Grünam, following Reichenbach, argued throughout the course of his life for the thesis that there is no fact of the matter whether, relative to a fixed, given inertial observer, events that are space-like separated from one another occur simultaneously. To be sure, all agree that distant simultaneity is relative to inertial observers in different states of motion who use the same synchronization procedure within their respective frames. But the thesis of conventionality for a single observer, as originally claimed by Einstein, does not command universal assent. Most notably, Malament (1977) took issue with Grünam’s claim that simultaneity for space-like separated events cannot be definable uniquely. Malament argued that, given certain allegedly innocuous assumptions, there is a unique criterion of simultaneity relative to an inertial observer that is definable from the causal structure of Minkowski spacetime. In response, Grünam countered that, on closer inspection, (some of) the allegedly innocuous assumptions are not so innocuous after all. The result, according to Grünam, is that Malament surreptitiously introduced a conventional element, and, thus, that Grünam’s original reasons for embracing the conventionalist thesis remain unscathed. (Grünam also argued against certain considerations against conventionality registered by Michael Friedman and endorsed by Malament, but this lies outside the scope of the present considerations.)

In this paper I argue inter alia that, although the conventionality thesis, as originally understood by Einstein, is cogent, Malament’s critique of Grünam is on target and Grünam’s reply deficient. In his works prior to 1977, Grünam assumed that the light cone structure of spacetime is already fixed (as well as causal structure in general) and argued that “topological” simultaneity (space-like relatedness) underdetermines metrical simultaneity since the $\epsilon$ parameter in Reichenbach’s formulation of the problem, is constrained only to the open interval $(0, 1)$, and not to the standard value $\epsilon = 1/2$. However, this is not the set-up as originally conceived by Einstein. Einstein claimed that there is no fact of the matter whether light takes the same amount of time to travel from point $A$ to point $B$ as it does to traverse the reverse course from $B$ to $A$. It is a matter of convention, then, that the speed of light is the same in both directions. Since the speed of light determines the light cone structure, it follows, as strange as it sounds, that convention is involved in fixing the causal structure of spacetime. The sense of weirdness is alleviated when it is realized that, at this stage of development of the kinematics, Einstein
has already laid out a coordinate chart on the manifold by means of an ensemble of rigid rods and periodic processes, but has done only that.

If the light cone structure is already given, then Malament’s method of defining the $\epsilon = 1/2$ criterion of simultaneity from causal structure goes through. Intuitively, this is given by the vectors Minkowski-orthogonal to the inertial observer’s tangent vector. So, Grünbaum was unwittingly correct in having accused Malament of tacitly introducing a convention. But Grünbaum’s earlier arguments also presupposed this convention and so fallaciously argued for a convention on top of a convention.

Finally, as I have argued elsewhere, Einstein’s conventionality thesis can be understood in terms of the hole argument. Different conventions correspond to Leibniz-shifted models. Those with a policy of Leibniz equivalence might see this as a refutation of conventionalism. But even if Leibniz equivalence can be understood, not as a metaphysical stance, but as a consequence of how we apply mathematics to the world, then Leibniz equivalence is blocked at the outset in Einstein’s argument. A (global) coordinate chart is given which serves to individuate the manifold of events. But if the Einstein premise to the effect that this can be done in principle with rods and clocks proves unrealistic, Leibniz equivalence again ensues and the conventionality thesis is defeated. This would indeed be a novel argument against that position.