1093-39-123 **Umang Varma*** (umang.varma10@kzoo.edu), **Archit U Kulkarni** (auk@andrew.cmu.edu), **Philippe Demontigny**, **Thao Do**, **Steven J Miller** and **David Moon**. *Generalizing Zeckendorf's Theorem to f-decompositions.*

A beautiful theorem of Zeckendorf states that every positive integer can be uniquely expressed as a sum of non-consecutive Fibonacci numbers $\{F_n\}$. For sequences $\{G_n\}$ satisfying linear recurrence relations with nonnegative coefficients, there is a notion of a legal decomposition which again leads to a unique representation. The number of summands in the representations of $m \in [G_n, G_{n+1})$ converges to a Gaussian as $n \to \infty$.

Given a notion of legal decomposition, we ask if $\{a_n\}$ exists such that every positive integer can be uniquely decomposed as a sum of terms from $\{a_n\}$. Given $f : \mathbb{N}_0 \to \mathbb{N}_0$, we say that if a_n is in an "f-decomposition" of a number x, then the decomposition cannot contain the $f(n)$ terms immediately before a_n in the sequence. We prove that for any $f : \mathbb{N}_0 \to \mathbb{N}_0$, there exists $\{a_n\}$ such that every positive integer has a unique f-decomposition using $\{a_n\}$. If f is periodic, then the unique increasing sequence $\{a_n\}$ induced by f satisfies a linear recurrence relation. For some class of functions f, we prove that the number of summands in the f-decomposition of integers in a suitable growing interval converges to a normal distribution. (Received August 08, 2013)