

Aineen olemus (2007)

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Hyvät luonnonfilosofit,

Professori Jukka Maalampi kertoi tiistaina *Aineen olemuksesta*. Historiallinen katsaus olemuskäsitysten muuttumisesta oli selkeä kertauskurssi, joka samalla antoi sopivasti perspektiiviä tämän päivän näkemyksille.

Emeritusprofessori Kaarle Kurki-Suoniolle oli varattu ensimmäinen kommenttipuheenvuoro, ja se tietysti toimi hyvänä keskustelun katalysaattorina. Monet muistanevat Kurki-Suonion esitelmän samasta aiheesta noin kaksi vuotta sitten ja sitä seuranneen keskustelun. Näyttää kuitenkin edelleen siltä, että arkikielen antamat merkitykset vaikeuttavat täsmällisten fysikaalisten käsitteiden ymmärtämistä. Aineen ja massan mieltäminen synonyymeiksi tuntuu edelleen aiheuttavan sekaannuksia.

En yritä laatia nyt kuullusta esitelmästä oman ymmärrykseni mukaista tiivistelmää, vaan kirjaan tähän joitain kommentteja ja kysymyksiä myös poissaolleille tiedoksi.

Siitä lähtien, kun päädyttiin tutkimaan aiemmin homogeeniseksi koetun aineen olemusta erilaisina hiukkasina ja niiden välisinä ”tyhjinä” tiloina, on hiukkasten lukumäärä ja olemus vaihdellut. Määrä on yleensä lisääntynyt. Sen jälkeen, kun Dirac ”keksi” ensimmäisen ns. ”tarpeettoman” hiukkasen 1928, niitä ”löydettiin” lopulta 400 – 500 ei-pysyvää (äärimmäisen lyhytikäistä) hadronia, kunnes kvarkkimalli lopulta vasta 1960-luvun alussa syrjäytti ne. Nykyiset 6 erilaista kvarkkia antavat tyydyttävän selityksen useimmille ilmiöille. Esitelmöitsijä totesi, ettei ole mitään koetuloksia, joita ei voitaisi selittää nykyisillä hiukkasilla, mutta jatkoi filosofisemmin kysymällä: Kysytäänkö oikeita kysymyksiä?

On kiinnostavaa, että Higgsin kenttä on jouduttu ottamaan selitysten avuksi ja näin ikään kuin palattu entisen eetterin suuntaan. Mikäli CERN’ssa ei hurjista investoinneista huolimatta löydetä tavoiteltua Higgsin hiukasta, on nykyinen teoria ilmeisessä pulassa. Joudutaan kysymään ollaanko harhapoluilla ja/tai voitaisiinko kvarkkeja pilkkoa vielä pienempiin osasiin? Se vaatisi käsittämättömän suuria energioita. Vai pitäisikö koko hiukkasmalli panna remonttiin.

Supersäieteorioiden, jotka tarvitsevat 10-ulotteisen avaruuden testaaminen on käytännössä mahdotonta. Onhan niitä kuulemma 10 potenssiin 500 erilaista vaihtoehtoista versiota. Silti näitä supersäikeitä, jotka ilmenevät tässä meidän 3-ulotteisessa (4-ulotteisessa sanoit esitelmöitsijä, viitaten aikaan) maailmassa hiukkasina, pidetään fysiikassa vakavasti otettavana teoriavaihtoehtona. Miksi testaamaton malli kymmenine mikroulottuvuuksineen vetoaa tiedemiehiin? Onko se mystiikan kaijuuta vai viehättääkö siinä eksoottinen

matematiikka?

Esitelmöitsijä teki retorisen kysymyksen: Onko siis luovuttava eräästä tieteen kulmakivistä eli teorioiden testattavuuden vaatimuksesta? Kurki-Suonio totesi, että näyttää siltä, että ollaan palaamassa antiikkiin, jolloin selityksiksi tarjottiin erilaisia filosofisia, ei testattavissa olevia selityksiä. Tämä tarkoittaisi Maalammen mielestä tietyssä mielessä tieteen loppua.

Ongelma palautuu oikeastaan aiemmin mainitsemaani kysymykseen: Kysytäänkö oikeita kysymyksiä? Kurki-Suonio totesi, että tiede redusoi kysymykset sellaisiksi, että tiede pystyy niihin vastaamaan. Talvio yhtyi tähän näkemykseen erinomaisella puheenvuorolla, jossa hän mm. huomautti, että kysyjä sisällyttää jo kysymykseensä maailmankuvansa mukaisia odotuksia vastauksesta, ja vastauksen hän tulkitsee vertaamalla sitä omiin odotuksiinsa. Näin kysymyksen asettelu ja vastauksen tulkinta predestinoivat kulkemaan tuttuja latuja.

Pimeä energia on esimerkki vallitsevan paradigman mahdista. Maalampi totesi, että pimeän energian olemassaolo perustuu havaintoihin, johon Kurki-Suonio vieressäni kuiskasi: "havaintojen tulkintoihin". Olen samaa mieltä. Kaikki havainnot muuttuvat väistämättä tulkinnoiksi. (Tulkitsematon havainto ei liene vielä havainto?) Tieteellisillä tulkinnoilla on tietysti vahvana tukena monin tavoin testattu teoria eikä pelkkä intuitio.

Ihmetyttää ja oudoksuttaa miksi Tuomo Suntolan DU-malli, joka ei tarvitse pimeää energiaa toimiakseen ja vain yhden (1) geometrisen ulottuvuuden lisää, on lisäksi matemaattisesti yksinkertainen, eikä ole ristiriidassa uusimpien havaintojen ja tutkimustulosten kanssa (päinvastoin istuu niihin ilman standardimallin tarvitsemia korjauskertoimia) ei herätä suurempaa mielenkiintoa fyysikoissa ja kosmologeissa – ei sen vertaa, että tulisi perusteltuja vastaväitteitä tai kritiikkiä.

Tuntematon rouva totesi puheenvuorossaan, ettei ihmisäly koskaan pysty selittämään perimmäisiä kysymyksiä. Varmaan hän on oikeassa. Mutta fysiikan ja tieteen siirtäminen filosofien kehitettäväksi ei tätä tosiasiaa muuttaisi. Tieteen tulee mielestäni profiloitua jatkossakin aiemmin omaksumiensa prinssiippien mukaisesti – vaikeuksista huolimatta. Se tarkoittaa mm. empiirisen tutkimuksen merkityksen ymmärtämistä sekä kiinni pitämistä falsifiointiperiaatteesta. Vaikka näin ehkä rajataankin joitain mielenkiintoisia ja eksoottisia sivupolkuja pois, säilyttää tiede kuitenkin tiedon eliittiin kuuluvan asemansa tässä kaikenlaisen huu-haan ja hömpän maailmassa. Toisaalta liian jyrkkä lukkiutuminen vallitseviin paradigmoihin ei kuitenkaan saisi muodostua uusien ideoiden hautausmaaksi – korkeintaan hautomoksi.

Näin haluaa toivoa
Heikki Mäntylä

PS. Jyrki Tyrkkö ei kallistunut dualismin kannalle kommentoidessaan edellistä kirjettäni. Hän toteaa muun muassa:

"Jos mainitunmallinen dualismi jotakuta tyydyttää, niin ei ainakaan minua." Ydinkysymykseen" niin kuin Mäntylä sitä kutsuu:"Onko minuus tai minätietoisuus aivojen luomus vai ovatko aivot vain minuuden käyttämä väline itsensä ilmaisemiseen" vastaisin: ehdottomasti jälkimmäinen vaihtoehto, kun merkitään 'väline' vielä tällä tavalla. Silloin ei jää enää tilaa dualistiselle substanssijattelulle – mikä ei silti estä käyttämästä totuttuja sanoja aivot ja henki (minuus, sielu, tietoisuus ym.) kuten ennenkin arkipuheessa."

Voi olla, että käsitän dualismin väärin tai ainakin omalla tavallani. Ajattelen, että 'minuus' on 'ei materiaa' ja aivot 'materiaa'. Olen myös viime aikoina lukenut ajatusmalleista, joissa henki/materia –ongelma ikään kuin siirretään sivuun ja korvataan käsitteellä 'informaatio'. Tähän on Tyrkkö jo aiemmin viitannut kysymällä:

"Onko ajateltava, että paljon käytetty termi "informaatio" pyritään sijoittamaan siihen asemaan tieteen filosofiassa, jossa "materia" on ollut jo pitkään; onko realismin 'nimi' kenties jonkun mielestä korvattava nimellä "informatismi"?"

Suosittu yleiskäsite informaatio ongelman ratkaisuna on kiinnostava. Siihen ovat viitanneet Tyrkön lisäksi muutkin tutut LFS-ajattelijat, muun muassa Kullervo Rainio, Paul Talvio, Tarja Kallio-Tamminen ja uusi seuramme hallituksen jäsen Ahti Lampinen. Tämän asian syvällisempää pohdiskelua en kuitenkin tässä yhteydessä yritä. Se vaatii kypsytelyä. Sama

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luin kiinnostuneena Heikki Mäntylän välähdyksen seuran Maalampi-tilaisuudesta. Kun en nykyisin itse näytä pääsevän mukaan, sallittaneen, että teen s-postissa pieniä ajatuskoukkauksia -- niin nytkin.

Mainitsen, että juuri tänä syksynä on ilmestynyt aivan erinomainen kvanttimekaniikan ontologian esitys (lähinnä Bohmin viitekehyksen mukaan) -- Paavo Pylkkäsen "Mind, Matter and the Implicate Order" (Springer Verlag. The Frontiers Collection). Luulenpa, että se johtaa ajatukset hyvinkin uusille teille ja auttaa vapautumaan mekaniikka-ajattelun jäänteistä, joka yhä näyttäytyy "partikkeliopin" muodossa.

Syksyn aikana olen tutustunut internetin ja nyt Pylkkäsen avulla kaikkein uusimpaan ajatteluun kvanttimekaniikan tulkinnan alalla ja sen seurauksena kirjoittanut kokonaan uuden luvun käsikirjoitukseeni "Discrete Process Model for Quantum and Mind Systems" sekä täydentänyt Discussion-lukua. Panen ne tähän liitteeksi. (DPM:iin voi tutustua LFS:n julkaisusta "Diskreetti prosessimalli", mutta olen sitä englantilaisessa versiossa korjannut ja täydentänyt tuntuvasti.)

Kommentit ovat kovasti tervetulleita.

Kullervo Rainio

5. Active information and DPM. Fundamental structure of reality

Although DPM has been created independently – starting rather “axiomatically” from the discreteness assumption of time and space and analyzing the logical consequences of it – it would be fruitful to examine the similarities between this framework and the recent ontological interpretations of the quantum mechanics. Because those studies are based usually on the wave mechanics – and the quantum evolution is considered continuous – it is difficult to show any one-to-one correspondence between them and our discrete presentation. (In this comparison DPM may make, for its “illustrative” character, actually, the ontological interpretations easier to comprehend.)

5.1. Information – particularly active information

The very essential concept in the recent ontological studies of quantum mechanics is the *information* (Bohm, Hiley, Chalmers, Wheeler, Pylkkänen, Atmanspacher, Stapp, von Baeyer etc.). It widens the domain of the quantum mechanics generalizing it essentially.

Pylkkänen describes the standpoint of Chalmers and Wheeler in the following way:

“[Chalmers proposes] that information is fundamental feature of the world which has both physical and phenomenal properties as fundamental properties.” ... “He considers the so-called ‘it from bit’ view advocated by Wheeler, according to which physics implies that information is fundamental to the physics of the universe, and even that physical properties and laws may be derivative from informational properties and laws.”¹

Henry Stapp (1999) sums up the character of quantum mechanics in the following way²:

“This theory (quantum theory) constitutes a radical break with prior tradition in physics, because it avers, if taken seriously, that nature is built not out of matter but out of knowings.” – “... nature is best understood as being built around knowings that enjoy the mathematical properties ascribed to them by quantum theory.”

David Peat describes the big change of the central notions in quantum mechanics sharply³:

“Physics of the 18th century dealt with the movement and transformation of matter. That of the 19th introduced the notion that various forms of energy - work, heat, electrical, chemical, biological, etc - are mutually interconvertible, transforming one into the other according to the laws of thermodynamics. . .”

“Now at the end of the 20th we should perhaps entertain the notion of a triad (matter, energy, information) in place of the duality matter-energy.”

But that information which is crucial for quantum mechanics is not - as Peat remarks - same as that which is “generally treated as something ‘passive’ ”...“in Information Theory, information is a cargo being shipped from sender to receiver.” . . . “Hence information is not something passive that is carried by a book, telephone line or radio wave, but an actual activity in nature, a physical form, albeit subtle, that has its interaction with matter and energy. And just as matter and energy are mutually convertible, the same may be true of matter-energy and information.”

David Bohm has given a telling name “active information” for the information having quantum mechanical effects. That could be seen as a brilliant innovation by Bohm⁴.

In the new usage of the concept of information it is very essential that it is understood as *ontic*, as an ordering factor having real effects on the occurrences - and not only *epistemic*, i.e., as the capacity of the human beings to transfer and to store the coded knowledge.⁵ This is the great insight by Bohm and it has a very important standing in the development of the recent quantum mechanics to a new direction, to a more articulated science. It widens its range of use decisively, it gives, for example, a feasible framework for analysis of consciousness.

It is easy to see that *the DPM is explicitly a presentation of active information*. What else the transition probability matrix should be than an information field - and, particularly, a field of the active information directing the course of events?

¹ Pylkkänen, 2007, p.243.

² Stapp, 1999.

³ Peat.

⁴ The fact that Bohm seemingly tried to “smuggle” the determinism back to quantum mechanics with his “hidden variables” aroused strong opposition. For this reason other thoughts by Bohm were also widely repulsed - among them the vision of “active information”. As far as I can see, the introduction of this concept does not at all presume the assumption that the trajectories of the particles were deterministic. - It has been recognized that later not even Bohm himself considered his deterministic viewpoint very essential. Pylkkänen writes: “However, Bohm felt in the end the essential point of the interpretation is that it makes a hypothesis about the nature of quantum reality, and not so much in its deterministic features...” (Pylkkänen, 2007, p.17.)

⁵ The epistemic information is consisted of coded messages included in physical structures. The receiver is more or less able to decode them, but the information itself, in a code form, has no effect on the occurrences. Only decoded as semantic information (in the mind of the receiving subject), it may have some effect but that is a totally different matter.

The maximum amount of information coded in the transition probability matrix is easy to calculate:

The entropy of a given Markov-vector (a row of a transition probability matrix) in bits is:

$$\text{Entr} = [-p_1 \cdot \log(p_1) - p_2 \cdot \log(p_2) - \dots - p_n \cdot \log(p_n)] / \log(2)$$

where n is the number of classes in the vector, or:

$$\text{Entr} = - \sum_{i=1}^n p_i \cdot \log(p_i) / \log(2)$$

Correspondingly, the information of the vector in bits is $\log(n) / \log(2) - \text{Entr}$. It is in bits

$$\text{Info} = [\log(n) + \sum_{i=1}^n p_i \cdot \log(p_i)] / \log(2)$$

The information of a *homogeneous vector* is $\text{Info}_{\text{homog}} = 0$. For example:

$$\mathbf{H} = (.2, .2, .2, .2, .2)$$

$$\begin{aligned} \text{Entr}_H &= 5 \cdot [.2 \cdot \log(.2)] / \log(2) = \log(.2) / \log(2) = \log(1/5) / \log(2) = \\ &= -\log(5) / \log(2) \end{aligned}$$

and

$$\text{Info}_H = \log(5) / \log(2) + \text{Entr}_H = \log(5) / \log(2) - \log(5) / \log(2) = 0$$

Counting in the corresponding way one can notice that the entropy of an binary unit vector (1, 0) is 0 and its Info = 1 bit. This maximum value is also the information capacity of a binary code having 2 elements.

The maximum of information and the capacity of the code are dependent on n, the number of classes in the vector. The information of the unit vector with 8 elements (1,0,0,0,0,0,0) is correspondingly: $\text{Info} = \log(8) / \log(2) = 3$ bits.

One can study the effect of vector interference on the information by comparing the information values of the vectors to each other. Thus, the constructive interference increases the information, e.g.:

$$\mathbf{V1} = (.9, .1) ; \text{information } .531$$

$$\mathbf{V2} = (.9, .1) ; \quad \text{''} \quad \text{''}$$

$$\mathbf{V}_{\text{interf}} = (.988, .012) ; \text{information } .947$$

Thus, the information increases .461 bits so that the first element becomes dominating.

Correspondingly, one can compute the effect of a destructive interference on the information:

$$\mathbf{V1} = (.9, .1) ; \text{information } .531$$

$$\mathbf{V2} = (.1, .9) ; \quad \text{''} \quad \text{''}$$

$$\mathbf{V}_{\text{interf}} = (.5, .5) ; \text{information} = 0$$

In this case the information decreases .531 bits.

The computation of information shows whether the vector interference is constructive or destructive. – It should be mentioned that the information of the vectors of the subsystems in the *two-slit experiment* is: $\text{Info}(S1) = .083$ bits and $\text{Info}(S2) = .043$ bits, but the information of the interference-vector is $\text{Info}(\text{Interf}_{S1,S2}) = .193$ bits. The interference is, thus, constructive. (We may add that the information of the vector showing the empirical results by Tonomura is: $\text{Info}(\text{Emp}) = .206$ bits.)

In DPM, the definition of “active information” is simply:

Active information is given as a matrix of transition probabilities, as the form it includes. It indicates the *order* which conducts the quantum evolution. It can be denoted an *information field* where that evolution occurs. It is not an energy field but it is, however, real, *ontic*. It has its effect on the reality by controlling and directing the chain of quantum “jumps”. – An important consequence of DPM has to be emphasized: No energy impulses are needed for the quantum “jumps” to occur. They are results of the assumed structure of the basic reality: the jumps (transitions) are *constrained* to happen on every time-step. From this point of view we could even say that the *time* is the reason for the chain of events! The reason for the *change* is time, the reason for a *certain* selection of a state (direction of the transition) is the transition probability matrix, i.e., the information field.

We have to emphasize again and again that the information included in the transition probability matrices is “active information”, ontic, effecting on the reality, and not only epistemic, carried in a coded form through communication.

The macrophysical events are represented in DPM by unit vectors. No interference can change these vectors. It looks like the active information would have no effect on those events. To be more exact, we have to say that it has an effect but in an implicate way: it *keeps* the system’s state quantum physically stable.

If there are *many* unit vectors in system’s information field (in the system’s transition probability matrix), then the effect of this field comes out very clearly and then there are many alternative stable states each of them having possibility to become realized. The end result, which one of these states then actually is realized, depends on the path which the quantum evolution takes. This fits in with Hiley’s and Pylkkänen’s remark concerning Bohm’s active information⁶:

“The proposal is that active information at the quantum level organizes the dynamical evolution of the system itself.”

“...the shape or form of the wave is more important than its magnitude.”

“For this reason, a small change in the form of the wave function can produce large effects in the development of the system.”

A system which itself perhaps does not to be realized at all may change remarkably through interference another system’s path structure and, thus, literally, “*change the world*” – and this happens without energy⁷. If our science takes the concept of active information seriously, assuming an “invisible world” or “spiritual world” – as belonging to the reality and even effecting on the material world – is not without coverage. The sufficiently detailed, plausible *knowledge* of it is, however, lacking.

5.2. Meaning

The *mental states* are information fields. – The *Life Space* is presented in DPM as a homogeneous field and its active information is, thus, 0. But every interference between it and a (heterogeneous) field – the differentiation of the Life Space – produces active information to it, e.g., the learning reinforcement, as well punishments as rewards. (In general, punishments

⁶ Hiley and Pylkkänen, 2006.

⁷ It is known in our everyday life that even an extremely little amount of energy can “change the world”, relieve tremendous amounts of energy: as well in the case of a power station, as of an atom bomb, as of a rat-trap. However, *some* amount of energy, differing from 0, is needed, be it a little stir of fingertip or a small push of rat’s paw. But the effect of information field does not need energy *at all* and that thing changes *qualitatively* our conception of reality.

bring less information to the Life Space than rewards, but its amount is primarily dependent on the learning coefficient.)

A mental state on the lowest level itself does not include *meanings* which could influence the course of events. Such information fields (on a “higher” level) are needed which carry the *interpretation* of states, i.e., the states of the Life Space get their meaning – as well subject’s experience of meaning as the dynamic properties, for example the qualities of attraction or repulsion. “Subject’s experience of meaning” we assume to be an *intrinsic* property of a state.

Thus, the semantic information in the form of *meaning fields* may have an influence to Life Space. In this sense the meanings are active information and, thus, *ontic*, included in the reality.⁸ This active information is actually present in *all behaviour* as its *meaningfulness* feature. The observer – a subject who operates also with meanings – identifies the outward characteristics of the perceived object, the movements, the gestures, the utterances, on the basis of their *meanings*. Only that is *relevant* and opens the possibility that the observer *understands* – by means of his own meaning fields – the behaviour of the observed individual.

5.3. Fundamental structure of reality

The new quantum mechanical framework applying the concept of active information (developed by Bohm, Peat, Hiley, Pylkkänen, Laszlo etc.) and illuminated well by DPM, is changing our ontological view in a very radical way.

The reality, uncovered by the recent thinking, appears to be first of all a *holistic, coherent whole*. It is neither “spirit” nor “matter”. We may talk about a “deep-structure” or about a fundamental structure of reality presented as information fields. This comes out particularly in David Bohm’s framework. He describes namely his “implicate order” notion in the following way:

“... the whole is in some way enfolded in everything and... each thing is enfolded in the whole. This implies that in some way and to some degree, everything enfolds or implicates everything.”

In DPM, this “enfolding” is represented in a more exact, articulated form: because every state (every node in the graph presenting the system’s transition space) is connected with every other state, every change in a transition probability vector effects on every other elements in that vector. We assumed namely that, in principle, the transition from every state of a system to every other is possible – the probability of the transition being, however, in some cases approximately 0. (See p. 15.)

The same view comes out in many expressions by the recent theorists. David Peat refers clearly to this kind of “deep-structure” when he writes about information fields and, particularly, about “pre-space structures”:

“Is it really correct, for example, to speak of a ‘field’ of information, since information does not fall off with distance, neither is it associated with energy in the usual sense. Possibly the notion of field should be widened or, at the quantum level we should be talking about pre-space structures, or about *algebraic relationships that precede the structure of space and time*.”

Would the notion of field be widened enough in DPM representation where we have been talking about “pure information fields”? They are not “associated with energy in the usual sense” but are “active” in the sense of “active information”.

⁸ David Peat denotes: “Meaning, which is normally taken to be subjective turns out to have an objective, physical consequence.”

Withdrawing from all kind of dualistic (or materialistic) views and attempting to find a *holistic* way of thinking comes out in Atmanspacher's writings; he uses the term "dual-aspect approach" and describes it in the following way⁹:

"Dual-aspect approaches consider mental and material domains of reality as aspects, or manifestations, of one underlying reality in which mind and matter are unseparated."

Would the "underlying reality in which mind and matter are unseparated" be the information field (given in DPM in the form of a transition probability matrix)? One can call such a field neither material nor mental, although both types of quantum evolution occurrences are presented – *mutatis mutandis* – by the same mathematical instrument, information field. (Only the existence of unit vectors separates the matter (particle) system from the others.)

According to Atmanspacher the new approach requires a change in the axiomatic basis of quantum mechanics :

"The primary purpose here is to understand correlations between mental and material domains rather than direct interactions between them. In this respect, it is worthwhile to refer to an attempt at generalizing the axiomatic basis of standard quantum theory in such a way that the concept of entanglement becomes applicable even beyond physical examples."

In DPM, the concept "vector interference" seems to be general enough and "applicable even beyond physical examples" – as we have seen in many contexts.

Atmanspacher notices that Chalmers has also adopted the "dual-aspect" view:

"Another proponent of such dual aspect thinking is Chalmers (1996), who considers the possibility that the underlying, psychophysically neutral level of description could be best characterized in terms of information."

"Dual-aspect" approach is present also in Whitehead's ontology and in Henry Stapp's framework which is near it¹⁰:

"... Whitehead's ontology, in which mental and physical poles of so-called 'actual occasions' are considered as psychological and physical aspects of reality. The potential antecedents of actual occasions are psychophysically neutral and refer to a mode of existence at which mind and matter are unseparated. This is expressed, for instance, by Stapp's notion of a 'hybrid ontology' with 'both idea-like and matter-like qualities' and 'two complementary modes of evolution'."

"In a recent interview (Stapp 2006), Stapp specifies some ontological features of his approach with respect to Whitehead's process thinking, where actual occasions rather than matter or mind are fundamental elements of reality. "

Might systems' quantum evaluation be an example of such a "process thinking"? Transition events (as "actual occasions") "rather than matter or mind" are "fundamental elements" in DPM approach.

Referring Bohm's framework , Hiley and Pylkkänen notice at first¹¹:

"...we assume that mind and matter are two *aspects of* or *ways of looking at* an underlying reality". . . "We follow Bohm in proposing that such a reality can, for convenience, be analyzed in terms of *levels* that differ with respect to their subtlety. Each level then has both a physical and a mental aspect, and this makes a 'two-way traffic' between levels possible."

The "subtlety" seems to be rather unexact concept. Therefore it is questionable whether we may say that "levels" have "both physical and mental aspects". As far as I can see, we

⁹ Atmanspacher, 2002.

¹⁰ Stapp, 1999, p. 159.

¹¹ Hiley and Pylkkänen, 2005.

can talk about “physical aspect” if the system reaches a state stable enough to be observed, in principle – in terms of DPM: if there is a unit vector in system’s transition probability matrix making one state stable (“real”). Other systems have the character of “mental” systems. Among them we may find Bohm’s “subtlety”: some mental system on the “lowest” level may interfere with some material (neural) quantum system, but on “higher” levels only with other “mental” systems. Carrying more and more abstract meanings those systems become more “subtle”.

How “high up” the hierarchy of “levels” gets rise, that is a very speculative but interesting question. We may include in a “human subject” interfering *meaning-giving* systems on several levels (systems interfering most intensely with each other forming the *core* of a “subject”, some others existing in a “periphery” of the “subject”). We may well suppose that on still higher “level” than these information fields forming the “subject” there are “superior” systems which are not observed by any introspection or reached by reasoning. Perhaps they form the sources of intuition.

Hiley ja Pylkkänen remark then how “Bohm suggested, radically, that even the quantum level can be thought to have, via active information, a *primitive mind-like quality*, although it obviously has no consciousness. We think this is a very important contribution that Bohm made to mind-matter research. It opens an option to provide a mathematical description of putative ‘proto-mental’ features (i.e., active information) at the quantum level.”

“Proto-mental” is again an expression indicating the reality “behind” both the material and consciousness systems, the reality which comes out in DPM as “pure information fields”.

As far as I can see – and have found out from the recent studies in quantum mechanics – the DPM shows the structure of active information and its way to influence the course of events at least mathematically more clearly than the descriptions based on the wave mechanics. Anyway, DPM is more illustrative.

We summarize our ontological view – which seems to be very near Bohmian way of thinking – in terms of DPM:

The world’s fundamental structure is active information which guides systems’ chains of events and is describable of the form of transition probability matrices.

The course of events is a chain of “jumps” (discrete transitions) from a superposition to another. A certain kind of “transcendentality” of the “deep-structure” comes out in a specific feature of the information fields; there seems to be no obstacles to assume such information fields (transition probability matrices) which have no vectors leading to stable states, only superposition states. These systems (“pure information fields”) themselves have no elements which could make them observable, but they are, however, *real* in that sense as the active information is real (i.e., it effects on the chain of events). It seems to be plausible to think that *generally* systems are just “pure information fields” and that, in *special cases*, the systems can fall into some stable state and become, thus, observable, “matter”, in principle.

6. Discussion

6.1. System’s autonomy

When a new conceptual and structural framework is represented, there arise always also new deep problems which can not be solved in the first schematic draft. It is, however, fruitful to discuss about them, because they show where are the limits of the theory.

Is the existence of a system always a consequence of the existence of some other system? In this way, are all systems consequences of one “initial system”? If so, how this “initial system” has got its origin? Or is it thinkable that a system may come into existence spontaneously, without any reason? The quantum mechanics includes many “mysterious” things; is it justified to add the origin of a system to this “quantum mysticism”?

Our intuition requires us to assume that the mind systems have some *autonomy properties*: a system may come spontaneously into existence and interact with other systems. For example, it seems plausible to suppose that the focus system we have described earlier should have this kind of autonomy character. – The *intentionality*, subject’s capability to set goals and values, is difficult to interpret without autonomy at least on some higher levels of mind systems. In that case, a spontaneous vector, connected to an attractive (or repulsive) object or value goal, comes into existence and interferes with the actual vectors in a decision-making situation.

If we accept the “freedom of will” in some sense, we seemingly can not avoid the assumption of autonomy of systems at least on some levels of the mental activity.

We may well add one more question: Noticing that the interaction between systems occurs through the interference, do we need to think that this is a mere chance – or are there some factors causing the interference between certain systems and in which circumstances it happens?

A particularly important problem in the case of mind systems is just which standpoint we should take concerning volitionism¹² (accepting the “freedom of will”)?

Fortunately, from the point of view of the empirical research, we are not forced to answer this kind of philosophical questions. In practice, as in the quantum mechanical laboratory experiments, when the preparation is made, it is possible, analogously, in the psychological testing to get the subjects to *commit* themselves to certain rules for a time period. When the subject follows the instruction obediently, he sets voluntarily a limit to his autonomy. During the test the subject has in his use only the relevant behaviour alternatives the experimenter allows to him. However, the subject has not loosed his autonomy, only voluntarily limited it: he is still free and autonomous, he can cancel his commitment, withdraw totally himself from the test situation or follow not the rules. This happens, however, relatively seldom. Therefore the psychological testing succeeds relatively often.

6.2. Some open questions

1) In the study on consciousness, the dynamic analysis of development of *meaning* would be important and essential, i.e., building systems for giving meanings to the states, in terms of valences. Each perception as well as image state belongs in many ways to the fields of meanings and to their intersections. The empirical research – in simple laboratory situations – of the meaning-giving may be possible according to the DPM frame of reference so that we could draw conclusions how the meaning systems operate and how does the focusing occur.

2) We have considered several times the *hierarchal structure* of mental systems on different levels. This is an important problem-area in consciousness research, particularly from the DPM point of view.

3) The dynamics of *meditation* seems to suit well to DPM description as a special case. In meditation the subject concentrates his mind on a certain, chosen object and keep his mind on

¹² Lowe, 2000, pp. 246-257

that during a period, instead of giving to his thoughts the freedom to “gallop” from one thing to another in rather hazardous way – as it happens usually in everyday life.

All that what has been told about the meditation exercises indicates that essential in it is the subject’s *remaining in the chosen state*. In the DPM presentation this means that the probability of staying in that state has to be sufficiently high (or the subject succeeds to “keep” it as sufficiently high). The meditative exercise requires *active* trial. Thus, it seems to indicate that a kind of *autonomy* is possible, i.e., we have to assume a “*subject*”, a kind of “highest” autonomous system¹³, a subject who can start some mental processes and bring the mental systems into interaction. Is this “subject” hypotheses properly justified view or not, that is a hard question which is much discussed among the philosophers and brain researchers. We have to admit that there seems to be no way to solve this problem in the DPM; we have to be satisfied with the analysis on much “lower” level.

If the subject is able in the meditation to bring together mental systems from different levels so that there is a corresponding stable state on all these levels, then he may experience the object of meditation very “deeply”, i.e., on all levels of meaning. That is just how the meditation has been described.

4) There are still, naturally, lot of open questions concerning the relations between the systems, particularly their interaction. – What kind of systems interfere with each other, if not all of them? Is it plausible to assume a system with which all systems interfere, immediately or indirectly – like Ervin Laszlo’s “A-field” or “quantum plenum”? – When the interference occurs; when it begins? How long time it endures, if not forever? – Is the interference phenomenon always un-located, and if not, what can restrict it locally? – Could any interference become hindered?

Our answers – if there exists any – are seemingly hypothetical. We may have fruitful visions, but we need not less than a new paradigm and lot of scientific work based on it if we want to get created the first draft of a meaningful and plausible “Theory of Everything”.¹⁴

6.3. Contribution of DPM to philosophy

The philosophical discussion in western civilization emphasizes the importance of the problem of consciousness and its autonomy. In the extreme cases, in the so-called eliminative materialism, the existence of consciousness has been totally denied – consciousness has been seen as an “unscientific concept”. Seemingly, however, this reductionistic brain research is not satisfying.

Nowadays many philosophers tend to think that quantum physics could say something essential about the ontological character of the consciousness; our modern physics has already shown the genuinely indeterministic nature of the quantum events. Thus, it seems, for example, adequate to accept the “freedom of will” to be true, in principle.

One has seen that the quantum mechanics leads to an enlarged ontology, so that the mental process needs to become accepted as a part of reality. Tarja Kallio-Tamminen writes¹⁵:

“If we take the state-function description seriously enough, the world can be seen as a developing or changing monistic system to which humans belong and which they shape by

¹³ Maybe it would be more plausible to assume more than one system: to “build” a “subject” we may add to this basic system of “cognitive decision making subject” several mind systems which are more or less entangled (wholly or partially) with it. According to this view, the “subject” would be merely a collection of overlapping information (mind) fields than a clearly distinct entity.

¹⁴ The “very hard problem of consciousness” concerning the nature of *qualia* seems to be too “hard” also to be solved in the DPM framework. We may assume the *qualia* to be some intrinsic properties of mental states but it does not include them essentially to the theory.

¹⁵ Kallio-Tamminen, 2004, pp. 325-326.

their actions. If the abstract wave-function controls not only the formation of matter but also the formation of mental states, we have proper tools to deal with both these aspects in the same overall framework” (p.326). And further she writes:

“In the quantum frame of reference, our mental states may be something real even if they are not directly reducible to material particles moving in space-time” (p. 325).

The quoted text by Tarja Kallio-Tamminen is a rather modest approach to “quantum ontology”.

The well-known philosopher Ervin Laszlo goes much further in his radical book “Science and the Akashic Field”¹⁶. He writes (in this context referring to Alfred North Whitehead):

“To some extent and in some ways, all matter is conscious, and no consciousness is categorically immaterial. And if so, there is no categorical divide between matter and mind (p. 146)” and further following seemingly the principles of the dual-aspect monism: “We take both matter and mind as fundamental elements of reality but (unlike in dualism) we do not claim that they are radically separate; we say that they are but different aspects of the *same* reality” (p. 147). (Italics by Laszlo.) It should be noticed that in our DPM representation this structural (and ontological) *sameness*, the dual-aspect monism, has been particularly emphasized.

Laszlo creates his vision on the basis of his “connectivity hypothesis” which means the complete connection of everything through quantum phenomena. It is easily seen that this corresponds exactly our fundamental assumption of the graph where all nodes (the states) are connected, in principle. (All transitions are possible while the probability of some of them may be 0 – or very near 0.) We have been dealing with many transition systems¹⁷, while Laszlo emphasizes the “A-field” which seems to include all possible states of reality. One may see here a difference between these two visions, but, actually, in DPM we may well assume the reality to be one system with one transition matrix. But what kind of “World Matrix”?

Let us look how Laszlo describes his A-field as a quantum vacuum:

“... the quantum vacuum¹⁸ is not only the seat of a superdense virtual energy field... but also a cosmically extended proto- or root-consciousness. There is no way we could tell by ordinary sensory experience. First, because we cannot observe vacuum fields, we can only conclude their existence by reasoning from the things we *can* observe.” (p. 154)

“... it is evident that all universes that exist, and have ever existed, arise in the quantum vacuum. The particles that make up a given universe spring from the vacuum and fall back into it at the end of the universe’s life cycle. The vacuum existed before any universe was born, and will continue to exist after all matter in that universe vanishes into black holes.” (p. 110)

“When this universe was born, the Bang that created it and the vacuum in which that event took place were not randomly configured. They were informed by prior universes.” (p. 110)

¹⁶ Laszlo, 2004

¹⁷ Actually, as it has been shown in Chapter 5, our transition probability matrix could be called an *information system* or *information field* – it describes the *order* of occurrences.

¹⁸ Some hints of the descriptions of the “quantum vacuum” in physics maybe here illustrating: “Our physic can explain most of the evolution of the Universe after the Planck time (approximately 10^{-43} sec. after the Big Bang)... events before this time are undefined in our current science, in particular, we have no solid understanding of the origin of the Universe (i.e., what started or ‘caused’ the Big Bang)... University probably derived from an indeterminate sea of potentiality that we call the ‘quantum vacuum’, whose properties may always remain beyond our current understanding... it is filled with potential particles, pairs of virtual matter and anti-matter units, and potential properties at the ‘quantum’ level. he creation of virtual pairs of particles does not violate the law of conservation of mass/energy because they only exist for times much less than Planck time. ... in fact, the ‘quantum vacuum’ is the source of all potentiality.” ... “Universe is not filled by the ‘quantum vacuum’, rather it is ‘written on’ it, the substratum of all existence.”

(<http://zebu.uoregon.edu/~js/ast123/lectures/lec17.html>)

It has been said that “Universe is ‘written on’ it (the ‘quantum vacuum’)”. We may make the conclusion, in terms of DPM, that there is a “pure information field” in question, “written” in the form of a transition probability matrix, “World Matrix” (or more matrices).

In the begin, we have to notice that the “World Matrix” can not be a totally homogeneous matrix, all elements being equal with each other, because its information is 0, but Laszlo emphasizes that his “A-field” is an information field, and very rich of information, indeed.

Laszlo writes about the *virtual* energy, which is not energy in the usual meaning. Thus, the matrix cannot have any realizable stable states (unit vectors with probabilities of type $p_{i,i} = 1$): “...we cannot observe vacuum fields”. Thus, the “World Matrix” is a “pure information field”. – There exists, however, according to Puthoff, fluctuations of energy in quantum vacuum, “ ‘jitter’ motion, or Zitterbewegung as it is called” (Puthoff, H.E.) – “In the quantum vacuum virtual particle-antiparticle pairs are continuously created and annihilated: the quantum vacuum is full of activity.” (Wikipedia) – These expressions indicate that some states could be *nearly* realized; to be more exact: although the time-step were the Planck’s time, no transition probability $p_{i,i}$ reaches the value 1. – All this means that the transition probabilities may vary widely; the matrix contains lot of information.

The “eternal” character of quantum vacuum is natural also from the DPM point of view: there is no reason to assume that “a pure information field” ever vanishes – nor that it has been born at a certain time point.

Are this “World Matrix” construction and Laszlo’s “A-field” analogous? -- Both of these frameworks are created totally independent of each other. They are based on different process models – Laszlo’s on continuous Schrödinger model and DPM on discrete (Heisenberg) model. Therefore there are difficulties to make exact comparisons, but the main characteristics of them seem to be very near each other.

This introductory approach, dealing with the discrete process model, has shown how one can build a solid mathematical representation of the reality, giving a monistic but not materialistic description of it. DPM is a logical construction, deduced from one coherent basis, from the assumption that the reality is thoroughly quantized, i.e., that both the space and the time are discrete.

It must be admitted, however, that this description has been only a draft. Its connection to empirical world lies on few facts and much has been based on “thought experiments”.

The draft character comes out also in illustrations of the processes. For the sake of simplicity, the scale used in our examples has been very “unrealistic”. (When we were talking about transition probability matrices of systems, we used, for example, 4 x 4 square matrices in cases when in “reality” the corresponding matrices may be of size million x million elements – but not infinite, that would be in contradiction to the picture of quantized world).

In the science we do not, however, try to construct a “complete” representation of the “reality”. We aim to reach *invariances*, regularities, general laws, principles. Those can be discovered in simple experiments – the scientific and philosophical consequences of the thinking behind them being, however, extremely meaningful and important.

What are, then, the invariances that we have tried to bring to light applying the DPM frame of reference?

We summarize the essential consequences of the assumption that the world is totally quantized and describable by discrete variables, only:

The discreteness determines the form of description. The course of events, the process of a system, is a series of transitions following each other, jumps from a state to another with certain probability at every time-step. The systems need to be treated as closed systems. Thus, the representation takes the form of Markov vectors and matrices.

The description of quantum mechanical processes with Markov matrices – instead of treating them as wave functions – is not an insignificant curiosity. No, it brings lot of new features to the interpretation of quantum mechanics. First, one can differentiate between the actualization of a state and the realization of it. The former means that a state (more exactly: a state component) becomes selected as a result (outcome) from a “lottery by Nature”. The realization requires, in addition, that the process remains to the actualized state for a long period. Thus, one can avoid the fuzzy talk about the “collapse of wave function after the measurement” and the long scientific debate on the question whether the “observation causes the collapse”.

Philosophically fundamental in DPM is the view that “becoming material”, observable, requires the remaining of the process in one state for a time period, sufficiently long. Only then the observation becomes possible and there exists a so-called “material thing”.

Dealing with “matter” one is not forced anymore to create images about “particles”, but it is natural to consider matter any state of process that makes observation possible. Such are, for example, stationary energy states. Actually, there are signs in the discussion among the quantum physicists of this change of interpretation. One talks about “matter” and “energy” as varying forms of manifestation of a “basic substance”. – We have, however, to emphasize that there is no need to limit the “manifestation of a basic substance” to “matter” or “energy”, but take into account the manifestations of mind, mental processes. Doing that, we have considered both “matter” and “mind” manifestations of discrete processes which have their basis on similar mathematical structure. In short, we have applied the “dual aspect monism”.

Thus, when a physicist talks about the “quantum field” that “fills up the whole universe”¹⁹, one can accept it. But one has to notice that there is a connotative meaning of the concept “quantum” which connects it to “something physical”. This meaning has to be avoided. There is no necessity to limit the quantum phenomena to physical events.

The stability principle comes out also in another, analogous, connection: In mind system the mental state which corresponds to the physiological sensation (brain state) needs to be sufficiently stable, so that there is time enough for the perception to be developed (a gestalt to be formed and to get a meaning). In that sense the birth of “matter” and the birth of “perception” are deeply analogous phenomena, i.e., basically same but existing in different systems. We have to emphasize that this difference between “mind” and “matter” is *not substantial* but *constructional* – the mind systems have structural characteristics which differ from the physical quantum systems, characteristics as the learning, for example.

Crucial assumption in our application of DPM is the *interaction* between systems in the form of *interdependence* (entanglement) and the *vector interference* as a consequence of it.

In standard quantum mechanics, the concept of wave interference is an essential conception. Vector interference is a generalization of the interference concept, applied to the discrete processes.

It seems that the vector interference interprets a large amount of various relations of systems. In mind systems it comes out as learning effects, as the influence of fields to the transition vectors and, above all, as the interaction between physical and mental systems (brain and mind) as well as the interaction between the mind systems on varying levels.

¹⁹ ... or psi-field or “Akashic Field” (Laszlo, 2004)

The great philosophical importance of the vector interference assumption is that it makes the reduction of phenomena not only unnecessary but *impossible*. Thus, we can not reduce consciousness to physical phenomena and *vice versa*. The mental and the physical (quantum) systems may interact strongly but both remain to exist. They continue to have their own transition probability matrices – according to the language of DPM.

It seems justified to maintain that the *psycho-physical problem (mind-body problem)* has been theoretically solved, in principle: Mental system *can* influence the physical system (quantum systems in synapses in brain) through vector interference between them and *vice versa*. It will be a task of specified sciences to find out where and when and in which form those interacting systems exist and influence each other.

Our method has been deductive. We have not tried to define the concept “system”. We have concentrated to describe systems mathematically, without direct interpretation of them in terms we use in everyday language, because that would create only wrong impressions of these things – carrying lot of irrelevant connotative meanings of the words.

DPM is a deductive mental construct, plausible and developed logically from the basic assumption of discrete space and time. It develops our conception of the world from vague ontological ideas to clearly stated thought experiments and offers the possibility to find more precise answers to ontological questions, including those concerning the status of consciousness in our reality.

A new, philosophically important conception of the world is developing in our days, but it does not mean that we had much (empirically confirmed) *knowledge* of it. In quantum mechanics that research which seems to be very essential from the ontological point of view – concerning for example entanglement phenomenon (Zeilinger et al.) – is actually in its first beginning, unarticulated, while in psychology hardly any ontologically relevant study has been made. Kurt Lewin’s still tentative system of dynamical psychology has got actually no other continuation than the stochastic framework by Rainio and the empirical application of it, the Group Maze experiment²⁰, shortly described in this book.

The new ontology need to be build – now and for a long time in the future – on the basis of deductions and visions. There are still many deep problems to be solved and their solution needs plausible knowledge and critical experiments.

However, the development of the new ontology has already created new philosophical means to correct the distortion of the western culture. The strongly materialistic main stream in our thinking has been – and is still – a real danger for this culture, foreboding disaster. The new ontology which puts the spiritual life to the position that belongs to it, may become decisively important for the cultural evolution of mankind.

Appendix 4. Measurement of spin in the case of two entangled particle system according to DPM.

When the known Einstein – Podolsky – Rosen paradox is presented, one refers to the measurement of spin of two entangled particles. Nowadays, especially Zeilinger has shown in

²⁰ Rainio, 1972, and 2000.

his experiments that the distant entanglement effect is non-local, not at all dependent of the distance between the place of the particles.

The starting point of the study is that we assume two particles a and b to interact between each other. The spins of them are not known (they are not measured). One separates the particles – carries them maybe very far from each other. The spin of one particle, say a, is then measured (using a magnetic field as a detector). The spin of particle b is measured separately of that. If the result has been “spin up” (+) in the measurement of a, it is in the case of b “spin down” (-). If we got in the case a the result “spin down”, the result in the measurement of b is unavoidably “spin up”, but in this study we never get the result “spin up” and “spin up” or “spin down” and “spin down”.

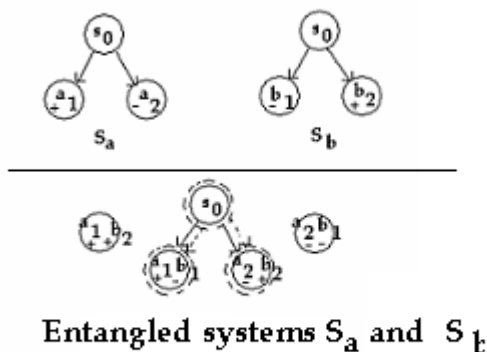
The way of thinking has been, that there exists no spin until the spin has been measured, i.e., the spin will be “borne” when it is measured – according to DPM we would say: when the system transits from a superposition to a stable state. (There has been lot of discussion about the “mystic” non-local instantaneous influence from a far distance – it is understandable at all according to our recent quantum physics – because it looks like the *measurement* action in one place could produce an effect in other place faster than the speed of light.)

We assume in the following example two systems , S_a and S_b , which are *entangled* with each other.

The entanglement comes out as follows:

The graph in Fig. L5 shows the entanglement of systems S_a and S_b . The states a_{1+} (“spin up” in the system S_a) and b_{1-} (“spin down” in the system S_b) are corresponding states, as well as a_{2-} and b_{2+} . It is essential that for the entanglement the states ++ and - - are impossible. In the graph this comes out in such a way that those states are isolated, there is no path leading to them.

+++++



Fi. L5. Two systems and their entanglement as a graph.

+++++

Let the transition probability matrices of the two systems be:

	T_a				T_b		
	s_0	a_{1+}	a_{2-}	s_0	b_{1-}	b_{2+}	
s_0	[0	.5	.5]	s_0	[0	.5	.5]
a_{1+}	0	.5	.5]	b_{1-}	0	.5	.5]
a_{2-}	[0	.5	.5]	b_{2+}	[0	.5	.5]

(s_0 is the starting state.)

We assume that these systems are entangled (or forced to become entangled) the corresponding states being a_{1+} and b_{1-} and a_{2-} and b_{2+} . (The probability .5 indicates that we do not have any exact information of the states except that they are superpositions.) When we count the interference within the row vectors we will have the matrix for both systems:

$$\begin{array}{c} \text{Int} \\ [0 \quad .5 \quad .5] \\ 0 \quad .5 \quad .5 \\ [0 \quad .5 \quad .5] \end{array}$$

It is easy to see that the process continues as jumps from one superposition to another if no environmental change will happen.

When the measurement is carried out in system S_a it means that a detector (magnetic field) is made present. It changes the matrix in the following form (cf. the Table 1.2 on page 23):

$$\begin{array}{c} \mathbf{M}_a \\ \begin{array}{c} s_0 \quad a_{1+} \quad a_{2-} \\ s_0 \quad [0 \quad .5 \quad .5] \\ a_{1+} \quad 0 \quad 1 \quad 0 \\ a_{2-} \quad [0 \quad 0 \quad 1] \end{array} \end{array}$$

What does this matrix mean? – It tells that the first jump of the quantum system is made either to a_{1+} with the probability .5 or to a_{2-} with the probability .5 but then the second jump leads to a stable (observable) state. Suppose that the first jump was a_{1+} . The vector indicating the state of S_a is now

$$\mathbf{a}_{1+}(\mathbf{M}) \quad \begin{array}{c} a_{1+}(\mathbf{M}) \quad a_{2-}(\mathbf{M}) \\ (1 \quad 0) \end{array}$$

Now we are coming to the essential point:

Because the systems are entangled the new vector $\mathbf{a}_{1+}(\mathbf{M})$ interferes with the \mathbf{b}_{1-} vector system S_b . This interference is not produced by any detector but occurs inside the system-pair. It is counted as follows:

$$\begin{array}{c} S_a \quad \mathbf{a}_{1+}(\mathbf{norm}) \quad \begin{array}{c} a_{1+} \quad a_{2-} \\ (1 \quad 0) \end{array} \\ \\ S_b \quad \mathbf{b}_{1-} \quad \begin{array}{c} b_{1-} \quad b_{2+} \\ (.5 \quad .5) \end{array} \\ \\ D \quad \begin{array}{c} (.5 \quad 0) \\ \mathbf{b}_{1-}(\mathbf{norm}) (1 \quad 0) \end{array} \quad D \Sigma = .5 \end{array}$$

The state b_{1-} of the system S_b somewhere far away and not influenced by the detector (magnetic field) has become to a stable state and observed as “spin down”. We have to emphasize that it is determined by the *inner* interference of the two systems, not by the detector.

(It is clear that if the actualized state by S_0 was a_{2-} the result was correspondingly a_{2-} and b_{2+} , i.e., “spin down” and “spin up”.)

DPM shows clearly the essential mathematics of the spin-experiment. The non-local influence, the entanglement phenomenon itself, stays as “mystical” as before.

4.12.2007 Kaarle Kurki-Suonio

Tervehdys, Heikki!

Kiitos tästä tiivistelmästä samoin kuin siitä, että teit aloitteen sähköpostikeskustelun uudelleen alkamiseksi.

Mainitsit kokouksessa vierekkäin istuessamme, että listoja on käytössä erilaisia. Tuntuukin vähän hämäävältä osallistua keskusteluihin, joiden osanottajien joukko on epämääräinen ja vaihteleva.

Akuutiksi tilanne tuli minulle eilen, kun olin sepittänyt oman lopetuspuheenvuoron Voitto Aaltosen alkamaan primavo-keskusteluun mutta huomasin hävittäneeni postilaatikostani kaikki sen keskustelun viestit ja niin kadottaneeni sen osallistujajoukon osoitteet. Olin kyllä jo ihmetellyt sen koostumusta - siinä oli suuri joukko nimiä, joita ei ollut aikaisemmalla LFS-listalla, mukaan luettuna Voitto Aaltonen itse! Lisäksi siinä oli lopussa jokin merkillinen tutu-lista, johon VA:n ensimmäisessä viestissä ilmeisesti viitataan tutu-seuralaisina. Mikähän sekin lienee, en ole koskaan kuullut, ja miten tämä primavo-lista lienee syntynyt? Sen keskustelun johdosta sain mm. yhden mieluisan yhteydenoton henkilöltä, joka uskoi liittyneensä joskus LFS-keskustelulistalle mutta ei kuitenkaan esiinny minulla olevassa listassa.

Pidin LFS-listaa postilaatikossani ajan tasalla sitä mukaa kuin Paul jaksoi sitä täydentää. Se on siellä yhä, mutta sen ajantasaisuus on tietenkin jo kyseenalainen. Minulla on myös tallessa Paulin vuodentakainen uudenvuodentervehdys, jonka lähetyslista on laajempi, ilmeisesti silloinen jäsenten osoitelista.

Tämän viestin lähetyslista on huomattavasti lyhempi kuin postilaatikossani oleva LFS-lista. Onko se nyt "virallinen" LFS-keskustelulista, vai miten olet sen koonnut?

Mukavinta olisi tietysti, jos olisi helposti ulottuvilla jonkin palveluntarjoajan listapalvelu, jonka puitteissa kaikki keskustelu kävisi listan nimissä ilman, että jokaiseen viestiin tulisi rasittavan pitkä osoiteluettelo. Muuten helpoin minun mielikuvitukseni tavoittama tapa ylläpitää yhtä hyvin määriteltyä listaa, tai miksei useampiakin, olisi juuri säilyttää postilaatikossa yhtä pohjaviestiä, jossa on listan mukainen vastaanottajaluettelo. Joku vastuhenkilö voisi päivittää sen luetteloja tarvittaessa ja lähettää sen tyhjänä viestinä listan jäsenille parilla napin painalluksella.

terveisin Kaarle