APPENDIX I

We will outline here the calculation of the correction factors due to a asymptotically free strong interaction. The theory to be considered is the standard gauge theory with SU(3) color triplets. In this theory[31]

$$\beta(g) = b g^3 + \ldots$$

$$\text{where } b = -\frac{1}{16\pi^2}\frac{1}{3}\left[11\, C_2(G) - 4\, T(R)\right] = -\frac{1}{16\pi^2}\frac{1}{3}\left[33 - 2n\right] \tag{1}$$

n is the number of quark types.

The effective amplitude contributing to the K_L-K_S mass difference is given by the time-ordered product of four currents joined by intermediate vector boson propagators. In order to proceed, we have to make the (dynamical) assumption[32] that the region in which the space-time locations of the four currents are close together yields the dominant contribution and that the operator product expansion may be used. As was discussed in the text there is no rigorous argument to support the validity of this assumption. There are suggestive arguments, however. In any case, we will proceed with this assumption.

Our task is to find firstly, the operators θ_A which have definite anomalous dimensions γ_A. The operators θ_A will be a linear combination of the operators S and T defined by

$$\begin{aligned} S &\equiv \bar{\lambda}_i(1+\gamma_5)n_i \quad \bar{\lambda}_j(1+\gamma_5)n_j \\ T &\equiv \bar{\lambda}_i\, \sigma_{\alpha\beta}(1+\gamma_5)n_i\, \bar{\lambda}_j\, \sigma^{\alpha\beta}(1+\gamma_5)n_j \end{aligned} \tag{2}$$