Bounded point derivations on certain function spaces

Let X be a compact subset of the complex plane and let $R(X)$ be the uniform closure of rational functions with poles off X. A bounded point derivation on $R^p(X)$ at a point x_0 is a bounded linear functional D on $R(X)$ such that $D(fg) = D(f)g(x_0) + D(g)f(x_0)$ for all functions f, g belonging to $R(X)$. Bounded point derivations provide a way to define a derivative for functions in $R(X)$ that are not differentiable in the usual sense. A related space is $R^p(X)$. For $1 \leq p < \infty$, $R^p(X)$ is the closure of rational functions with poles off X in the L^p norm. Bounded point derivations can also be defined for $R^p(X)$; however, the definition needs to be altered a bit. In this talk, we present some results concerning bounded point derivations on both spaces and how they relate to the classical definition of the derivative.