FURTHER ADVANCES IN NONCONVENTIONAL LIMIT THEOREMS.

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Abstract. Nonconventional limit theorems deal with the asymptotic behavior of sums of the form $\sum_{n=1}^N F\big(\xi(q_1(n)), \xi(q_2(n)), ..., \xi(q_\ell(n))\big)$ where F ia a function, $\xi(n)$, $n \ge 0$ is a stochastic process with some stationarity properties, in particular, it can be generated by a measure preserving transformation T in the form $\xi(n) = f \circ T^n$ where f is a function. The functions $q_j(n)$, $j = 1, ..., \ell$ take on nonnegative integer values on nonnegative integers and they satisfy some properties, for instance, they may have the form $q_j(n) = jn$. We discuss first the crucial question on positivity of the limiting variance for the sums above and then exhibit new results concerning the nonconventional local limit theorem, Berry-Esseen type estimates and the functional central limit theorem for the case when $q_j(n)$'s are general integer valued polynomials. These results are obtained together with my student Yeor Hafouta.