Correct factors in $L_p$ spaces for certain differentiation operators.

The averaging operators $1/|I_n| \int_{I_n} f(x-t)dt$, where $I_n$ are shrinking intervals tending to the origin, exhibit differentiation properties simultaneously in all $L_p$ spaces, $1 \leq p \leq \infty$, or in none. In the latter case, we investigate the rate of divergence in comparison to the analogous setting in ergodic theory. (Received February 01, 2006)