FUNCTORIAL PROLONGATIONS OF LIE GROUPOIDS

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Our starting point are the results by C. Ehresmann on the jet prolongations of Lie groupoids and their actions. We extend his construction to the case of an arbitrary fiber product preserving bundle functor F on the category of all fibered manifolds with m-dimensional bases and fiber preserving maps with local diffeomorphisms as base maps. We deduce that every Lie groupoid Φ over M induces a Lie groupoid $\mathcal{F}\Phi$ over M and every action of Φ on a fibered manifold $Y \to M$ induces an action of $\mathcal{F}\Phi$ on $FY \to M$. The principal bundle version of this result was deduced by M. Doupovec and the author in Monatsh. Math. 134(2001), 39–50. Our procedure is essentially based on the characterization of F in terms of Weil algebras by W. Mikulski and the author, Differential Geometry and its Applications 11(1999), 105–115. We also clarify that for every Weil functor T^A on the category of all manifolds, $T^A\Phi$ is a Lie groupoid over T^AM and every action of Φ on Y is canonically extended into an action of $T^A\Phi$ on $T^AY \to T^AM$.