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Logics of dichotomous change

Contemporary temporal logics, studied and applied also in computer science, have philosophical roots. Arthur Prior, the creator of the first contemporary temporal logics, was motivated in his researches by the following question: how can we consistently describe a world where time flows due to the changes occurring within it? As a result, he proposed logics that enable to construct deductive reasonings with temporal parameters. Logics such as LTL, PDL, and CTL fulfill the original idea of Prior. In these logics, there are primitive expressions such as "always it will be...", "in next moment it will be", "until it will be". In models of some of these logics time is linear and in other cases it is parallel, or branching. We will show that Prior's project can also be realized by using the primitive notion of change which enables to define Prior's temporal operators. Our approach is limited to dichotomic changes, that is, those that occur between contradictory states of affairs (in the classical sense of contradiction). As we will show, within the framework of our logics we also can describe linear, parallel or branching courses of time. The presented logics of change and Prior-like logics represent two competing ways of talking about time – one might say they are two sides of the same coin. The proposed logics can be applied in discourses that are based on the concept that changeability is a measure of the passage of time. Such discourses are present not only in philosophy, but also, for example, in the social sciences, medicine, and psychology.

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