culture will grow and change to exceed itself. The pocket-sized books mentioned above all carried these messages. They are enlightening and not only provide various phases of study of cognitive sciences neatly and in a form appealing to intellectual curiosity but also suggest to members of society and culture how to provide younger members with “culture” itself with a higher quality and therefore a higher probability of changing and growing. Following these books, *“How people learn – the world of everyday cognition”* (Inagaki and Hatano, 1989, Chuko Shinsho) was published and will be mentioned in the last part of this article.

Internationalizing the Hypothesis-Experiment-Instruction

Let’s return to the flow of Dr. Hatano’s studies. From the latter half of the 1980s, studies of learning sciences that use the research of the learning process and achieve more practical learning results as the base for theoretical consideration emerged mainly in North America and Europe. Cognitive sciences form the base of these studies as many of researchers who represented themselves as researchers of learning sciences had been central members of the society of cognitive sciences 10 year before. Within this flow of movements, Dr. Hatano and Dr. Inagaki examined how people reconstruct a naive science configured on the basis of daily experience, which can be called a universal science of people, into conceptual, abstract, and “scientific” knowledge. Their studies used the Hypothesis-Experiment classrooms as their research field to verify the effect of collaborative cognitive processes and promoting motivation toward understanding through collective discussions subsequently (Inagaki & Hatano, 1983; Hatano, 1986). As a compilation of such studies “Sharing cognition through collective comprehension activity” (Hatano and Inagaki, 1991) was published in *“Perspectives on socially shared cognition,”* which was edited by Resnick, LeVine, and Teasley.

This paper re-analyzed classroom conversations among students in the Hypothesis-Experiment lessons and explains a mechanism by which recognition of fellows sharing one’s opinion and attempts to integrate their ideas will raise one’s own knowledge construction to a conceptual level. Here the mechanism for the conceptual change is deeply rooted in collaborative dynamics among the students. While intellectual curiosity held naturally by individuals was the

main factor for configuring conceptual knowledge in the conventional explanation by Dr. Hatano, he and Dr. Inagaki proposed in that paper a practical process that converts procedural knowledge into conceptual knowledge through a “social” mechanism, namely integrating opinions with fellows sharing similar opinions (plus discrimination from ideas of others having different opinions). Thus, it could be asserted that people have not only intellectual curiosity and intrinsic motivation but also “partisan” motivation, so they can become wiser through collaboration with the support of society. Some researchers of learning sciences cite the above mentioned book containing the paper of Drs. Hatano and Inagaki as one of the most influential books in changing their outlook on learning. This paper of Dr. Hatano and Inagaki showed that their work was ahead of its time in establishing the base of learning sciences.

Studies on naive biology

Beginning in the latter half of the 1980s and continuing for the next two decades, Drs. Hatano and Inagaki continued to educate the world about the base of scientific understanding naturally supported by culture, i.e. the naive theory, one of the most popular topics of their research community at the age, and eventually created an environment in which Hatano and Inagaki’s work was an indispensable part. The subject of their study was naive biology. Through carefully designed experiments, they clarified that infants establish their vital understanding of organisms with the support of cultural practice and by fully utilizing animistic analogies with themselves as the base. They further demonstrated that infants’ experiences in interacting with organisms in their everyday life largely influenced the depth of their understanding.

Such naive biology changes into understanding of truly scientific and conceptual biology depending on how it is handled. There are three requisites for causing such change. These are a certain level of meta-cognitive ability to evaluate and monitor the inconsistency in the existing system of knowledge, at least potential existence of concepts or conceptual representations that can substitute for the existing system of knowledge, and social and cultural contexts where children are exposed to diverse and sometimes inconsistent information as triggers for change. Dr. Inagaki commented privately, “I have ended up continuing to study naive biology over 20 years.” Beginning with the paper in 1987 (Hatano and Inagaki, 1987b), which was printed in a Newsletter of Dr. Cole’s laboratory, more than 20 works were published, the last of which was *“Young Children’s Naive Thinking about the Biological World”* published by the Psychology Press in 2002.

Fortunately for us Japanese, this book has been translated into Japanese (Inagaki and Hatano, 2005). It will be the most suitable textbook to learn about how to conduct research on the topic and how to develop discussions adopted by Dr. Hatano and Dr. Inagaki in detail. However, the research theme of development and change of conceptual knowledge of children in relation to naive

biology, which is the focus of this book, has never been handled as an independent theme itself, as we have tried to explain. Dr. Hatano gave a lecture titled “Language is not the only universal knowledge system: A view from ‘everyday cognition’” at the symposium held when Chomsky visited Japan after being awarded the Kyoto Prize (the paper by Hatano (1990) was written based on that lecture). Chomsky has asserted that human beings are superior in perception and language but are commonly poor in science (e.g., physics). He further stated that if studies of problem solving and knowledge acquisition in the field of science are conducted, there is little prospect of being able to obtain useful information for understanding the human mind.

Contradicting that assertion, Dr. Hatano countered that human beings commonly acquire the germ of scientific understanding in daily life driven by intellectual curiosity and supported by social mechanisms. Therefore, he continued, studying this naive science and studying the process in which naive science changes into true science are important themes of cognitive sciences. In the record of this lecture, he already demonstrated the basis of examples of experiments in which children aged four to five correctly understood that all organisms inevitably grow and die. He further conjectured that children’s personification using themselves as the model is the basis of such understanding and that how the child personifies itself is a naive theory with a sophisticated system such as that it can be easily applied to rabbits but would be difficult to apply to stones.

We can assume that such everyday science is universal, but this does not mean that the knowledge content is the same for everybody. He advocated that, for the very reason that forming naive theories and scientific theories is influenced by living environments including culture, studies comparing the knowledge comprising everyday science between different cultural groups are both necessary and effective. In other words, culture was an essential element in Dr. Hatano’s study of the construction and functions of cognitive knowledge. We think that a major theme that he tackled throughout his life, i.e. how a researcher who can only live and conduct studies in one culture should study the influence of culture on cognition, is hidden in his book, “*Young children’s naive thinking about the biological world*” (Inagaki & Hatano, 2002).

What Dr. Giyoo Hatano has left and beyond

The personal computer that Dr. Hatano used to the end contains Vitae in English and study results written in English alone. We are now preparing a list of Dr. Hatano’s complete publications, both in English and in Japanese, as much as we can collect. His works that we have so far been able to mention are only part of this collection. His works concerning arts and music can be found as early as 1966. Other works we could not include here range from numerous studies on reading of Kanji and critical reading, handling of numbers and educational practice in mathematics to studies of social psychology, evolutionary

psychology, brain sciences, genetic psychology, and boundary areas beyond them.

After 2000, the number of articles written in handbooks and dictionaries as well as commentaries on special editions of books and magazines increased significantly. We believe that anybody intending to do research in cognitive sciences will certainly find a paper or two precisely meeting their interests from the list of his work. We suppose the reason is not solely the wide range of study areas that Dr. Hatano covered. Instead, the real reason is that the research theme generation and construction of human knowledge, which Dr. Hatano continued to pursue, is a universal theme for cognitive sciences that any cognitive scientist would want to pick up.

Dr. Hatano continued to be a member of the Japanese Society of Cognitive Science to the end. To reflect on his motive in our own way, we would dare to pick up his enlightening book “*How people learn*” (Inagaki and Hatano, 1989) again instead of his academic papers. We are confident that we will not be only one, among Japanese, who wants to compare this book with “*How people learn*,” published in the United States in 1999. American “*How people learn*” was published by the National Research Council to help direct the education policy of the United States by committee of learned scholars and is the foundation on which learning sciences of today is established as a definite research area. Although Dr. Giyoo Hatano’s “*How people learn*” was a pocket-sized book, it demonstrates that a book was published in Japan 10 years before the national project of the United States with almost the same viewpoint in content and spirit.

From our perspective, this book represents most excellently the research senses of two Japanese researchers, namely Giyoo Hatano and Kayoko Inagaki, and their stances in researching cognitive sciences that they want to share their scientific belief with common people worldwide. They taught us that cognitive science research must not only be faithful to the reality of cognitive processes of people but must also continue to sophisticate the results of research as theories by returning them to the reality of the actual lives of people and verifying them there. This message is addressed to all members of the cognitive science community, where Dr. Hatano was an active member to the end whom we must never forget.

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References

- Azuma, H., Kashiwagi, K., & Hess, R. D. (1981). *Maternal attitude and behavior and the intellectual development of their children: Japan-U.S. comparison study*. Tokyo: University of Tokyo Press. [in Japanese].

- Azuma, H. (1994). *The Japanese discipline and education*. Tokyo: University of Tokyo Press. [in Japanese].
- Chase, W. G., & Simon, H. A. (1973). The perception in chess. *Cognitive Psychology*, 4, 55-81.
- Hatano, G. (1966). *Equilibration in the acquisition of conservation*. Unpublished Doctoral dissertation, Department of Education, Tokyo: University of Tokyo. [in Japanese].
- Hatano, G. (Supervision of translation). (1976). *Intellectual development and education in infants*. J. McV. Hunt. Tokyo: Kaneko-Shobo. [translated into Japanese]
- Hatano, G. (1982a). *Cognitive consequences of practice in culture specific procedural skills*. Paper presented at the Symposium "Cognitive Development: Emerging and re-emerging themes", Society for Research in Child Development, Boston.
- Hatano, G. (1982b). Cognitive consequences of practice in culture specific procedural skills. *The Quarterly Newsletter of the Laboratory of Comparative Human Cognition*, 4, 15-18.
- Hatano, G. (1986). *Enhancing motivation for comprehension in science and mathematics through peer interaction*. Invited address given at American Educational Research Association, San Francisco.
- Hatano, G. (1990). Scientific knowledge as a research target in cognitive science. In Japanese Cognitive Science Society (Ed.), *Advances in Japanese Cognitive Science, Vol.2*. Tokyo: Kodansya. ("Language is not the only universal knowledge system: A view from 'everyday cognition'.") [in Japanese].
- Hatano, G. (2001) Toward the theorization of "adaptive Expertise." *The Annual Report of Educational Psychology in Japan*, 40, 45-47.
- Hatano, G., & Amaiwa, S. (1984). *Formation of a mental abacus for computation and for memorizing digits: A developmental study*. Paper presented at the American Educational Research Association, New Orleans.
- Hatano, G., & Amaiwa, S. (1987). Formation of a mental abacus for computation and its use as a memory device for digits: A developmental study. *Developmental Psychology*, 23, 832-838.
- Hatano, G., & Inagaki, K. (1971). *Intrinsic motivation in education and development*. Tokyo: Meiji-Tosho.[in Japanese].
- Hatano, G., & Inagaki, K. (1973). *Intellectual curiosity*. Tokyo: chuko-Shinsho.[in Japanese].
- Hatano, G., & Inagaki, K. (1977). *Development of intellectual power – from infancy to old age*. Tokyo: Iwanami-Shoten. [in Japanese].
- Hatano, G., & Inagaki, K. (1981). *Psychology of enervation – Conditions for motivation*. Tokyo: Chuo-koronsha. [in Japanese].
- Hatano, G., & Inagaki, K. (1983). Culture and cognition—on the transmission and the construction of knowledge.. In Sakamoto, T., *Current trends in basic psychology, Vol.7.Thinking, intelligence, and language*. (pp. 191-210). Tokyo: University of Tokyo Press. [in Japanese].
- Hatano, G., & Inagaki, K. (1984). *Intellectual power and learning to learn – What to learn in school*. Tokyo: Iwanami-Shoten. [in Japanese].
- Hatano, G., & Inagaki, K. (1986). Two courses of expertise. In H. Stevenson, H. Azuma & K. Hakuta (Eds.), *Child development and education in Japan* (pp. 263-272). Freeman & Co.
- Hatano, G., & Inagaki, K. (1987a). A theory of motivation for comprehension and its application to mathematics instruction. In T.A. Romberg & D.M. Stewart (Eds.), *The monitoring of school mathematics: Background papers. Vol.2: Implications from psychology; Outcomes of instruction* (pp. 27-46). Madison, WI: Wisconsin Center for Education Research.
- Hatano, G., & Inagaki, K. (1987b). Everyday biology and school biology: How are they interact? *Quarterly Newsletter of the Laboratory of Comparative Human Cognition*, 9, 120-128.
- Hatano, G., & Inagaki, K. (1991). Sharing cognition through collective comprehension activity. In L.B.Resnick, J.M.Levine & S.D.Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 331-348). Washington, D.C.: APA.
- Hatano, G., & Kuhara, K. (1976). *Guidance to Educational Psychology*. Tokyo: Yu-hi kaku. [in Japanese].
- Hatano, G., Miyake, Y., & Binks, M. G. (1977). Performance of expert abacus operators. *Cognition*, 5, 57-71.
- Hatano, G., & Osawa, K. (1983). Digit memory of grand experts in abacus-derived mental calculation. *Cognition*, 15, 95-110.
- Inagaki, K., & Hatano, G. (1968). Intrinsic motivation in cognitive observation. *The Japanese Journal of Educational Psychology*. 16, 191-202. [in Japanese].
- Inagaki, K., & Hatano, G. (1977). *Intrinsic Motivation in Development and Education*, Tokyo: Meiji Press.[in Japanese].
- Inagaki, K., & Hatano, G. (1983). Collective scientific discovery by young children. *The Quarterly Newsletter of the Laboratory of Comparative Human Cognition*, 5, 13-18.
- Inagaki, K., & Hatano, G. (1989). *How people learn—the world of everyday cognition*. Tokyo: Chuo-koronsha. [in Japanese].
- Inagaki, K., & Hatano, G. (2002). *Young children's naive thinking about the biological world*. Philadelphia, PA: Psychology Press.
- Inagaki, K., & Hatano, G. (Eds.). (2005). *Children's conceptual development and change—on naive biology*. Tokyo: Kyoritsu-Publishing. [in Japanese].
- Takahashi, K., & Hatano, G. (1990). *Psychology of lifelong development*. Tokyo: Iwanami-Shoten. [in Japanese].