I think that the Electron Muon Collaboration effect (EMC effect) could be explained like a orbital overlap between quarks in the neutron and proton: the nuclear orbital.

The proton $p(udu)$ can exchange a $\pi^+(u\overline{d})$ meson (Yukawa potential) to give a neutron $n(udd)$, and a neutron can exchange a $\pi^-(\overline{u}d)$ to obtain a proton.

So that it could be possible to use an overlap orbital between the proton quark p(..u) and the neutron quark n(..d)

The neutron wavefunction is:

$$|n\uparrow\rangle = \frac{1}{\sqrt{18}}(2|d\uparrow\rangle|d\uparrow\rangle|u\downarrow\rangle - |d\uparrow\rangle|d\downarrow\rangle|u\uparrow\rangle - |d\downarrow\rangle|d\uparrow\rangle|u\uparrow\rangle - |d\uparrow\rangle|d\uparrow\rangle|u\downarrow\rangle +$$
$$+2|d\uparrow\rangle|d\downarrow\rangle|u\uparrow\rangle - |d\downarrow\rangle|d\uparrow\rangle|u\uparrow\rangle - |u\uparrow\rangle|d\uparrow\rangle|d\downarrow\rangle - |u\uparrow\rangle|d\downarrow\rangle|d\downarrow\rangle + 2|u\downarrow\rangle|d\uparrow\rangle|d\uparrow\rangle)$$

exchanging the quark u with quark d ($u \leftrightarrow d$):

$$|p\uparrow\rangle = \frac{1}{\sqrt{18}}(2|u\uparrow\rangle|u\uparrow\rangle|d\downarrow\rangle - |u\uparrow\rangle|u\downarrow\rangle|d\uparrow\rangle - |u\downarrow\rangle|u\uparrow\rangle|d\uparrow\rangle - |u\uparrow\rangle|u\uparrow\rangle|d\downarrow\rangle +$$
$$+2|u\uparrow\rangle|u\downarrow\rangle|d\uparrow\rangle - |u\downarrow\rangle|u\uparrow\rangle|d\uparrow\rangle - |d\uparrow\rangle|u\uparrow\rangle|u\downarrow\rangle - |d\uparrow\rangle|u\downarrow\rangle|u\downarrow\rangle + 2|d\downarrow\rangle|u\uparrow\rangle|u\uparrow\rangle)$$

then using the nuclear orbital

$$|d\uparrow\rangle = \frac{A|d\uparrow\rangle + B|u\uparrow\rangle}{\sqrt{2}}$$

for the neutron wavefunction, and the

$$|u\uparrow\rangle = \frac{A|d\uparrow\rangle + B|u\uparrow\rangle}{\sqrt{2}}$$

for the proton wavefunction, it is possible obtain the minimum energy for the quantum chromodynamics Hamiltonian.

If everything is right, then there is an discrete energy spectrum in the nuclear orbital, with discrete solutions of the quantum chromodynamics, and there is indistinguishability of the quarks u and quark d, in the nuclear orbital: this is equivalent to say that there is indistinguishability of the nucleons.