Completely positive maps and noncommutative dynamics

We present an overview of completely positive maps and their applications to the study of a class of semigroups of endomorphisms of $B(H)$ (the bounded linear operators on a Hilbert space $H$) called $E_0$-semigroups. We find that a special kind of completely positive map acting on the $n \times n$ complex matrices can be combined with linear functionals acting on $B(L^2(0, \infty))$ in order to induce $E_0$-semigroups. Through this construction, we obtain uncountably many non-equivalent $E_0$-semigroups, some of which have a very surprising property.