

Chapter 11

Logic as a Narrative

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ABSTRACT

In this chapter, the authors present an argument which can be called “logic as a narrative.” First, they consider two different types of systems concerning logic. One is formal logic, which is ordinarily called mere logic. Another one is a collective of knowledge that we may not regard as logic at first glance. The argument of “logic as a narrative” starts with a comparison between two types of logical systems. Formal logic, which is often handled as mathematical logic nowadays, can be regarded as one of the mathematics, as the name itself indicates. As well as the other mathematical systems, formal logic is formalized and schematized by axioms; hence, it is also an axiomatic system. All the propositions are described axiomatically; thus, axioms and application rules of axioms precede propositions. Outside situations that are not supposed in an axiomatic system cannot be naturally represented by the system. The expressive power depends on each system. As a result, the description by mathematical logic becomes static and the system itself is regarded as a non-dynamic one.

INTRODUCTION

It is being considered that logic is a packed powerful system. By using logic, things or matters are classified into some groups. In a similar way, accumulated situation is applied into another unexperienced situation. Each specific experience is transformed into a general law through already approved logic. Formal logic is one of the most sophisticated such ones. Meanwhile, logic is ineffective for completely unknown situations. At the periphery of logic, things are examined whether they are incorporable to logic or not, and logic itself is updated.

In this chapter, above features are focused on as intrinsic and important functions of logic. The features can be summarized as soundness on each instant, and updatability of a logical system. A system satisfying the soundness and the updatability is a useful logical system, and called such a logical system a *Logic as a Narrative* (LaaN) in this chapter. A proposal of LaaN is as follows. First, two different types of systems concerning logic are considered. One is formal logic, which is ordinarily called merely as logic. Another one is a collective of knowledge that may not be regarded as logic at the first glance. The argument of LaaN starts with a comparison between such two types of structures.

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Logic as a Narrative

Formal logic, which is often handled as mathematical logic nowadays, can be regarded as one of the mathematics, as the name itself indicated. As well as the other mathematical systems, formal logic is formalized and schematized by axioms, hence it is also an axiomatic system. All the propositions are described axiomatically, thus axioms and rules of the application of axioms precede propositions. Outer situations that are not supposed in an axiomatic system cannot be naturally represented by the system. The expressive power of the system depends on each system. As a result, the description by mathematical logic becomes static and the system itself is regarded as a non-dynamic one.

It is sometimes difficult that a non-dynamic system responds to indeterminate situations properly, because all the situations of the indeterminate world cannot be described preliminarily (McCarthy & Hayes, 1969). In fact, this is an inevitable feature of the indeterminate one by its definition. For example, logical inclusive relation is ensured by definitions of both antecedent and consequent. The definitions of objects and relations among objects precede detailed observations of objects that are applied in the system. One of the purposes of formal logic is an abstract description of relations among objects under eliminations of features of each object.

What are more practical logical systems? One direction to the solution is a basis-free construction. Here, the basis means an axiom or a definition. In addition, the basis also indicates other ones: Top and Bottom elements. In general, the definition of complement of an element needs Top and Bottom elements. Top and Bottom elements are representations of the whole and the empty of the world, respectively. Adopting Top and Bottom elements is a decision of the range influenced by the system. In this sense, the Top and Bottom elements are bases of the logical system, which determines the act of the system. Practical logical systems may include variable Top and Bottom elements. For example, consider subsets of $\{a, b\}$. The Top and Bottom elements are $\{a, b\}$ and $\{\}$, respectively. However, when subsets of $\{a, b, c\}$ is considered, the Top and Bottom elements become $\{a, b, c\}$ and $\{\}$. Note that the former Bottom element is represented by to either $\{c\}$ or $\{\}$ in the latter system, thus the former and latter do not necessarily correspond to each other. The former system is a subsystem of the latter one.

These basis-free features can enable the system to have a potential to be connected to both change of situations in the system itself and new situations in other systems. Though such system acts as a consistent logical system in a current moment, at the same time, it has an ability to change in order to adapt a new situation. It is important to satisfy concurrently these two aspects: consistency and adaptability. When a system has these two aspects, the system is regarded as a useful logical system.

This chapter is organized as follows: in the first subsection of the second section, some different aspects of logic are discussed when logic is treated as a formal system. To group the aspects into some pairs helps us to understand. In the second subsection of the second section, a narrative is introduced as a theoretical apparatus of an integration of the divided logics. This subsection is a theoretical description of the project of LaaN. In the third section, a concrete network model representing LaaN is developed. The model is a simple but strong network model, similar to the BA model (Barabási & Albert, 1999). This part is based on a preprint (Sawa, 2015). In the fourth section, some meanings, implications and future possibilities to be evoked from LaaN and the model are presented. In sum, this chapter is a proposal that logic becomes more useful when it is treated as one with a narrative or a narrative itself.

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