

Reasoning About Evidence in Hypothetical Situations

(Extended Abstract for “Epistemology Meets Logic, Informally”)

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1 Introduction

A *multi-agent situation* is a set of circumstances involving a finite number of individuals, each of which has his own beliefs and evidence as to what is true at any particular moment during these happenings. A *descriptive report of a multi-agent situation*—hereafter called a *report*—is a written document consisting of a sequence of assertions whose joint purpose is to describe a multi-agent situation to a reader. Everyday examples of reports include news articles, police accident reports, and affidavits submitted to a court of law.

Our intent here is to restrict our attention to reports whose accuracy is not at issue. One way of understanding our intent is to think of a report not as a description of something that actually happened but instead as a description of a hypothetical situation that is defined by the sequence of assertions made in the report. So one should not read a report thinking, “Is the writer presenting a distorted picture of reality?” Instead, one should read a report thinking, “Based on what I have read in this report, what do I know about the situation therein described?” In essence, a report defines a situation, and the reader is then asked to perform various thought experiments subject to the constraints of the situation.

Our work is motivated by the philosophical analysis of knowledge, where reports are used to explicate concepts, provide examples and counter-examples, and constrain the scope of discussion so that precise statements may be formulated and tested. Since our motivation arises out of epistemic concerns, our focus will be on the concepts of truth, justification, belief, and knowledge. Specifically, we will be interested in how one can reason about reports concerning the knowledge and evidence held by each of a finite number of individuals.

2 The Gettier Examples

In a famous paper [9], Gettier gave two examples in which an individual S has a justified true belief (meaning a *correct* justified belief) of something and yet it is incorrect to say that S knows that something. The second of Gettier's examples has the following basic structure.

1. S has a justified belief that F is true.
2. Unbeknown to S , it turns out that F is false and B is true.

This is an example of a report: it is a sequence of assertions that describes a multi-agent incident (though only one agent is involved in this particular example). Based on this report, Gettier argues that it is possible to have justified true belief without having knowledge. His argument goes as follows. S has justified belief of $F \vee B$ by the fact that S has justified belief of F and then reasoned that $F \vee B$ using the logical principle $F \supset F \vee B$. S 's justified belief of $F \vee B$ is true (as in *correct*) by Line 2. So S has a justified true belief that $F \vee B$. However, it is incorrect to say that S knows $F \vee B$ because S 's justification for $F \vee B$ is based on his evidence for F , and the latter evidence is faulty by the fact that F is false. S therefore has justified true belief of $F \vee B$, but he does not know that $F \vee B$.

Notice how Gettier's argument does not call into question the accuracy of the report. After all, the intent of the report is to provide a counter-example, and so the statements of the report are to be understood as defining a particular domain in which we are to perform the reasoning given by Gettier's argument.

3 This Talk

Our task in this talk is to discuss our efforts toward developing a theory in which we can formalize Gettier's reasoning within the domain defined by the report in the previous section. In general, this theory ought to be able to formalize the reasoning a reader may undergo when reasoning within the domain of a report concerning the beliefs, knowledge, and evidence of a finite number of individuals.

Our theory will make use of a number ideas from the evidence framework of Justification Logic, which is a family of theories for reasoning about evidence and justification alongside other doxastic attitudes [1, 2, 3, 4, 5, 6, 7, 8, 10, 11]. Our task will be to describe how appropriate combinations of these theories can meet our goals. A particular challenge we must address is the issue of derogation of evidence in a report. Handling this of this issue is essential to the formalization of the Gettier example: while the reader accepts that S has a justified belief of $F \vee B$ after reading lines 1, reading line 2 causes the reader to discount S 's justification in line 1, which leads the reader to reject S 's justified belief in $F \vee B$.

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