$$\int_0^1 dx\, x^{n-2} F_i(x,q^2) \underset{-q^2\to\infty}{\simeq} \tilde{C}_i^{(n)}(q^2,g)\langle n|O^{(n)}|n\rangle \qquad 5.10$$

(where x is the standard Bjorken variable, $x = \frac{-q^2}{2\nu}$ and F_i stands for νW_2 or xW_1). Of course the moment is also proportional to the nucleon matrix element of the operator $O^{(n)}$, however the q^2 dependence is contained in $\tilde{C}^{(n)}(q^2,g)$.

One can apply renormalization group techniques to Wilson's expansion to derive an equation relating the dependence of $C^{(n)}$ on x^2 and g.[21,22,23]. If the operator $O^{(n)}$ is multiplicatively renormalizable (renormalization constant Z_n), then one derives that:

$$\left[\mu\frac{\partial}{\partial\mu} + \beta(g)\frac{\partial}{\partial g} + 2\gamma_J(g) - \gamma_n(g)\right] C_i^{(n)}\left(\frac{q^2}{\mu^2},g\right) = 0 \qquad 5.11$$

where γ_J is the anomalous dimension of the "current" J(x), and γ_n the anomalous dimension of $O^{(n)}$:

$$\gamma_n(g) = \mu\frac{\partial}{\partial\mu}\ln Z_n \Big|_{g_u,\alpha_u,\Lambda \text{ fixed}} \qquad 5.12$$

In the case under consideration the currents (linear combinations of V^a_μ and A^a_μ) are conserved or partially conserved. They therefore have vanishing anomalous dimension, so that the solution of Equation 5.11 is

$$\tilde{C}_i^{(n)}\left(\frac{q^2}{\mu^2},g\right) = \tilde{C}_i^{(n)}(1,\bar{g}(t,g))\ \exp.-\int_0^t \gamma_n\left[\bar{g}(x,g)\right]dx. \qquad 5.13$$

In our asymptotically free models, $\bar{g}\to 0$ and $\gamma_n(\bar{g})$ vanishes as $t\to\infty$. However $\gamma_n(\bar{g})$ does not vanish fast enough to render the integral in Equation 5.13 convergent. Let