

Richard Timoney  
Trinity College Dublin

## Elementary operators and their lengths

### Abstract

Elementary operators on an algebra, which are finite sums of operators  $x \mapsto axb$ , provide a way to study properties of the algebra. In particular, for  $C^*$ -algebras we consider results that are related to the length  $\ell$  of the operator, defined as the minimal number of summands required. We will review some results concerning complete positivity or complete boundedness. Although all elementary operators on a  $C^*$ -algebra  $A$  are completely bounded, that is induce uniformly bounded operators on the algebras  $M_n(A)$ , the supremum is always attained for  $n = \ell$ , or for smaller  $n$  in case  $A$  has special structure. For positivity, there are also results couched in analogous terms, but with different bounds.

In recent work with I. Gogić, we have shown that for prime  $C^*$ -algebras  $A$  the elementary operators of length (at most) 1 are norm closed, but that for the rather tractable class of homogeneous  $C^*$ -algebras more subtle considerations are required for closure. For instance  $A = C_0(X, M_n)$  fails to have this closure property if  $X$  is an open set in  $\mathbb{R}^d$  with  $d \geq 3$ ,  $n \geq 2$  ( $X \neq \emptyset$ ).

Talk time: 07/22/2016 9:00AM— 07/22/2016 9:30AM  
Talk location: Brown Hall 100