1 Reorganize Figure 1

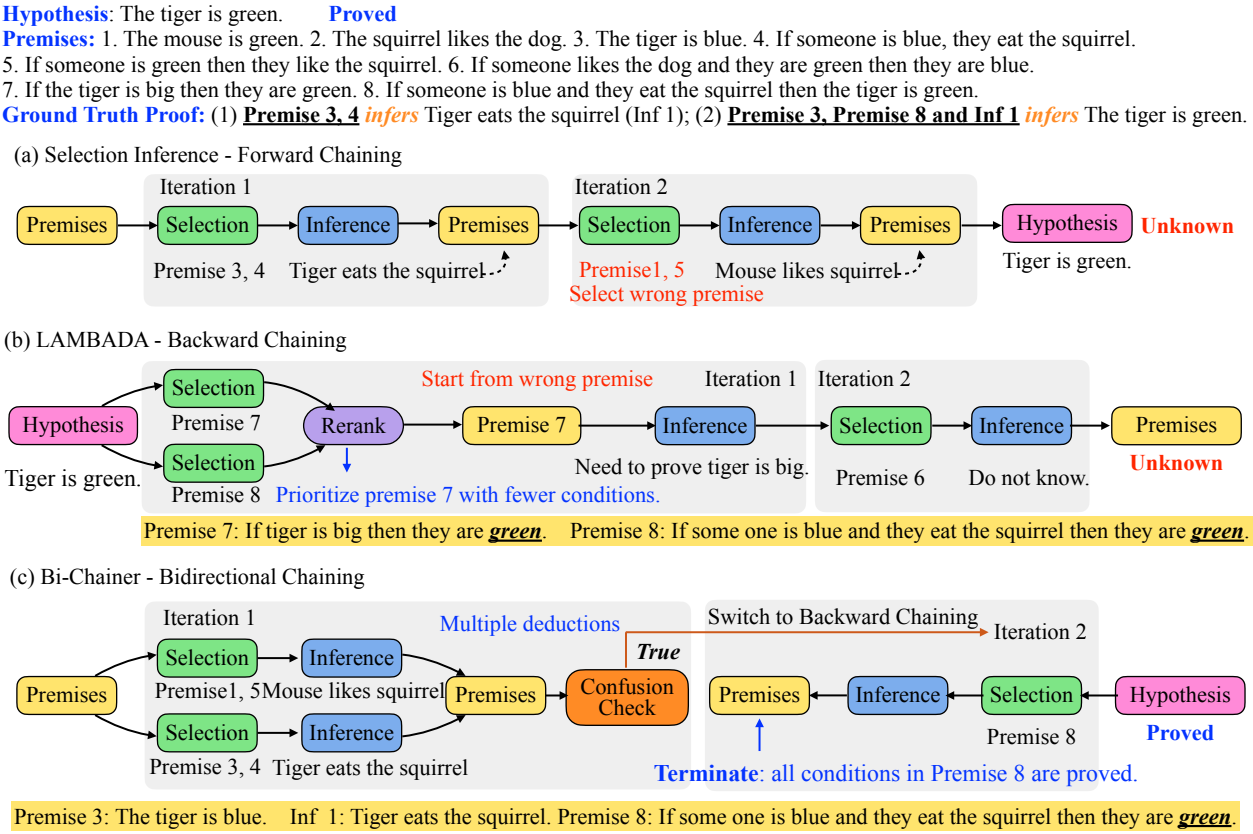

Figure 1: Bi-Chainer framework in bidirectional chaining (c) in comparison with the Selection-Inference framework in forward chaining (a) and the LAMBADA framework in backward chaining (b). Each iteration step involves rule selection and executing a logical deduction in forward chaining or a logical abduction in backward chaining.

2 Revised Section 3.1

Bidirectional chaining is a reasoning strategy that combines both forward and backward chaining to facilitate the inference process. It involves simultaneous exploration in both directions, starting from the available facts and working forward to derive new conclusions, while also starting from the goal and working backward to decompose the goal into sub-goals using applicable rules.

Figure 1 illustrates the application of bidirectional chaining in proving a hypothesis using a set of premises. Initially, forward chaining is employed to derive more definite facts and update the premises. In the forward chaining process, deductions are made based on selected premises, such as Premises 3 and 4 leading to the deduction "Tiger eats the squirrel", and Premises 1 and 5 establishing the deduction "Mouse likes squirrel". However, as multiple deductions are obtained, further forward chaining becomes confusing on which deduction to select to continue the chaining process. Therefore, the Confusion Check module triggers a switch to backward chaining. In the backward chaining phase, both Premise 7 and Premise 8 support the consequence of the hypothesis "Someone is green". However, Premise 8's conditions can all be proven using the intermediate deductions obtained from forward chaining. As a result, the hypothesis is successfully proved using bi-directional chaining.