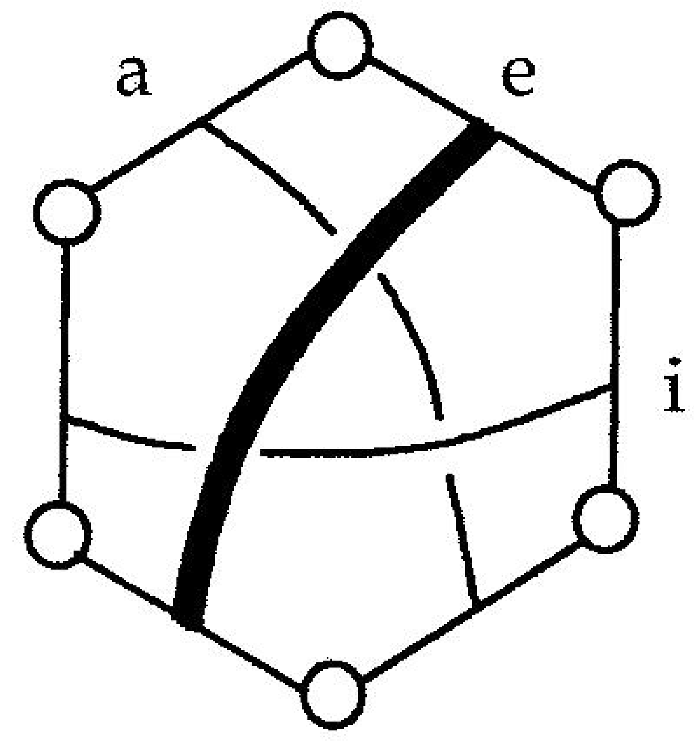
Catalogue

plastic chromodynamic

1 - material presentation

here his a knotian pattern formed of three crossings named *corner,* drawn into an hexagonal frame, each thread has been labelled with a voyel and is common to two crossings, each crossing is common to two threads.



above-under reading

to each crossing is associated a symbolical marking, named ***ornure,*** corresponding to the above-under reading. as there are just two kinds of crossing, so there are two ornures, **w** and **w'**.

unlike in mathematical methods, there is no standard of ornure attribution. once the first ornure has been attributed, only opposition makes the coherence.

before we look at the ornure attribution protocol, we explain the knotian alternance.

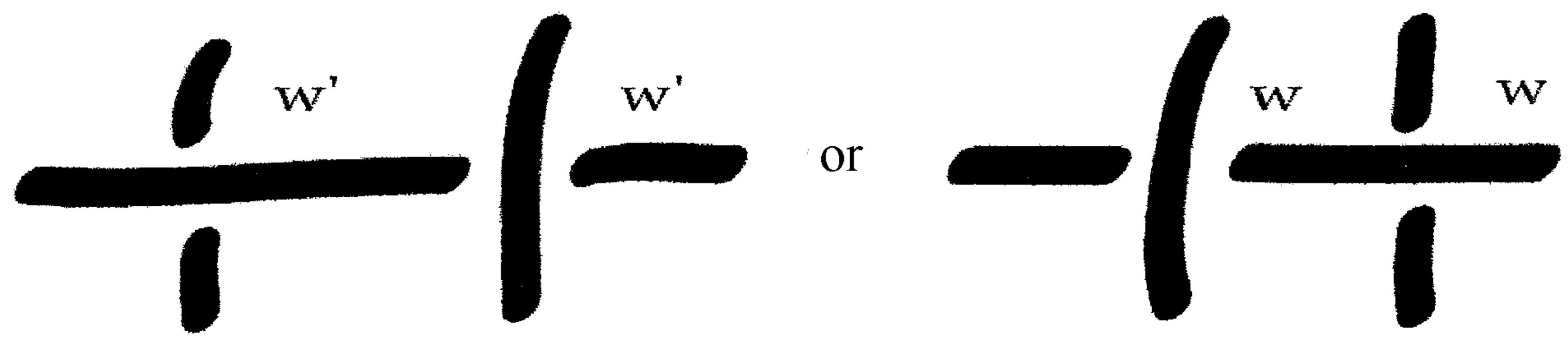
a) alternance - two consecutive crossings are alternated when their common thread pass now under, now above without reading order preconception. they form a pattern named alternated *pin.*

- two consecutive crossings are not alternated when their common thread pass always under or above . this pattern is named non-alternated pin .

therefore in a similar way, we can say : a corner is framed of three
- consecutive crossings
- threads crossed two by two
- pins drawing up a flexible triangle

a corner is alternated if all its pins are alternated, it is non-alternated in the opposite case. on the drawing above, the corner is non-alternated, pin *"i"* only is alternated.

b) ornure attribution - when two consecutive crossings are alternated, their ornure are similar, **w** and **w** or **w'** and **w'**.



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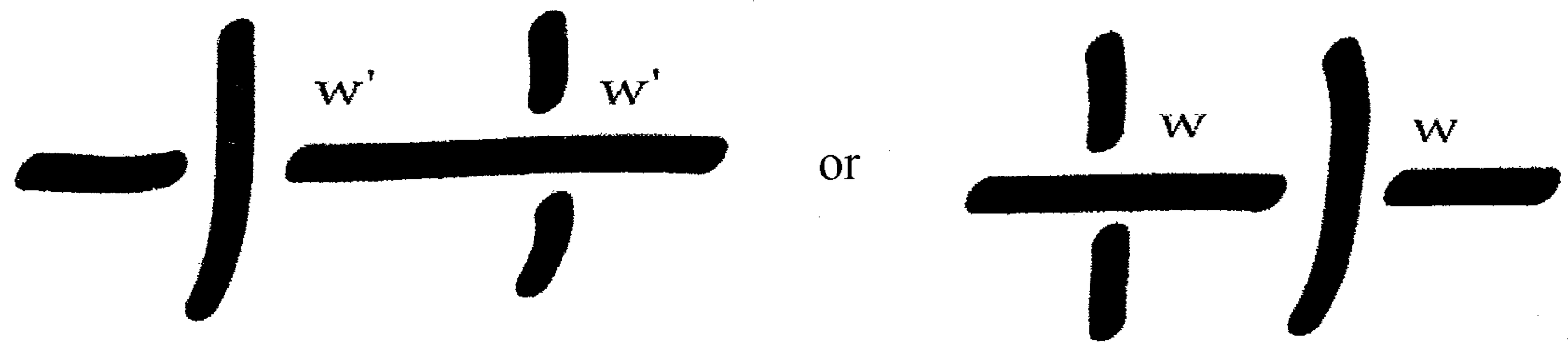
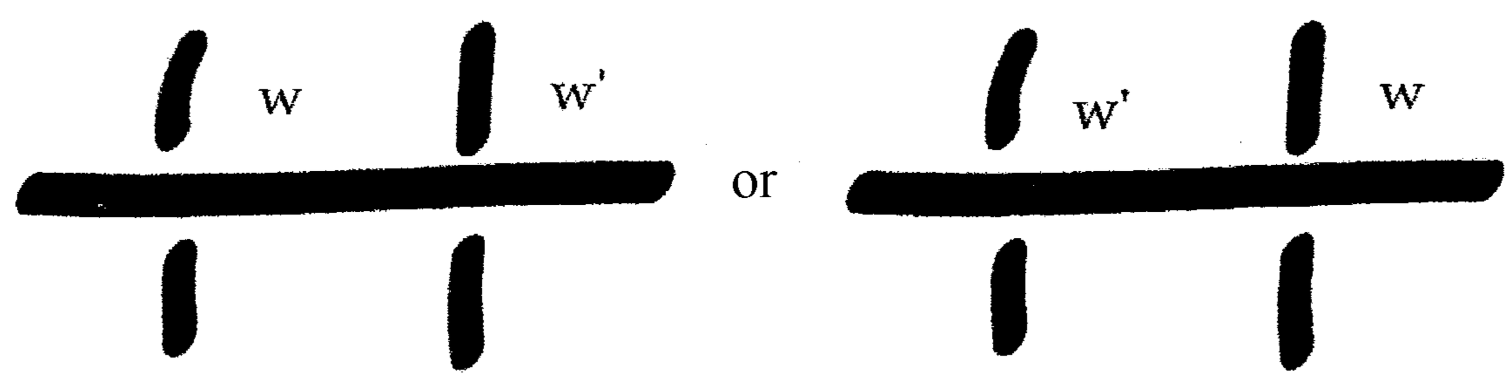


when two consecutive crossings are non-alternated, their ornures are different, **w** and **w'**or **w'** and **w**



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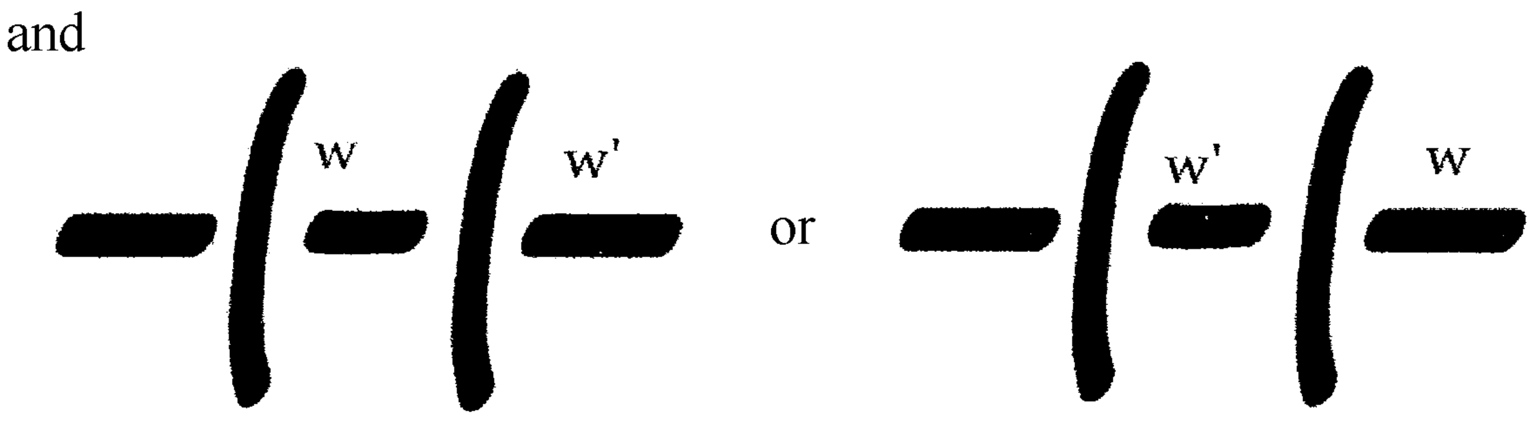
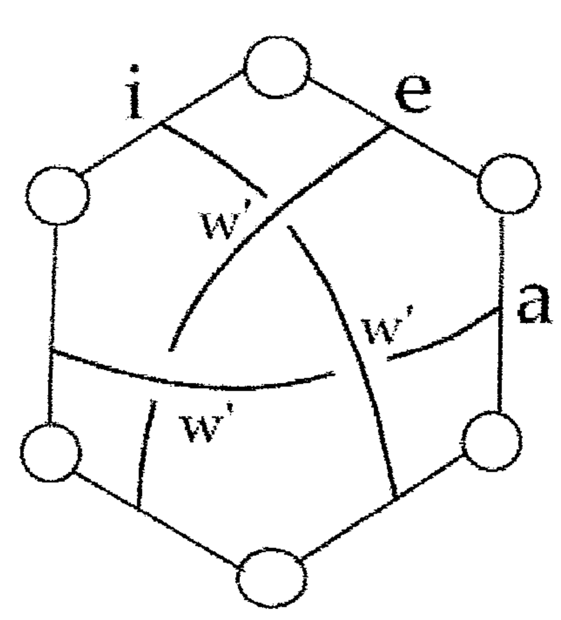
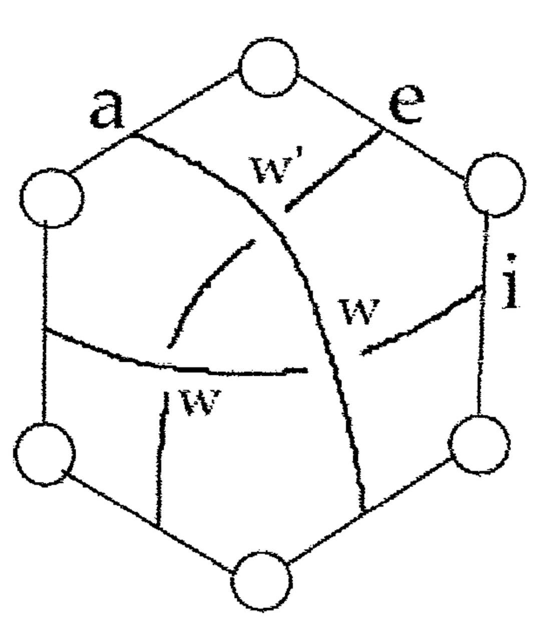


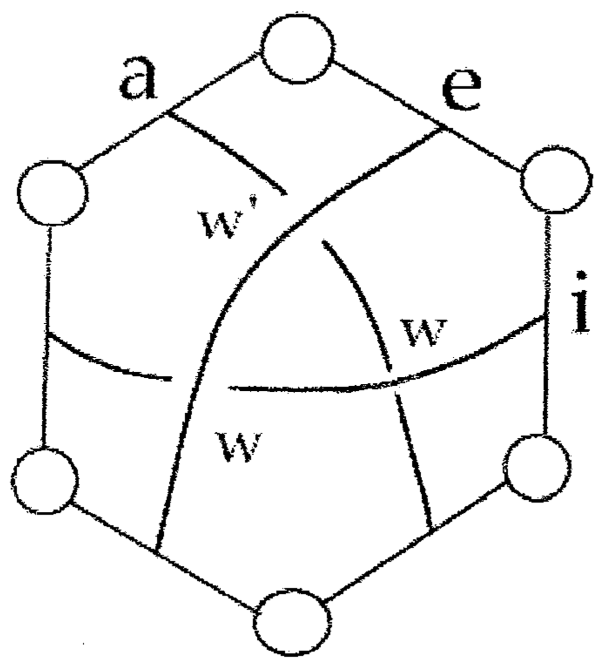
here are two corners marked with ornures and voyels.





now we can refer to a corner with a syllable written with its ornure and the voyel *that does not participate* to the crossing. each crossing is formed of two threads. when the thread passes above, we write it with a capital letter and with a small letter when it passes under.

example:



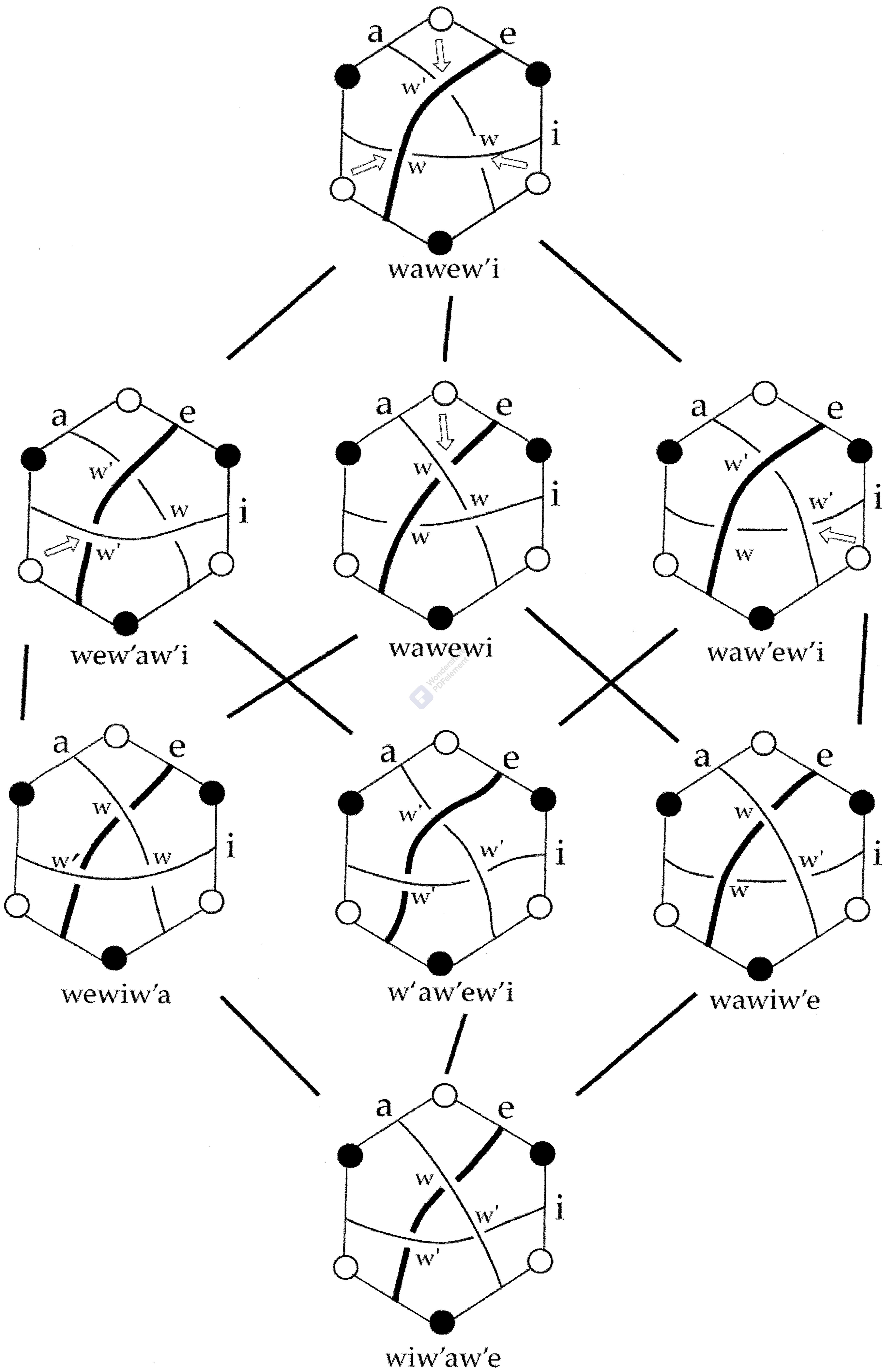
- a crossing named Ei and ornamented **w** is named wa
- a crossing named Ia and ornamented **w** is named we
- a crossing named Ea and ornamented **w'** is named w'i

so this corner can be readen as a three-syllables word texted in alphabetical order with w before w'. example above is readen wawew'i.

two operators

we use two corners transformations: **above-under transposition (aut)** and **turning** , in order to produce all feasible ornamented corners and corresponding words.

a) aut - from an ornamented corner, we produce seven different ones with successive aut.

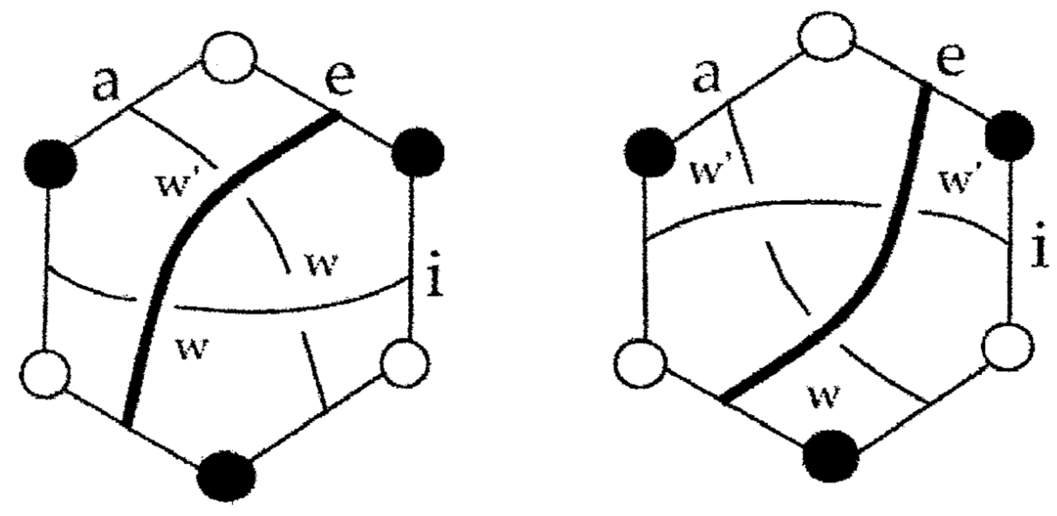


we get an ensemble of 8 corners : two are alternated, the two homogeneously ornamented corners wawewi and w'aw'ew'i, and the six others are non-alternated.

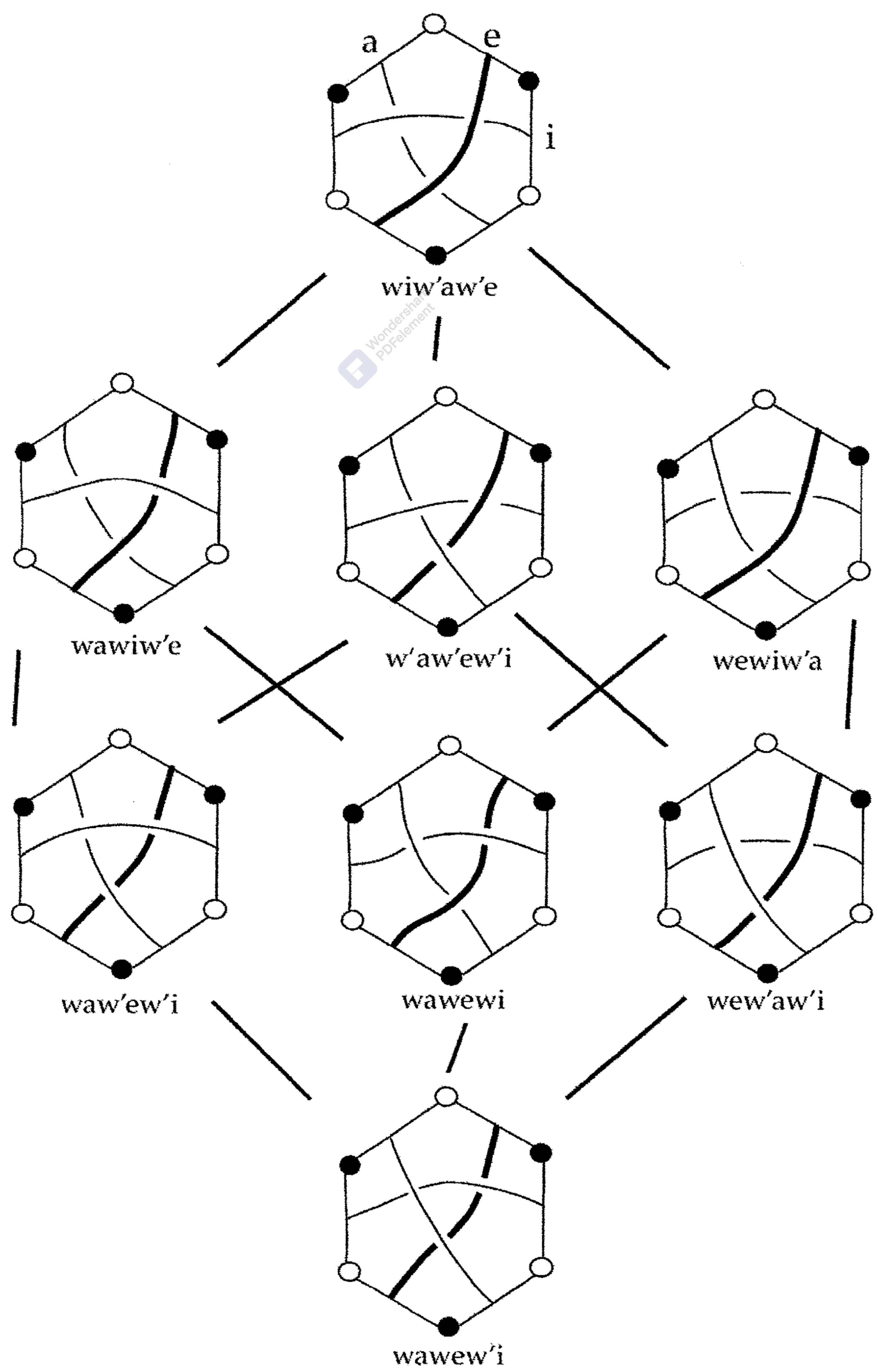
b) turning - this metamorphosis concerns only the non-alternated corners, so named **turnable** corners. it is involutive. in a turnable corner, there are two non-alternated pins, one above and one under.

turning consist in moving one non-alternated pin from initial state to the other side of the its facing crossing, resulting in the final state. in this case, the non-alternated pin takes the name of turning pin and the opposite crossing takes the name of turnable crossing. turning is accomplished into one single wave, so annihilating the turning pin's two crossings of the initial state, and materializing two others into the final state, on the other side of the turnable crossing.

here is the drawned procedure, there is indiscernability as for wich turning pin is making the move, no matter which one, the resultant state is identical.



from the turn of previous ensemble initial ornamented corner, we produce with successive **aut,** seven different ornamented corners into a similar ensemble.

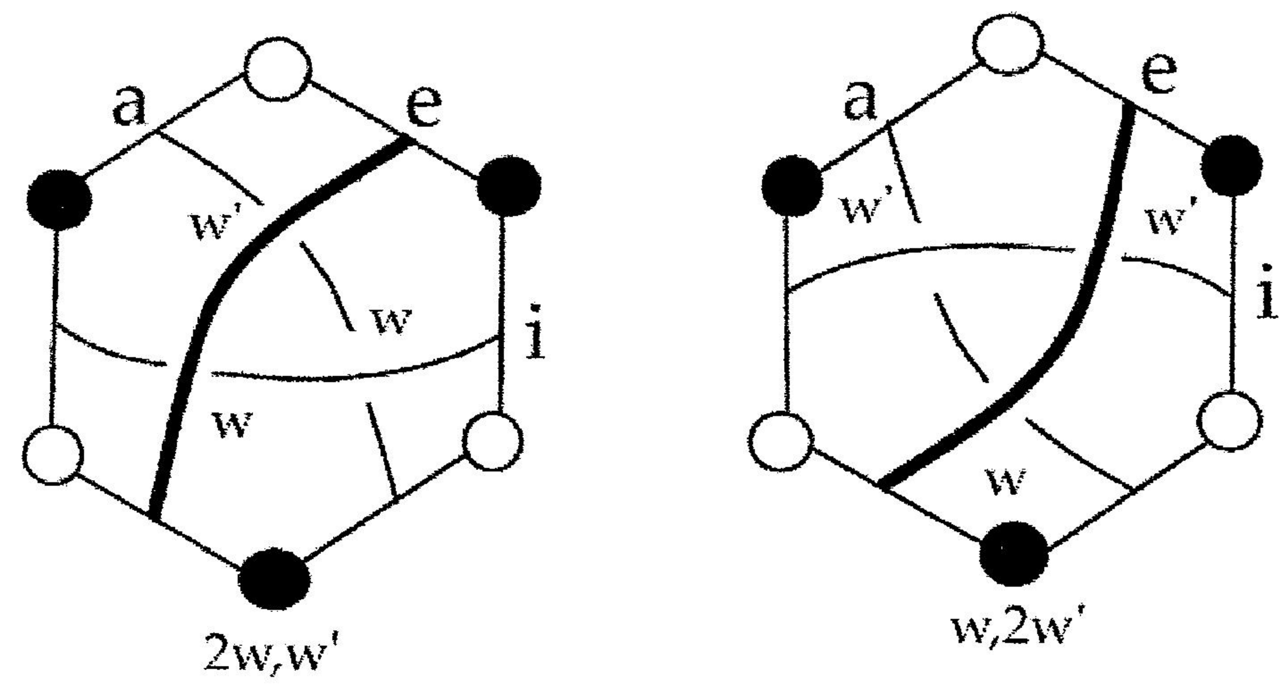


with these two ensembles, there are height words for sixteen ornamented corners, each word corresponding to two homonymous ornamented corners. corners differentiate themselves through the arrangement of their vocalized threads, their ornure and the frame's vertex value (coloring).

2 - plastic calculation

a) little ***ornure algebra***

without any special hypothesis, it is possible for each ornamented corner to calculate every ornure's respective contribution. let's take two non-alternated corners, one turned from the other.

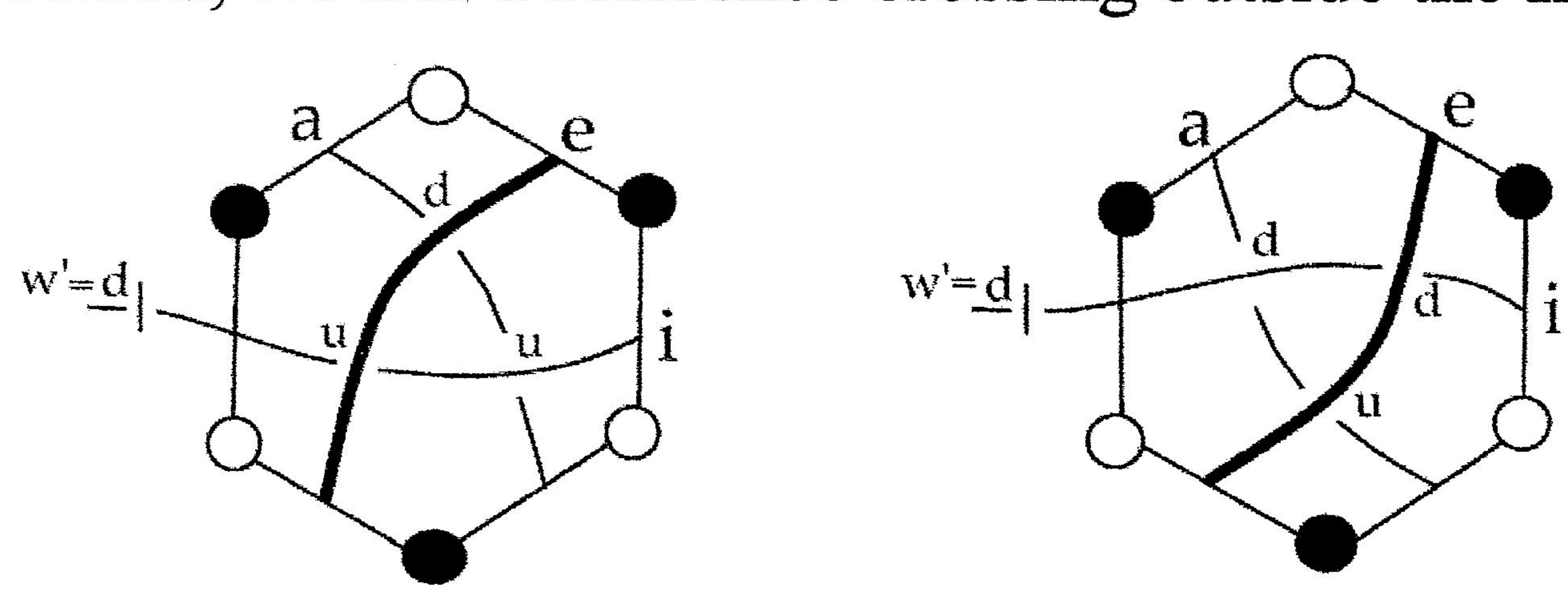


the corner (2w,w') permits to write : 2 w+w' = k. in the same way, the corner (w, 2w') permits to write w + 2w' = k'. the resolution of this system gives w = (2k - k')/3 and w' = (2k'-k)/3.
choosing values from the ensemble (-1, 0, +1), we arbitrarely assign the value 1 to k and 0 to k', so w = 2/3 and w' = -1/3

- **flavours**

at this stage, we can take the quantic chromodynamic language in translating ours ornures into quarks flavours : **w = u** and **w' = d**, that is equivalent to identify knotian crossings to quarks and corners to particles.

now, to each turnable corner, we add a reference crossing outside the frame.



the corner www' = uud is metamorphosed into corner ww'w' = udd and reciprocally. there are one to the other as proton uud is to neutron udd.
so turning of the corner matches with the nucleon's chromodynamic involutive transformation, of proton into neutron and reciprocally.
relatives contributions of our ornures w = 2/3 and w' = -1/3 respect equivalent contributions of u and d flavours of CDQ.

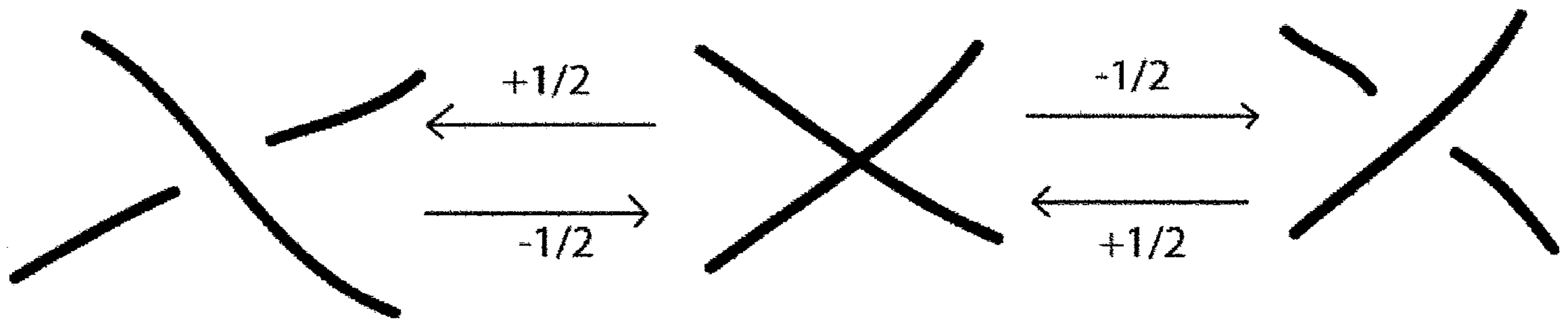
1st series of corner's values : quarks Q load

wawewi = 2/3 + 2/3 + 2/3 = 2
wawew'i = wawiw'e = wewiw'a = 2/3 + 2/3 - 1/3 = 1
waw'ew'i = wew'aw'i = **wiw'aw'e** = 2/3 - 1/3 - 1/3 = 0
w'aw'ew'i = - 1/3 - 1/3 - 1/3 = - 1

b) 2nd series of corner's values : I_z component of isospin I

when we invert an above-under, crossing's ornure changes either from w to w' and its value from 2/3 to - 1/3, so varies of -1 substracted value and negative of pion π^+, either from w' to w and it's value from -1/3 to 2/3 so varries of +1 substracted value and positive of pion π^-.

considering that value of the crossing without above-under is 0, and that unsticking value is identical in both directions, w value should be 1/2 and w' should be -1/2



using this values with the preceding list we get :

wawewi = 1/2+1/2+1/2 = 3/2
wawew'i = wawiw'e = wewiw'a =1/2+1/2-1/2 = 1/2
waw'ew'i = wew'aw'i = **wiw'aw'e** =1/2-1/2-1/2 = - 1/2
w'aw'ew'i = -1/2 -1/2 -1/2 = -3/2

identification of some particles :

the formula $Q = I_z + 1/2$ permits to identify words of the two values series, term to term, to know particles. for instance, bold face typen words in both lists give :

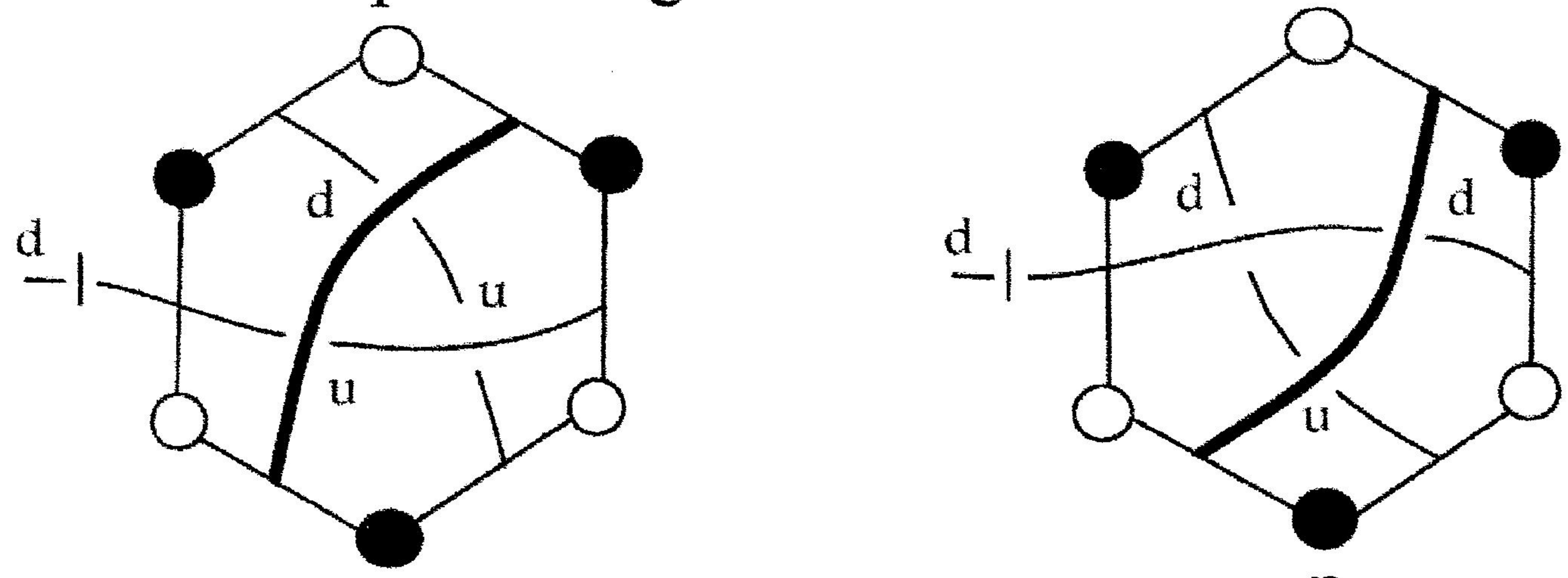
- Q(wawew'i) = 1 and
- I_z (wawew'i) = 1/2 identify wawew'i to the proton, and its returned wiw'aw'e
- Q(wiw'aw'e) = 0 and
- I_z (wiw'aw'e) = -1/2 to neutron
- Q(wawewi) = 2 and
- I_z (wawewi) = 3/2 identify the Δ^{++} particle
- Q(w'aw'ew'i) = -1 and
- I_z (w'aw'e'w'i) = -3/2 identify the Δ^- particle

information taken in charles ruhla's book, 1982, " physique 1982 "

we can also consider alternated pins values ww = 2/3+2/3 = 4/3, w'w' = -2/3, returning pin ww' = 2/3-1/3 = 1/3, etc

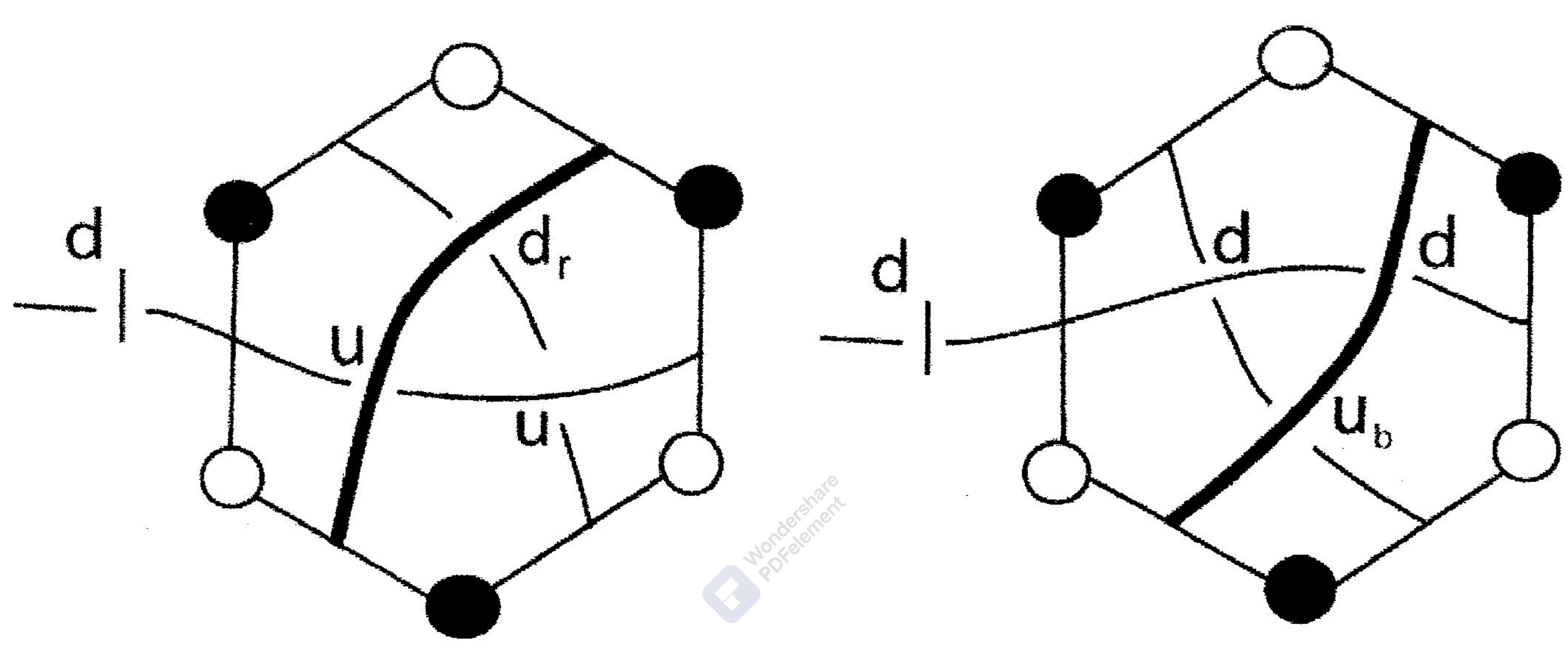
- **colors**

a particle formed of three quarks is white if it has the three fundamentals colors blue, yellow and red.
let's see again the two corners representing the two nucleon's state.



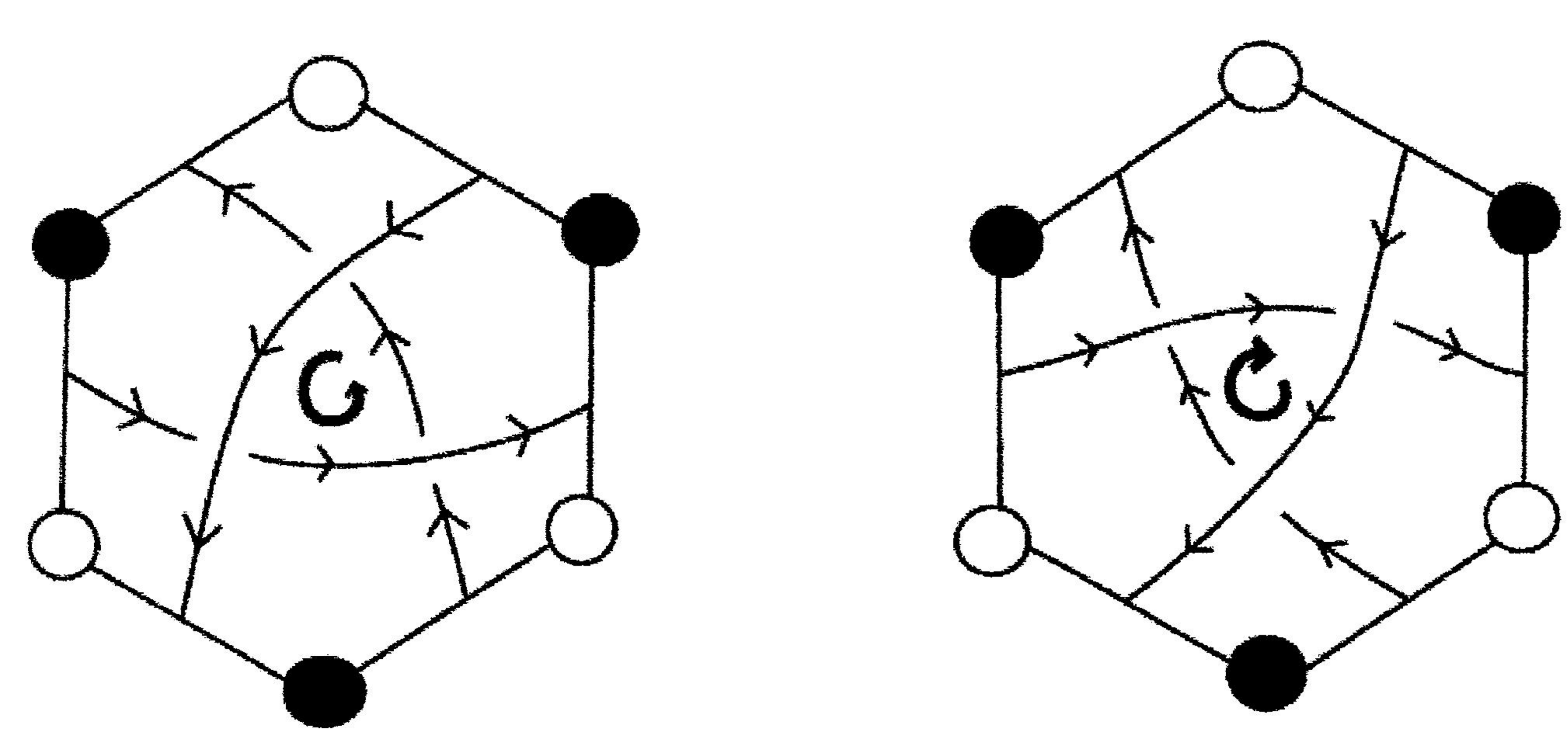
p n

as nucleon is a white particle, its two states, proton and neutron, must be white. formulas flavours + colors are, marking b for blue, r for red and y for yellow :
proton p = $u_b\ u_y\ d_r$
neutron n = $u_b\ d_y\ d_r$
so we can immediatly assign on the proton's scheme the red color to quark d and on the neutron's scheme the blue color to quark u.



in order to assign all the colors, we need to answer two questions :
1° - which color do we assign to each proton's u and to each neutron's d ?
2° - how do we do so that nucleon's return respects color's swap in a manner that both states stay white.

here is one way
a - *orientation*
each nucleon's thread is given a direction in a manner that the 3 directions create a circulation. there are two equivalent possibilities and we just select one of them

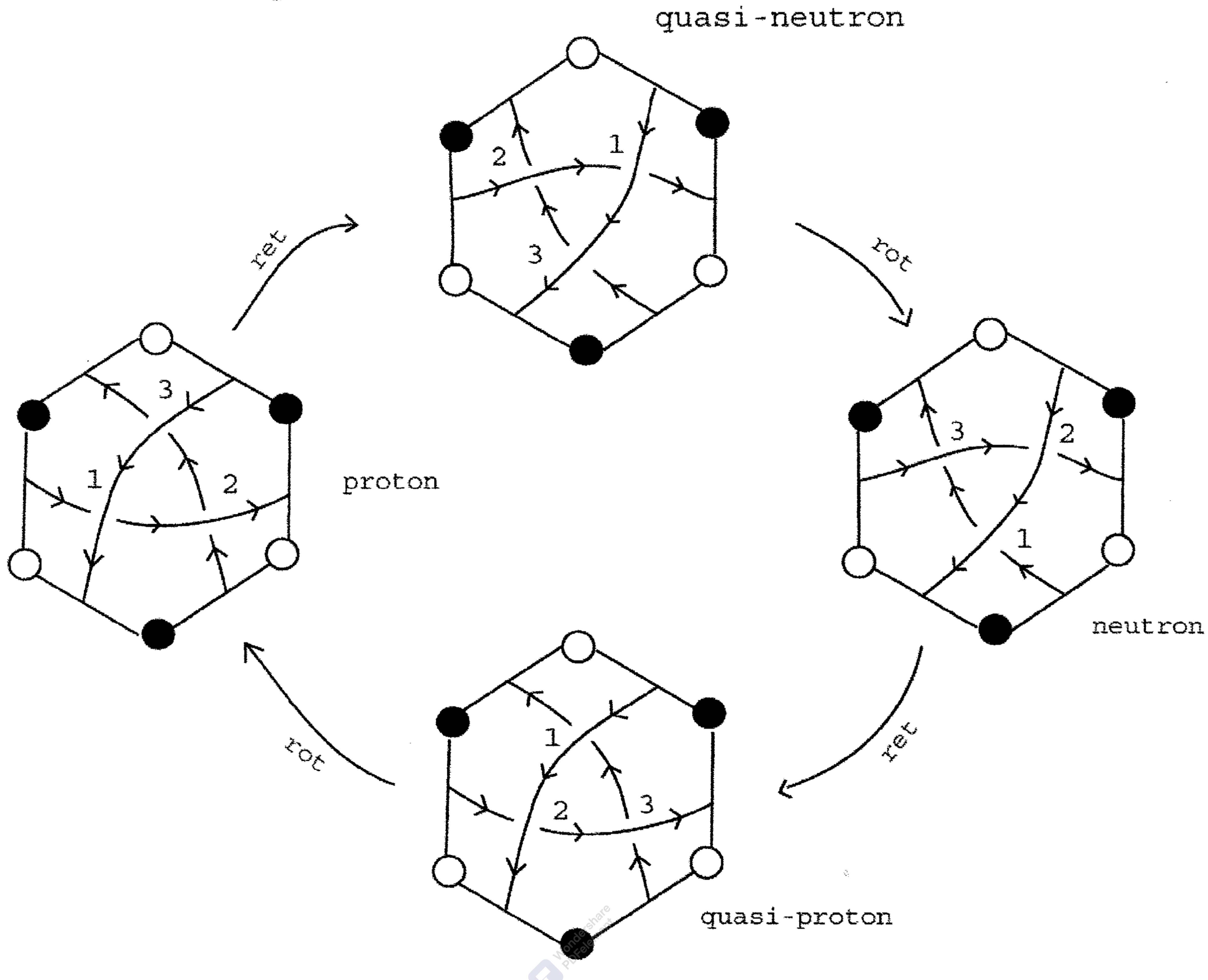


josef bayéma

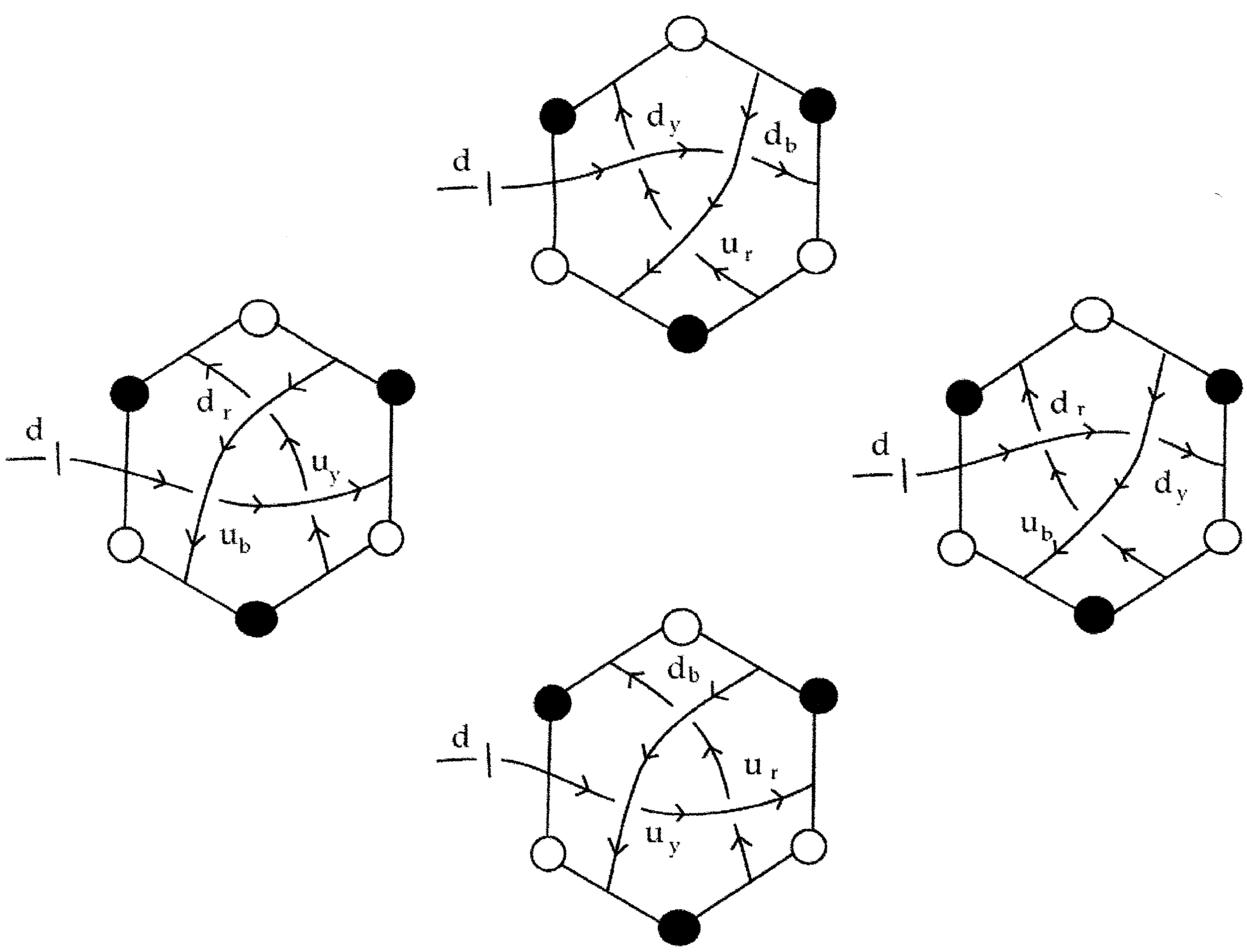
b - *circulation*

without giving attention to flavours, let's mark 1, 2 and 3 the three colors on the proton's corner and let's return it. we get a quasi-neutron as if colors were returned as flavors, like after the third of a revolution in the three-dimensional space, sliding each color in the circulation way, from the crossing that receives it to the crossing that retains it, we get the true colored neutron.

here is the table of the whole process.

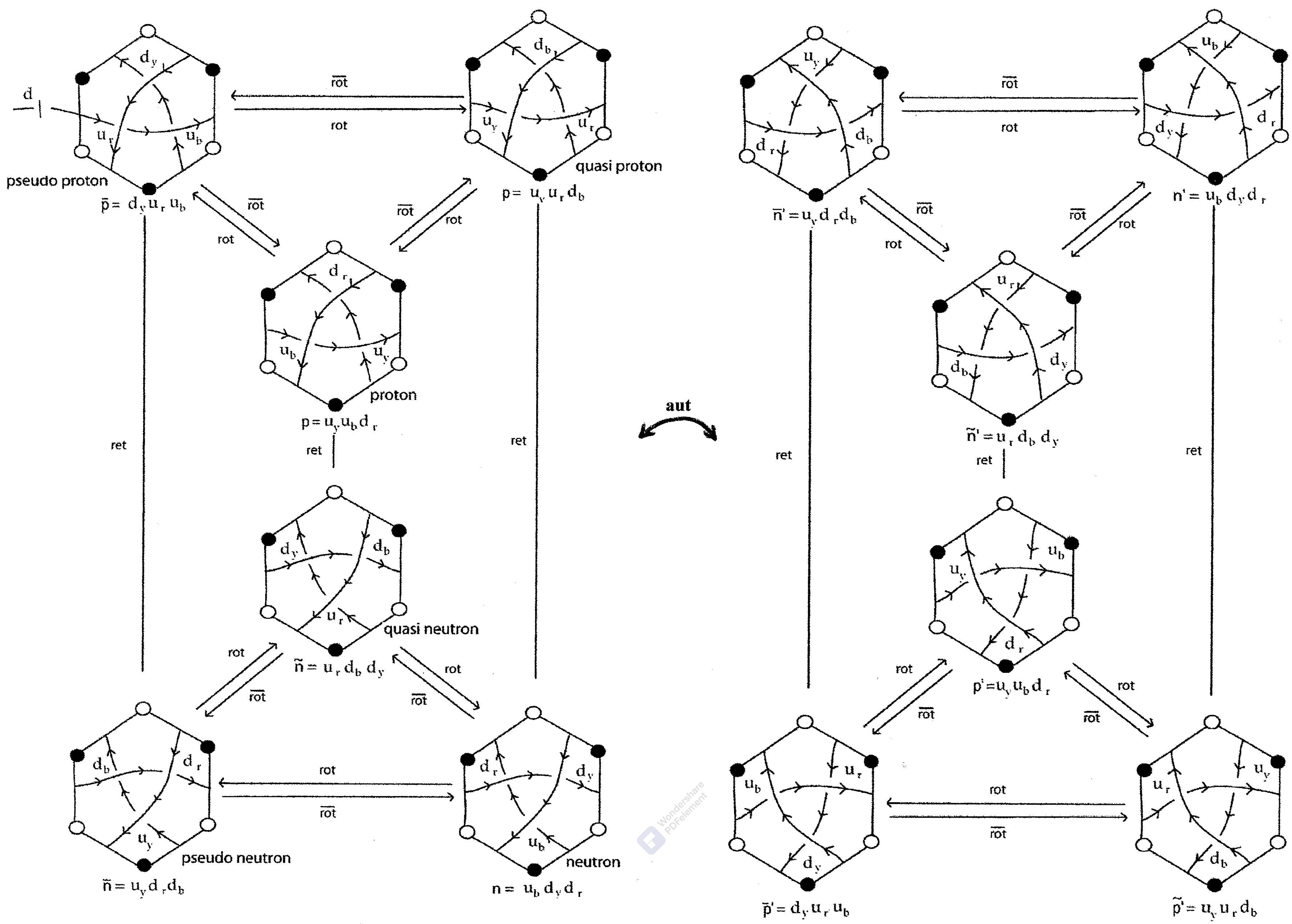


superposition of flavours' returns and colors' rotations gives the full picture of each nucleon's state.

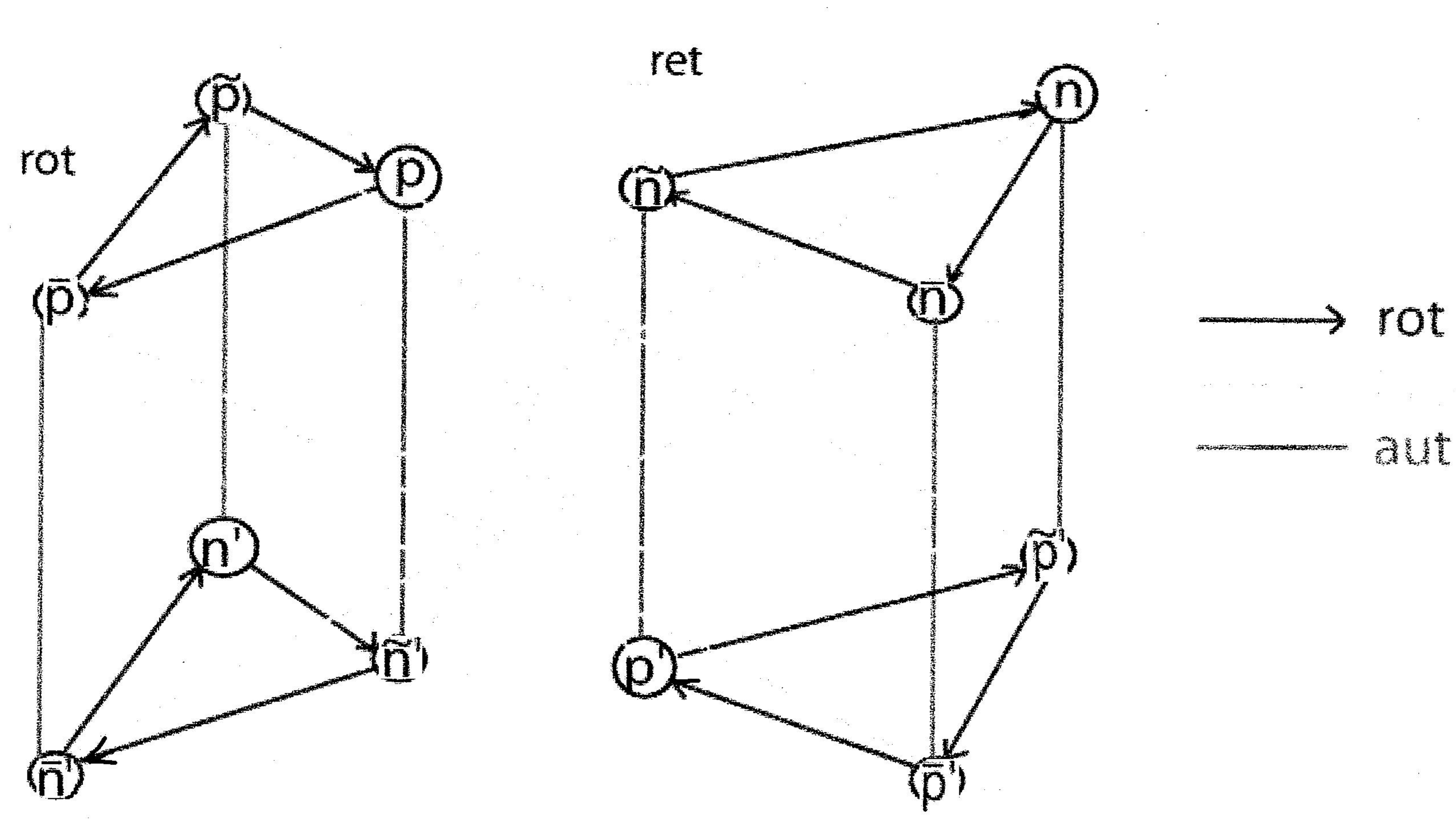


the rotation we carried out in the circulation way is named *direct rotation* and we mark it **rot**. but we can also consider an indirect rotation in the opposite way. we name it *anti-rotation* and mark it $\overline{\textbf{rot}}$. so, the four particles table becomes a six particles table.

this table is still incomplete. indeed, each particle and quasi-particle can produce another one through **aut,** and these new particles are themselves contained in a table of relations rot, anti rot and ret .



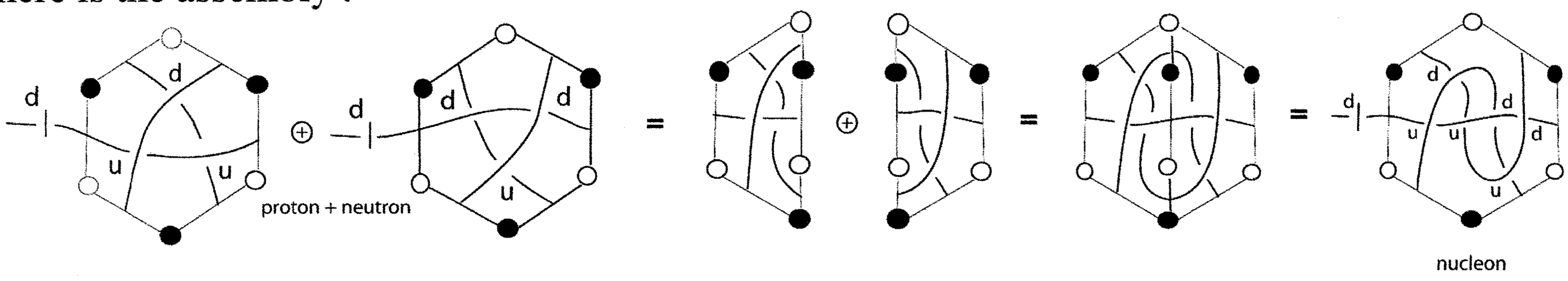
at the end, the full final table contains only 12 particles where each particle generate the 11 others.



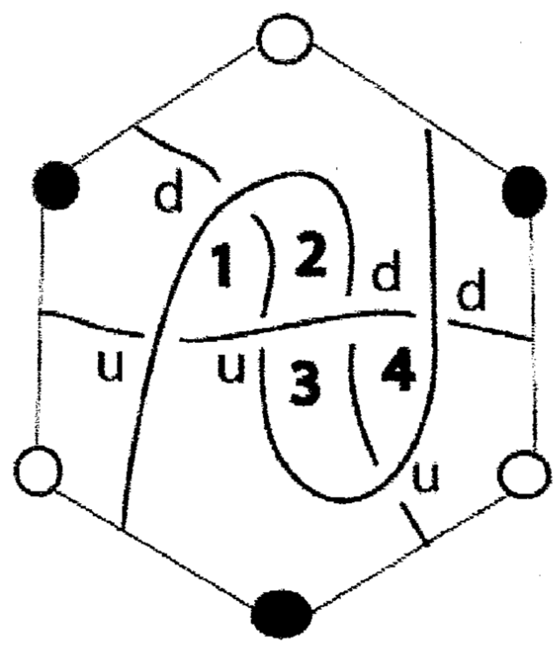
the nucleon :

we described the metamorphosis of each nucleon's state. now, we must check that results of plastic chromodynamic concerning the assembly of a neutron and a proton comply with those of QCD.

here is the assembly :

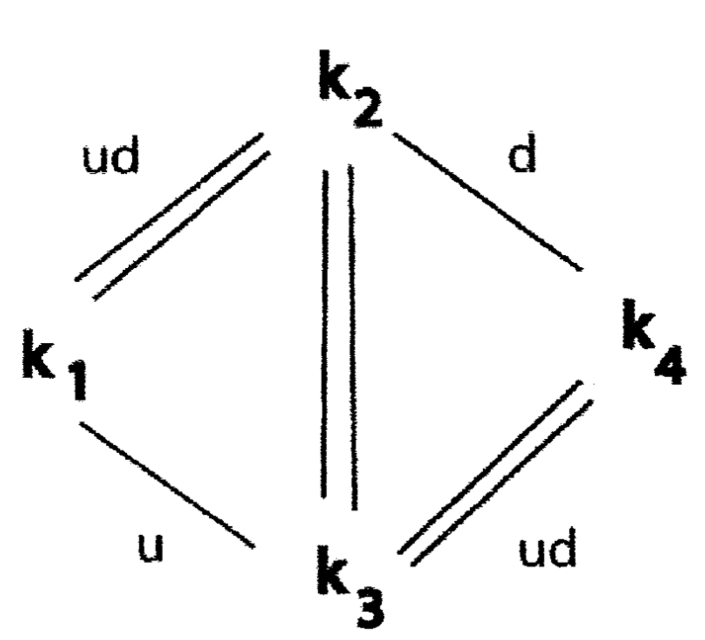


from this assembly, many possibilities are open. indeed, as each neutron or proton's pattern offers only one regular metamorphosis, their assembly offers *four* patterns of metamorphosis, 4 returnable corners, numbered on the drawing from 1 to 4.



corners k_1 = uud, k_2 = udd, k_3 = uud and k_4 = udd. let's write their connecting formulas from the table of their common crossings.

	k_2	k_3	k_4
k_1	ud	u	
k_2		ud	d
k_3			ud



as k_1 and k_4 don't have any common crossing, they can be operated simultaneously. every other case is inhibiting : k_1 and k_3 or k_2 and k_3, etc. can't be operated simultaneously. so from this assembly, we may use two possible directions of metamorphosis :

a) those that can operate simultaneously, here k_1 and k_4, they are **simply additive**

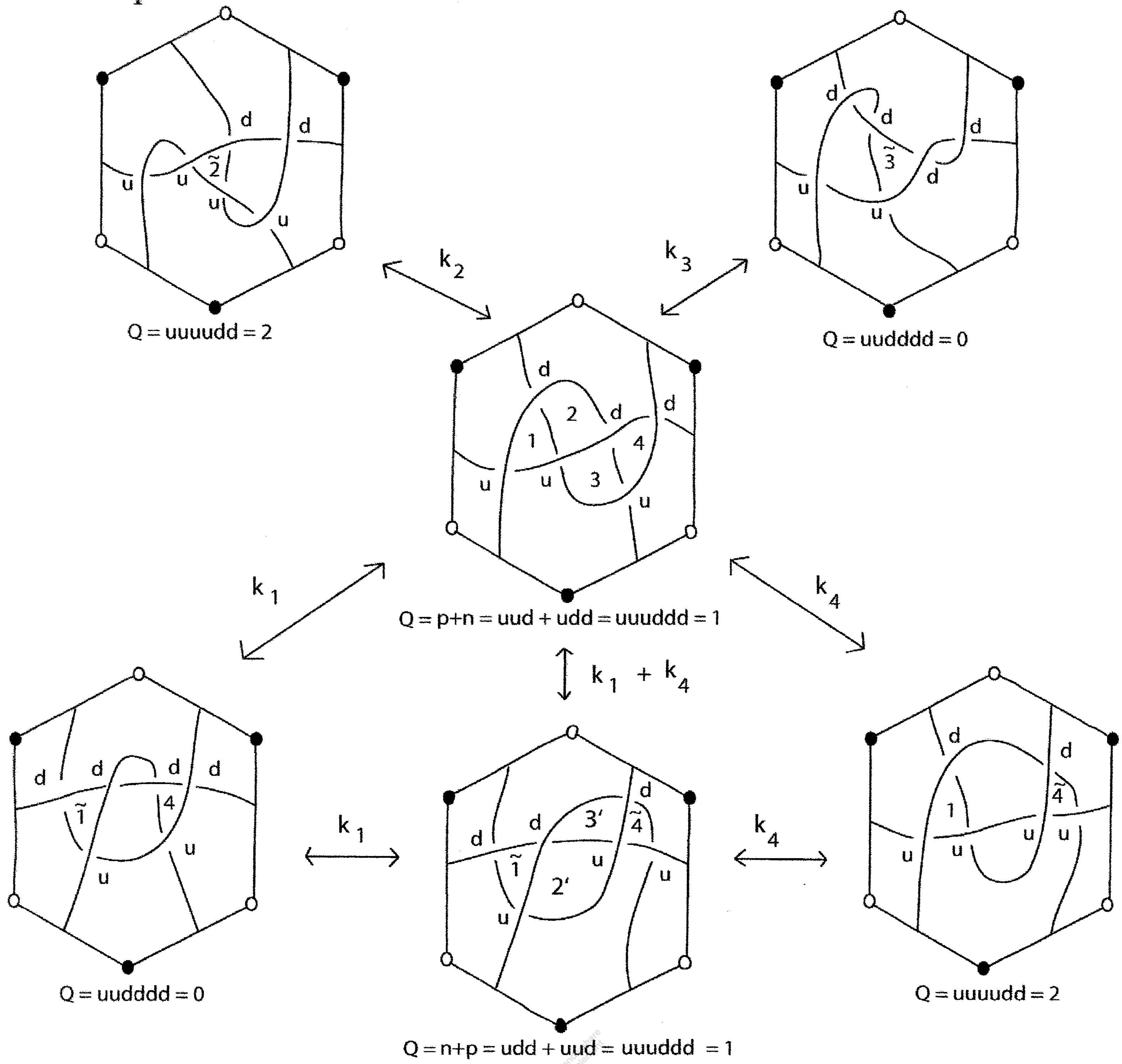
b) those that mutually inhibite, OR one OR the other but not both together, they are **exclusive** ; OR k_1 OR k_3, etc.

we present these possibilities into an inhibitions' table.

the only white case is indicating additivity and crosses are indicating inhibition

	k_2	k_3	k_4
k_1	X	X	
k_2		X	X
k_3			X

let's draw all the possibilities.



the metamorphosis p + n ↔ n + p is stable from the point of view of the quarks' load, but we notice 4 states for whom this load varies. furthermore, the nucleon's final state is susceptible of metamorphosis in the same way as initial state to end either into initial state turned final and so on ad infinitum, or into one of the states of load 0 and 2. the ensemble of all these states forms the nucleon's metamorphosis' universe; some states are seen *inside out* two by two, a little bit as if nucleons was a protoplasm which would roll up on itself, showing us not only states changes, but also presentations changes : operating k_2 into n + p gives k_3 into p + n seen inside out, etc.