

Untimely Proposals for Philosophical Studies of Go

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(Abstract)

There is no royal road to philosophy. Thanks to Go, however, I have come to be a happy retired professor of philosophy. Go not only led me to the Socratic tradition of knowing nothing but my ignorance but also provided me with ample sources of inspiration for my philosophical journey. As a consequence, I have more difficult questions than ever. Since there is no hope for me to find answers to them shortly, I would like to present proposals to tackle them with all members of the International Society of Go Studies.

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There is no royal road to philosophy. Thanks to Go, however, I have come to be a happy retired professor of philosophy. Go not only led me to the Socratic tradition of knowing nothing but my ignorance but also provided me with ample sources of inspiration for my philosophical journey. As a consequence, I have more difficult questions than ever. Since there is no hope for me to find answers to them shortly, I would like to present proposals to tackle them with all members of the International Society of Go Studies. As AlphaGo has been a challenge and a blessing to both philosophers and Baduk players, my philosophy of Go can also be divided into two periods: before and after AlphaGo. In Section 1, I will briefly discuss my philosophy of Go before AlphaGo. Section 2 will be devoted to my philosophy of Go after AlphaGo. In these two Sections, I shall summarize my published papers, and add some afterthoughts, which could be proposals for future collaborative studies with all members of the International Society of Go Studies. Finally, in Section 3, I shall present a proposal for collaborative research on what I believe to be one of the most urgent issues of Go scholars.

1. How to Bridge Philosophers and Go Players: Korean Society of Baduk Studies

1.1. Philosophy of Baduk and Papers Published in Journal of Baduk Studies

In 1997 Myongji University startled the Go world and the entire academia by opening a new department of Baduk Studies. It was a historical event that inspired me to reflect upon some of the possibilities for the philosophy of Go

as a part of Go studies. The outcome of the reflection is found in my book *Philosophy of Baduk*. [Park (2002)] I was so happy when the professors of the Department of Baduk Studies welcomed my book. I believe that, with all its problems and limitations, my book at least contributed to the founding of the Korean Society of Baduk Studies in 2003. As a founding member of the Society, I have continued to take a small part in it, as a member of the Board of Trustees, as a vice president, as the president,

The most important message in my book was summarized in my unpublished article entitled “Abduction and Thought Experiment in Baduk”, which I read at the Helsinki international conference “Applying Peirce” in 2007. [Park (2007)] Though immature in many ways, it clearly shows what problems I had wanted to solve through my series of papers compiled in my book. Given the ongoing controversy as to whether abduction is inference to the best explanation (IBE), it is by no means clear what abduction is. This situation seems partly due to the lack of clear examples of abduction in the history of science. So, I proposed to look for better examples of abduction in an oriental board game called Baduk(Go; Weichi). For, at the most crucial stages in the game, Baduk players delve into sophisticated reasoning that is neither deductive nor inductive. As recent Peirce scholarship has unearthed game theoretic, dialogic, interrogative, and strategic aspects of his thought, it seems a timely project to analyze abductive reasoning in Go. I tried to show how to interpret Go players’ abductive reasoning as based on the so-called sequence dissection technique. Then, this technique could be assimilated into the proof-theoretic procedure of reduction (contradistinction to deduction) in Aristotle’s logical theory. Insofar as sequence dissections can shed light on abductive reasoning in Go, I argued, we may improve our understanding of scientific abduction at the same time.

In retrospect, I have to say that my selective abductive choice to participate in “Applying Peirce” conference turned out to be a divine move. There I met Lorenzo Magnani, John Woods, and Ahti-Veikko Pietarinen, who have become my best friends and co-workers. It is almost impossible to mention all the projects we did together. Let it suffice to indicate that Abduction in Context [Park (2017)], “Logical Foundations of Strategic Reasoning”, Special Issue of *Journal of Applied Logics - IFCoLog Journal of Logics and their Applications* [Park and Woods (2018)], and *Natural Arguments: A Tribute to John Woods* [Gabbay, Magnani, Pietarinen, and Park (2019)] are all based on our friendship that started in the Helsinki conference.

1.2. Counterfactual Reasoning in Baduk

The first issue of the *Journal of Baduk Studies* appeared in 2004, and I am so proud of the fact that my paper was included in it. In “Counterfactual Reasoning in Baduk: A Preliminary Survey” [Park (2004)], I examined in a somewhat cursory fashion what a cognitive scientist, who has been tormented by recurrent problems of analyzing counterfactuals, might learn something from counterfactual reasoning in Go. At the same time, it might enhance Go players’ self-consciousness of what exactly they are doing in their constant performance of counterfactual reasonings. In this preliminary survey, I concentrated on the problem of evaluation of counterfactual reasoning. For, whether it be posed as a problem of establishing the truth condition of counterfactual conditionals or as that of searching for conditions of rational support, what makes counterfactuals challenging must be found in the unexpected difficulties involved in their evaluation. I used Hansson’s analysis as a foil to fathom how and in what respects we might highlight the most salient

features of the counterfactual reasoning in Go. [Hansson (1995)]

In retrospect, this piece is just a plea to both logicians and professional Go players to collaborate. Logicians should provide us with updated information on the logic of counterfactual reasoning in the last twenty years. Professional Go players together with psychologists of Go may analyze their counterfactual thinking process at all stages of the game. Even though the game records already present ample sources for studying counterfactual reasoning, it would be nicer if professional Go players kept in-depth recollections in diaries.

1.3. Belief Revision in Baduk

In “Belief Revision in Baduk: A Preliminary Discussion” [Park (2005)], I suggested that a study of belief revision in Go could be an unexpectedly fertile ground of research for logicians, philosophers, computer scientists, and game theorists as well as for Go players. The study of belief revision turns out to be one of the most distinguished success stories in the recent history of logic. Starting from the legendary AGM postulates published in 1985, it has expanded its scope far beyond epistemic logic and philosophy of science up to computer science, artificial intelligence research, and economics. Nevertheless, there are many serious open problems, which are largely philosophical in character, in current theories of belief revision. By examining some typical situations of belief revision in Go, I proposed to shed light on one of those philosophical problems, i.e., the principle of informational economy in AGM theory.

In retrospect, I have to confess that I failed to make clear how the problems of belief revision in Go are connected to the problems of counterfactual

reasoning in Go. It is indeed regrettable, for it may not be too difficult to do that if I had analyzed just one game record in terms of how counterfactual reasoning and belief revision are intertwined in the players during the game. As we can witness the recent great achievements in psychologists' study of counterfactual reasoning, some fruitful collaborations between Go players and cognitive scientists are expected shortly. [See, for example, Hoerl et al. (2011)]

2. After AlphaGo Shock

I struggled to understand human reasoning by learning from Go long before AlphaGo's appearance. How have I responded to AlphaGo's challenge, then? In some sense, I have just continued to try to understand human reasoning by learning something from Go. But the meaning of "learning from Go" itself has changed drastically and irrevocably.

Immediately after AlphaGo shock, I published three papers in *Journal of Applied Logics - IFCoLog Journal of Logics and their Applications*. Two of them were based on my presentation at the international workshop "Logical Foundations of Strategic Reasoning" hosted by Korean Society for Analytic Philosophy in 2016 and KAIST. Later, I co-edited and published with John Woods, who was the plenary speaker for the international workshop, the proceedings of this workshop as a special issue of *Journal of Applied Logics - IFCoLog Journal of Logics and their Applications*. [Park (2018a, 2018b)] The third paper was the outcome of my collaborative research with Jeounghoon Kim, who is a cognitive scientist, and his students. [Park, Kim, Kim, and Kim (2019)]

2.1. Enthymematic Interaction in Go

In “Enthymematic Interaction in Baduk”, I proposed to view each move in a game of Go as presenting an enthymematic argument. [Park (2018a)] It is largely inspired by Paglieri and Woods, who suggested parsimony rather than charity as the driving force of enthymematic argumentation. [Paglieri and Woods (2011)] Since their theory is not the final word in the history of enthymeme, my interpretation of Go as enthymematic interaction in terms of their fine distinctions may shed light not only on strategic reasoning in Go but also on the study of enthymeme itself.

In retrospect, I tend to think that the elementary character of this paper was inevitable for bridging the two different groups of experts: i.e., logicians and Go players. I also believe that I have been on the right track in tackling the thorny issue of the explainability of artificial intelligence. In particular, the dialogical and dynamical orientation of my approach is consonant with the most recent trends in logic, discourse analysis, argumentation theory, etc.

2.2. Strategic Reasoning in Go

Strategic reasoning is everywhere, as it has been a focal issue in many scientific disciplines. In “When Is a Strategy in Games?”, I argued, however, there is an unbridgeable gap between the concept of strategy in game theory and that in real games played by actual human players. As an antidote, I proposed to analyze the concept of strategy in Go. For, in this ancient Asian board game, which has become famous for the recent success of AlphaGo, we can get lessons for both theoretical and practical reasoning. Admittedly,

the previous discussions of strategy in Go literature are not thorough enough to secure a rigorous definition of strategy. However, there is one important clue: What is salient in usual approaches to strategic reasoning in Go is that strategy is always discussed together with tactics. Ultimately, I aim at a concept of strategy, according to which (1) it is not necessarily the case that a strategy is found in any game, (2) there has to be an intriguing interaction between a strategy and tactics, (3) it is inconsistency-robust. I shall present an analysis of a historical game record as an example that satisfies all these desiderata. Insofar as this preliminary attempt deserves more careful examination, it would be interesting to raise questions such as “Does AlphaGo have Any Strategy?” or “Could There Be a Strategy in a Mirror Game?”. By discussing these questions, I was able to hint at some implications of some crucial concepts, such as backward induction or common knowledge, in game theory.

In retrospect, I regret that I failed to consume more extensively the pioneering achievements of Johan van Benthem and his followers in the areas of game logic and epistemic logic in general. [Van Benthem (2014)] Insofar as this paper was a response to John Woods’ ideas on the logical foundations of strategic reasoning, its value should be assessed in that particular context. The good news could be that, if there is something for epistemic logicians to learn from my paper, they will be able to learn many more precious things from Go players about strategic reasoning.

2.3. AlphaGo’s Decision Making

In “AlphaGo’s Decision Making”, co-authored with S. Kim, G. Kim, and

J. Kim, I studied the similarities and differences between the process of decision-making in humans and AlphaGo in playing Go. [Park, Kim, Kim, and Kim (2019)]

Previous discussions of unique or unconventional moves of AlphaGo ignored how AlphaGo tends to play in different situations: (1) when AlphaGo is leading the game, (2) when she is falling behind, and (3) when the situation of the game is close enough. Nor did they pay due attention to the problem of strategic choice of moves of AlphaGo. We argued that (1) that AlphaGo tends to play very thick and safe enclosing moves when she is leading the game, (2) that she tends to play do-or-die (all-or-nothing or gambling) moves that are backed up by very carefully calculated scheming strategy when there is no hope to win the game, and (3) that she tends to figure out creative moves in order to take the initiative when the game is close enough. After sharpening the concept of strategy itself, we also argued that there is sufficient ground to ascribe strategic reasoning to AlphaGo. Based on DeepMind AlphaGo team's monumental paper in Nature [Silver et al. (2016)], we checked to what extent our results are compatible with AlphaGo's structure and its operating principles. What is most striking in our examination of AlphaGo's decision-making is that her features can be better explained by prospect theory [Kahneman and Tversky (1979)] rather than by expected utility theory. To test this hypothesis, we analyzed many examples from AlphaGo's games. We concluded with a brief discussion of the possible implications of our study and the remaining urgent problems for future study.

In retrospect, I realize that this study was impossible without the help of many people, including Dr. Byung-Doo Lee, a computer Go researcher, and

Master Jin-seok Mok, the ex-coach of Korean national team of Go. If there is anything remarkable in this study, it must be because it was achieved in the true team spirit. Unfortunately, we failed to secure a grant to continue our collaborative research. Interdisciplinary, multidisciplinary, and transdisciplinary research on Go is urgently needed.

3. How to Make AlphaGo's Children Explainable

The international journal *Philosophies* invited me as the guest editor of a special issue on “Abductive Cognition and Machine Learning: Philosophical Issues”. I heartily accepted the invitation, and the paper entitled “How to Make AlphaGo's Children Explainable” is my contribution to the special issue of the journal. [Park (2022)] was my own contribution to this special issue.

Under the rubric of understanding the problem of explainability of AI in terms of abductive cognition, in chapter 8, “How to Make AlphaGo's Children Explainable”, I proposed to review the lessons from AlphaGo and her more powerful successors. As AI players in Go have arrived at a superhuman level, there seems to be no hope for understanding the secret of their breathtakingly brilliant moves. Without making AI players explainable in some ways, both human players and AI players would be less-than-omniscient, if not ignorant, epistemic agents. Are we bound to have less explainable AI Go players as they make further progress? I showed that the resolution of this apparent paradox depends on how we understand the crucial distinction between abduction and inference to the best explanation (IBE). Some further

philosophical issues arising from explainable AI were also be discussed in connection with this distinction

In retrospect, I would say that this paper represents how my views on Go changed by AlphaGo and the subsequent developments. Contrary to what most people thought, even after the appearance of AlphaGo and her descendants, we humans are still enjoying playing Go. By now, no one doubts the superiority of AI Go players over the best human Go players. Nevertheless, professional Go players have updated their skills and knowledge to such an extent that was never thought to be possible for humans. This unexpected remarkable development should be studied extensively later by scholars of Go studies. The limitation of my paper is rather obvious, as I failed to get feedback from scholars in other scientific disciplines and professional Go players. To upgrade this paper, researchers representing more than three or four different areas and those professional Go players who especially devoted their time and energy to human/computer interaction. It is my shame, in particular, that I failed to contact the leading scientists of DeepMind who created AlphaGo and her children.

4. Philosophy of Go as the Key for Philosophy of Skills and Expertise

My reflection on AlphaGo and human interactions with her and her children deepened my understanding of abductive cognition and reasoning. My most recent papers clearly show this fact.

Inspired by Bermúdez's notion of proto-logic and Magnani's pioneering

role in the study of animal abduction, in “What Proto-logic Could not Be”, I tried to fathom what the true proto-logic could be like. [Bermúdez (2007); Magnani (2007, 2022); Park (2021a)] But this was approached only in a negative way of figuring out what it could not be. I argued that it could not be purely deductive by exploiting the recent research in logic of maps. This allowed us to reorient the search for proto-logic, starting with animal abduction. I also suggest that proto-logic won’t get off the ground without proto-geometry. These negative results shed some light on some further conceptual and historical issues around the language of thought (LOT) hypothesis to arrive at the true proto-logic.

In Park (2021b), I asked “How do we discover and justify axioms of mathematics?” Given the long history of axiomatic method, not to mention the history of logic and mathematics as a whole, it is rather embarrassing that we are still lacking a standard answer to this simple question. Thomas Forster’s recent paper “The Axiom of Choice and Inference to the Best Explanation” provides us with a nice point of departure: “An argument often given for adopting the Axiom of Choice as an axiom is that it has a lot of obviously true consequences. This looks like a legitimate application of the practice of Inference to the Best Explanation”. [Forster (2006), 191] The axiom of choice is arguably one of the most frequently discussed famous axioms throughout the history of mathematics. The heated controversies around the discovery and justification of this axiom indeed supply rich sources of insights for philosophers and historians of mathematics. Furthermore, by treating the crucial terms “abduction” and “inference to the best explanation (IBE)” as synonymous, Forster presents me with a perfect target I intend to aim at in this paper. I will argue that, by separating sharply between abduction and IBE, we can give a convincing account of both the discovery and

the justification of the axioms of mathematics. I will tackle the problem of the discovery and the justification of the axiom of choice as a concrete example for comparing Russell's and Zermelo's regressive method. John Woods' idea of regressive abduction as abductive premise search and mathematical proof as enthymeme resolution will loom large in this discussion. Contrary to Woods' denial of the identity of these two intriguing searches, I will speculate on the possibility of assimilating them by introducing the notion of abductive enthymeme.

Currently, I am trying to synthesize my ideas in these two papers on abduction with those presented in my papers on AlphaGo and her children. In this exciting venture, I am especially pursuing the possibility of connecting my ideas on Go and abduction with Fernand Gobet's recent work on knowledge based on expertise. For, the currently available knowledge of Go is mostly knowledge of skills and expertise rather than theoretical one. As a distinguished psychologist, Gobet has published many articles and books on chess based on his research using eye trackers. Good news is that he has also published articles on Go most recently. [See, for example, Bossomaier, Traish, Gobet, and Lane (2012); Gobet (2017)] Under the general rubric of "Knowledge of Skills and Knowledge in Go", we may secure all possible collaborations of scholars in Go Studies. We do not merely pursue issues of Go Studies scientifically. Rather, we hope to find a way for the entire world of human learning inspired by Go and Go Studies.

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