1144-05-109 **Cosmin Pohoata*** (apohoata@caltech.edu), 120 West Wilson Ave, Apt 1448, Glendale, CA 911203. *Some new thoughts on an old problem of Erdos and Newman.* Preliminary report.

Suppose $A \subset B + B = \{b + b', b, b' \in B\}$ for finite sets of reals A, B. Trivially, $|B| \geq |A|^{1/2}$. Improving on this bound for sets A with some additional structure is in general a hard problem. The first available result in this spirit is a classical theorem due to Erdős and Newman, who prove that when A is the set of the first m perfect squares and B is a set of integers, we have that $|B| \geq m^{2/3-\epsilon}$ for any $\epsilon > 0$. For sets A with small product set AA, Shkredov and Zhelezov managed to prove that a condition of the form $|AA| \ll |A|^{1+\epsilon}$ for some $\epsilon > 0$ implies $|B| \geq |A|^{1/2+1/442-\epsilon'}$ even if A and B are sets of real numbers (which are not necessarily integers). Here, $AA = \{aa', a, a' \in A\}$. In this talk, we will discuss an improvement of this result in the case when A and B are a set of integers, and furthermore, answering a question of Shkredov and Zhelezov, show that if $|AA| \ll |A|^{1+\epsilon}$ and $A \subset B + B$, then $|B + B| \gg |A|^{10/9-\epsilon''}$ for every $\epsilon'' > 0$. If time permits, some two dimensional variants of this result will be considered. (Received August 22, 2018)