1099-46-279   **Raquel Cabral*** (`toraquelmc@gmail.com`), 1455 de Maisonneuve Blvd. West, Montreal, Quebec H3G 1M8, Canada. *A counterexample in the theory of strong differentiation of the integral.*

We build a function in the product Hardy space $H^1(\mathbf{R} \times \mathbf{R})$ and the Orlicz space $L(\log L)^\epsilon(\mathbf{R}^2)$ for all $0 < \epsilon < 1$, whose integral is not strongly differentiable almost everywhere on a set of positive measure. Our construction is inspired by an example of J. M. Marstrand and another of A. Stokolos. The inclusion in the product Hardy space $H^1(\mathbf{R} \times \mathbf{R})$ follows from the atomic decomposition, while the inclusion in $L(\log L)^\epsilon(\mathbf{R}^2)$ relies on a method to estimate of the Orlicz norm of series of functions. The failure of the strong differentiation of the integral is a consequence of a result concerning "approximate independence of sets" which illustrates how geometric properties can yield consequences of a probabilistic nature. It consists of a generalization Marstrand's claim about hyperbolic-cross shaped sets and applies to any sets of sufficiently low complexity in any Euclidean space. (Received February 10, 2014)