Instead of calling your $\Delta(w,t)$ Dirac delta, it is better to call it Heaviside function $H\left(x-\frac{1}{2}\right)=\frac{1}{2}(1+sgn(x-\frac{1}{2}))$ https://en.wikipedia.org/wiki/Heaviside_step_function

Good thing about Heaviside function is that is can be approximated by the smooth logistic function $H(x)=\frac{1}{1+e^{-2kx}}$, with k large enough (along with other smooth approximations). This may both be related to entropies and used as a differentiable loss function in optimizing ML models (not sure how to at the moment).

$N_p(w,*)=\sum_t N^p(w,t)$ technically is not a norm, as it does not satisfy homogeneity property (except for p = 1). It is a pseudonorm though. Similarly to the above $\Delta(w,*)$ is a pseudonorm and is Hamming distance of such vector from zero.

It may be useful to consider a vector space over vocabulary $T=\{t\}$ of size $|T|$ and a vector N in this space with $|T|$ components $N(w,t)$. It is interesting to note that an entropy-like expression can be obtained for actual $l_1$norm, because

$$\frac{d}{dp}\|N\|_{l_p}=\frac{d}{dp}\left(\sum_t N^p(w,t)\right)^{1/p}=\log\sum_t N^p(w,t)\left(\sum_t N^p(w,t)\right)^{1/p}\sum_t \log N(w,t)\,N^p(w,t)=$$

$$=H(w,*)\|N\|_{l_p}\log\sum_t N^p(w,t)$$

I don’t have a viable physical interpretation for this, but it may be highly far-reaching.