Logic for Lunatics

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Hintikka taught us that S5 was the wrong epistemic logic because of the unwarranted powers of negative introspection afforded by the (5) schema, $\Diamond p \to \Box\Diamond p$. (Tim Williamson later targeted the (4) schema, and with it S4, but that is another story.) The punchline here is that the problem is really the (B) schema, also known as the Brouwershe schema:

(B) $p \to \Box\Diamond p$.

In fact, you should think of the (5) schema within S5 as the best hand to play in a classical modal system with (K) when you are dealt the (B) schema. That is the conclusion of (Wheeler 2015), which is about the *logic of information* rather than logic for lunatics. The behavior of (B), when interpreted as an epistemic modal rather than as a provability operator, is so bizarre, so unreasonable *qua* epistemic modal, that epistemic logicians should stop referring to (B) as the Brouwershe schema to avoid sullying Brouwer's good name. Instead, I recommend hereafter for epistemic logicians to refer to (B) as *The Blog Schema*.

While (B) is a normative disaster for epistemic modals, it has a second life in a descriptive theory of philosophy tabloids. Here we present sound and complete axiomatizations for two tabloid blogs: Leiter Reports and New APPS. I shall first describe the mechanism that the (B) schema captures, then the general class of logics to which these two tabloids belong, then their individuating descriptive axiomatizations.

Within regular modal systems the (B) schema entails the following two known schemas, which in the original paper I call the *Bombs Away LeMay* schemas, or BAM. But for Lunatic Logics they may just as well be called the BUM schemas:

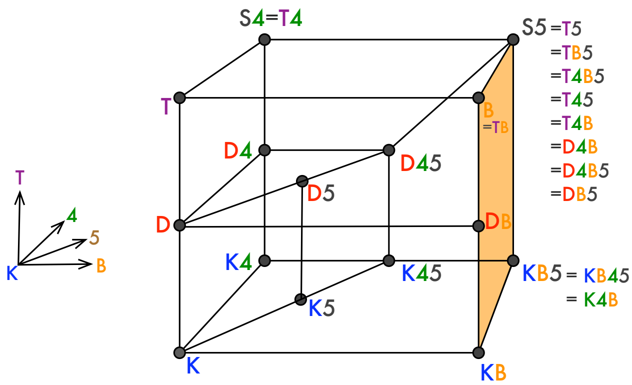
(BUM1) $\Box(\Diamond p \to q) \to (p \to \Box q)$.

(BUM2) $\Box(p \to \Box q) \to (\Diamond p \to q)$.

The problem is that classical modal systems that include K and these BUMs are trigger-happy, licensing inferences that no regular epistemic logic should accept. To illustrate, interpret the box as the (weak) epistemic model "Subject S is informed that —." Now consider the following example, which pulls its misbelief out of BUM2:

> *Emperor Caligula, meeting with his praetorian guard, is informed that ($\Box$): if there is a conspiracy (p), then Caligula is informed that there is danger ($\Box q$). Caligula immediately concludes that there is danger and stabs his guard. "Why?" the dying soldier asks. "Because Caligula is not informed that there is not a conspiracy," Caligula replies.*

Provided that Caligula is informed either that there is no conspiracy or he is informed that there is danger, Caligula can pull from BUM2 the reasoning that, if he is not informed that there is no conspiracy, then there is danger.



The figure to the left highlights in orange a subset of canonical BUM systems. Notice that S5 is a BUM system, but in this case the (5) schema explains the jump in reasoning. Contraposed, the (5) schema says that you are informed that p is false if the falsity of p is not luminous to you, which is to say that you are not informed that you are not informed that p is false. The (B) schema, by contrast, mixes form. The (B) schema says that the falsity of p is not luminous to you if p is false, tying the standing of a cognitive state, the failure of luminosity of p, to the bare semantic fact of whether p, but it does so without the means to explain the connection. That is (5)'s job. The weaker BUMs don't give any explanation at all. Finally, the (K) schema adds distribution to the mix, which allows a cognitive state about p to depend on the bare semantic fact of some other q, yielding reasoning that only a lunatic would love.

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Nelson Goodman remarked somewhere that the price of fame in philosophy is banality. I wonder what he would have made of philosophy tabloids. Each is a mille-feuille of rumor, non-sequiturs, outrage, and insult, much like any other tabloid. But characteristic to philosophy tabloids, I suggest, is reasoning by BUMs: drawing an inference to one thing without information about another, and doing so without confronting honestly how the one thing is related to the other.

The weakest, most general normal BUM system is KB, which is called *Leiter Logic*. Leiter Logic is neither constrained by truth nor by reflection. Its commitments are to distribution and symmetry.

New APPS, a second generation philosophy tabloid, is characterized by the BUM system KDB, which is *Deontic Leiter Logic* in a single-agent format, or *Shame Game Logic* in multi-agent form. This is Leiter Logic but with a commitment to moralizing about other people's obligations or perceived failings, either as individuals or as abstract categories.

Lastly, both KB and KDB are well-known to be sound and complete normal modal logics. See (Chellas 1980).

References

Chellas, B. (1980). *Modal Logic*. Cambridge: Cambridge University Press.

Wheeler, G. (2015). Is there a logic of information? *Journal of Experimantal and Theoretical Artificial Intelligence 27*(1), 95–98.