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In the space of C^k piecewise expanding unimodal maps, $k \geq 2$, we characterize C^2 smooth families of maps where the topological dynamics does not change (the "smooth deformations") as the families tangent to a continuous distribution of codimension-one subspaces (the "horizontal" directions) in that space. Furthermore such codimension-one subspaces are defined as kernels of linear functionals in an explicit class. As a consequence we show the existence of $C^{k-1+Lip}$ deformations tangent to every given C^k horizontal direction, for $k \geq 2$. We also show that if f_t is a smooth deformation then the average

$$R(t) = \int \psi d\mu_t$$

is smooth and we give a formula for its derivative. Here ψ is a smooth function and μ_t is the SRB measure μ_t of the piecewise expanding unimodal map f_t . (Received January 28, 2008)