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Michael Robinson* (michaelr@american.edu), 220 Don Myers Building, 4400 Massachusetts Ave NW, Washington, DC 20016. *The Category of Binary Relations, Dowker complexes, Cosheaves, and Functoriality.*

The Dowker complex is an abstract simplicial complex that is constructed from a binary relation in a straightforward way. As motivation, this talk will consider the problem of determining a consensus file format from the behavior of programs that purport to read compliant files. Although there are two ways to perform the Dowker construction – vertices for the complex are either the rows (programs) or the columns (files) of the matrix representing the relation – the two constructions are homotopy equivalent. This talk explains how the construction of a Dowker complex from a relation is a non-faithful covariant functor. Furthermore, this functor can be made faithful by enriching the construction into a cosheaf on the Dowker complex. The cosheaf can be summarized by an integer weight function on the Dowker complex that is a complete isomorphism invariant for the relation. The cosheaf representation of a relation actually embodies both Dowker complexes, and the talk will describe a duality functor that exchanges the two complexes. (Received August 24, 2020)