

PHYSICAL MODALITIES AND THE SYSTEM E

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A sentence may be said to be physically necessary either simpliciter or relatively to another sentence. Candidates for the former are such sentences as 'the speed of light is finite' (assuming this is not analytic) or ' $F = MA$ '. Candidates for the latter are such sentences as 'the pencil will fall,' which could be necessary only given the truth of other sentences about the status of the pencil. Surely the use of the former, the monadic, modality is somewhat limited in scope, while the latter, the binary one, is quite widespread.

In "A New System of Modal Logic," Georg von Wright constructs a system of binary modalities called M_d , introducing as primitive ' $M(\underline{\quad}/\dots)$ ' to be read ' $\underline{\quad}$ is possible relatively to \dots '. An interesting feature of this system is that the more familiar alethic modalities can be defined in it, as can the binary physical ones. Thus it would seem as if M_d is just the system to distinguish the two. Unfortunately, von Wright imbeds M_d in a system of material implication. Anderson and Belnap have argued at some length in [1] and [2] that material implication, like the Lord Privy Seal, who is neither the Lord nor a privy nor a seal, is neither material nor an implication relation. Instead, they offer a system called E which suffers from none of the difficulties besetting systems of material implication. In this paper I shall try to carry out in E von Wright's program with respect to the physical and alethic modalities.

The most obvious way to do this is simply to adopt von Wright's system wholesale, interpreting his implications as Anderson and Belnap entailments. In doing so, I shall make two minor changes. First, while von Wright takes relative possibility to be primitive, I take relative necessity to be primitive in order to facilitate the fit with E. (The two notions are dual in the usual way.) Second, von Wright introduces ' $N(\underline{\quad}/\dots)$ ' as symbolizing relative necessity. This notation proved a little confusing when the ' $N\underline{\quad}$ ' of alethic necessity is introduced to the system. Thus, I have replaced it with ' $\mathcal{H}(\underline{\quad}, \dots)$ ' and ' $\mathcal{M}(\underline{\quad}, \dots)$ ' for relative necessity and possibility respectively, where ' \mathcal{H} ' and ' \mathcal{M} ' are Cyrillic script for the Latin 'N' and 'M'. The von Wright axioms, then, become these: