Given a Banach space $X$ with an unconditional basis, we consider the following question: does the identity on $X$ factor through every bounded operator on $X$ with large diagonal relative to the unconditional basis? We show that on the Banach space with an unconditional basis that Gowers constructed to resolve Banach’s hyperplane problem, there exists an operator for which the answer to the question is negative. By contrast, for any operator on the mixed-norm Hardy spaces $H^p(H^q)$, where $1 \leq p, q < \infty$, with the bi-parameter Haar system, this problem always has a positive solution. The one-parameter $H^p$ spaces were treated first by Andrew [Studia Math. 1979].