## Bohr's phenomenon for functions on the Boolean cube

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We study the asymptotic decay of the Fourier spectrum of real functions on the Boolean cube $\{-1,1\}^N$ in the spirit of Bohr's phenomenon from complex analysis. Every such function admits a canonical representation through its Fourier-Walsh expansion $f(x) = \sum_{S\subset\{1,\dots,N\}} \widehat{f}(S)x^S$, where $x^S = \prod_{k\in S} x_k$. Given a class $\mathcal{F}$ of functions on the Boolean cube $\{-1,1\}^N$, the Boolean radius of $\mathcal{F}$ is defined to be the largest $\rho \geq 0$ such that $\sum_S |\widehat{f}(S)|\rho^{|S|} \leq \|f\|_\infty$ for every $f \in \mathcal{F}$. We indicate the precise asymptotic behaviour of the Boolean radius of several natural subclasses, as e.g. the class of all real functions on $\{-1,1\}^N$, the subclass made of all homogeneous functions or certain threshold functions. Compared with the classical complex situation subtle differences as well as striking parallels occur. An interesting side aspect of our work is the following Bohnenblust-Hille type inequality for real functions on $\{-1,1\}^N$: There is an absolute constant $C > 0$ such that the $\ell_{2d/(d+1)}$-sum of the Fourier coefficients of every function $f : \{-1,1\}^N \to [-1,1]$ of degree $d$ is bounded by $C^{\sqrt{d\log d}}$. It was recently proved that a similar result holds for complex-valued polynomials on the $n$-dimensional torus $\mathbb{T}^n$, but that in contrast to this a replacement of the $n$-dimensional torus $\mathbb{T}^n$ by the $n$-dimensional cube $[-1,1]^n$ leads to a substantially weaker estimate. Joint work with Mieczysław Mastyło and Antonio Pérez Hernández.