1038-05-291 **Richard Ehrenborg*** (jrge@ms.uky.edu), Department of Mathematics, University of Kentucky, Lexington, KY 40506-0027, and **Margaret Readdy** (readdy@ms.uky.edu), Department of Mathematics, University of Kentucky, Lexington, KY 40506-0027. *Exponential Dowling structures.*

The notion of exponential Dowling structures is introduced, generalizing Stanley's original theory of exponential structures. Enumerative theory is developed to determine the Möbius function of exponential Dowling structures, including a restriction of these structures to elements whose types satisfy a semigroup condition. Stanley's study of permutations associated with exponential structures leads to a similar vein of study for exponential Dowling structures. In particular, for the extended r-divisible partition lattice we show the Möbius function is, up to a sign, the number of permutations in the symmetric group on $rn + k$ elements having descent set $\{r, 2r, \ldots, nr\}$. Using Wachs' original EL-labeling of the r-divisible partition lattice, the extended r-divisible partition lattice is shown to be EL-shellable. (Received February 12, 2008)