The mathematical foundations of psychology and sociology as a generalization of (quantum) gravity.

Johan Noldus*

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Abstract

In a long paper of this author [1], I explained that the "spiritual" interaction between living beings would require a gravitational theory on an appropriate space. In this paper, we further develop this idea and construct different types of idealized limits.

1 Introduction.

Sociology and psychology are two fields which are, in spite of their considerable age, in a detrimental state. Psychology is merely the tool policy makers impose upon us to manifacture a desired "humanity" or civilization and is by no means a science; sociology is rather in the same state. In this paper, I intend to present the honest mathematical foundations of something which could eventually become a science; for the educated physicist, it should not come as a surprise that such theory is a theory of double (quantum) gravitation. We will work with the most primitive concepts such as the space of psychological types $\mathcal{M}$ which has to be thought of as a parameter space relevant for defining spiritual interactions, conscious (c) or unconscious (u) reception (R) and/or sending (S) of signals. In particular, we will make a completeness assumption that every send signal is also received so that in a sending/reception process there are exactly four possibilities corresponding to (c,c), (c,u), (u,c) and (u,u). We will, moreover, assume that perfect transmission is possible meaning that an (un)consciously received signal is also perfectly (un)consciously transmitted with the same parameters. A signal transmits information which we write down by the letters α, β; now, it is not so that the received information equals the transmitted one and therefore we need to consider triplets of the form (x, α, a) where $a \in \{c, u\}$. In order to write down a dynamics on the space (x, α, a), we need a geometry on that space and we will in particular be interested in geometries g which are "lifts" π of "standard" geometries h_a on (x, α) meaning that $g \circ \pi(x, \alpha, a) = h_a(x, \alpha)$ in some well defined sense. An example of such type of geometry would be given by two Lorentz metrics[1] $d_a : (x, \alpha) \to \mathbb{R}_+$,

*Relativity group, departement of mathematical analysis, university of Gent.

[1] A Lorentz metric d on a space X is a mapping $d : X \to \mathbb{R}_+$ satisfying $d(x, y) > 0$ implies that $d(y, x) = 0$, $d(x, x) = 0$ and $d(x, y), d(y, z) > 0$ implies that $d(x, z) \geq d(x, y) + d(y, z)$.

defining partial orders $\prec_a$ corresponding to two half cones, with the following interpretation: if $(x,\alpha) \prec_a (y,\beta)$ then, there is a signal of the type (x,α,a) towards (y,β,a); otherwise, there is a signal from (x,α,a) to $(y,\beta,\neg a)$. This model is c/u symmetric and induces a transitivity on consistent (un)conscious signalling and transmission. Other schemes, apart from this double Lorentzian metric theory, are also possible and other (quantum) gravitional theories will be discussed (such as a noncommutative Lorentzian metric theory).

We leave the task of specifying the space of all triples (x,α,a) open, but I strongly suspect that it is not as simple as what psychologists do. I forsee for example that the quantity of meat one eats a day or wether one prefers to eat meat over fish does not really belong to $\mathcal{M}$. A direct characterization in terms of genomes would be much more efficient and wishful. Also, the dependency upon the message α could be nontrivial in the sense that some cause more "curvature" than others. Equally likely is the implementation of some form of telepathy. Basically, the development of a general framework of signalling messages between certain types is all we need to do psychology and sociology; of course, it is a bit presumptious to think that it will be easy to concretely implement this theory as the much easier theory of general relativity in physics is still rather poorly understood. Here, the situation is much more complex as the kinematical space at hand is much more complicated than a four dimensional real manifold and likewise is its geometry. This means that in a very real sense, the best social scientists are (some) physicists indeed.

2 The most general setting and some additional principles.

One would suspect that the kinematical space at hand is some $\mathcal{N} \times \mathbb{Z}_2$ bundle over $\mathcal{M}$; here, as before, $\mathcal{M}$ is the space of pure "psychological types" and $\mathcal{N}$ is a space of possible messages. In reality, the space is even more complex as $\mathcal{N}$ may depend upon x. To incoorporate this, we consider a triple $(\mathcal{Z},\mathcal{M},\alpha)$ where $\alpha : \mathcal{Z} \to \mathcal{M}$ is continuous and surjective and every $\alpha^{-1}(x)$ is of the form $\mathcal{N}_x \times \mathbb{Z}_2$. This reasoning is classical but can be lifted to a quantum and/or statistical setting by allowing for superpositions and/or unions of classical states. The (quantum) geometry at hand is defined by some relational quantity associated to an SR process which we denote by $X(x,\alpha,a;y,\beta,b)$ where $x,y \in \mathcal{M}$, $a,b \in \{c,u\}$ and finally α,β are the details of the message respectively. As a general remark, we do not speak about an asymmetry between c/u in case you might want to implement the idea that you are conscious to some degree, which is expressed by a positive real number between zero and one, where zero means unconscious and one fully conscious. In the model of this paper, the "degree of consciousness" is a binary variable which can take on values in $\mathbb{Z}_2$, but the reader might wish to extend the theory to more complex situations.

X here can really mean anything; for example, it can stand for a function to some (noncommutative) algebra or for an expression of the kind $\partial\partial' Y(x,\alpha,a;y,\beta,b)$ where the (un)primed derivatives live in (y,β) $((x,\alpha))$ respectively. To further delimit the situation, we need more principles:

- X transforms as a scalar under coordinate transformations of $\mathcal{Z}$,
- X is the lift of some continuous "geometry" on $\cup_{x\in\mathcal{M}}\mathcal{N}_x$ to $\mathcal{Z}$ which means that the details of the propagation in that space determine wether the signal is received (un)consciously if it has been transmitted (un)consciously,
- the theory is c/u symmetric meaning that the mapping which permutes them both leaves the theory invariant; this dynamical principle is remnicent to the time reflection symmetry in ordinary Hamiltonian physics where the distinction between past and future is also kinematical. It does not need to be so, but for now it is to be regarded as a simplifying working assumption,
- there is transitivity on sending conscious signals with conscious, faithful transmission and reception. Sloppy reasoning might suggest this is not the case: for example, if some beautiful girl Kristien were to send a message to one of my friends Alain that she loves me and Alain sends this to me, then I am conscious that he says that she says that she loves me (note here that the sending to my friend of the message by GSM has to be included in the spatio-temporal aspect of the theory which we neglected so far). The latter is clearly different from the situation where Kristien sends me a direct message that she loves me. This is *not* the kind of transitivity I am talking about since here the final messages are *not* identical; note also that the *mode* of interaction, by GSM, text message, or telepathy is irrelevant in our reasoning since those details belong to some theory to be constructed by means of the geometry. We only have to decide upon the theoretical question wether the *possibility* for K to send by any means α, which is picked up by A as β and transmitted by A as β and picked up by me as γ should imply the possibility that K can directly send α, possibly by other means, which is being picked up by me as γ. I posit here that the answer must be a resounding *yes*.

The first principle states that the "geometry" should be of the most universal and therefore, simple nature: $\mathcal{Z}$ does not need to be a differentiable manifold and therefore speaking of Lorentzian or Riemannian metric tensors might not be opportune. The second principle is more or less natural and states that the nature a of the reception should depend upon the structure of $\cup_{x\in\mathcal{M}}\mathcal{N}_x$ only given the mode b of sending. The third assumption is a conservative one and motivated by simplicity; this invariance under large homeomorphisms of $\mathcal{Z}$ does not need to hold, but it might work very well as an approximation. Finally, our fourth assumption reveals some Lorentzian nature of the "geometry" and we shall work it out further now.

3 Synge's world function and Lorentz spaces.

Principles one till four reveal that $X(x,\alpha,a;y,\beta,b)$ must be the lift of some continuous $\Omega_a(x,\alpha;y,\beta)$ where the lift is defined by means of some characteristic of Ω_a and defines *locally* a partial order as well. An example of such function, known in the literature, is Synge's world function which is defined on $\cup_{x\in\mathcal{M}}\mathcal{N}_x$ from a Lorenzian metric tensor as half of plusminus the square of the geodesic

distance; the partial order being defined in a similar way. More in general, we have the following:

- a conscious signal from (x, α) is consciously received at (y, β) if and only if $\Omega_c(x, \alpha; y, \beta) \leq 0$ *and* there exists a consciousness orientation o_c such that (y, β) is positively oriented with respect to (x, α); otherwise, the signal is unconsciously received,

- everything is consistent meaning that faithful conscious transmission and reception defines a partial order *locally* but not necessarily globally; we will however consider its transitive extension.

Of course, one can consider sociological theories of this rather general type but in order to make some progress we will assume henceforth that $\mathcal{Z}$ is a trivial fibre bundle over $\mathcal{M}$ with α as projection and locally constant $\mathcal{N}_x$. Also, $\Omega_a(x, \alpha; y, \beta)$ *is* locally Synge's function associated to a standard Lorentzian metric[2]. Traditionally, a local Lorentz metric is derived from Synge's world function by

$$d_a(v, w) = \sqrt{2 \max\{-\Omega_a(v, w), 0\}}\theta(v, w)$$

where $\theta(v, w) = 1$ if v can be connected to w by means of an o_a respecting curve[3] and 0 otherwise.

4 Double Lorentzian metric theories, classically as well as quantum mechanically.

It is a reasonable approximation to assume that psychological types constitute a differentiable manifold in the same way that it is reasonable for spacetime to behave as such. Generalizations of such assumption can be made and physicists are studying such models. At first sight, one might suspect that $\mathcal{N}$ is *not* a manifold if one were to restrict attention to letter messages in english of a fixed style type. However, it is always possible to make a manifold out of it and, if desirable, restrict attention to the so called "pure" classical configurations. So, a general "pure" geometrical configuration is given by

$$|g_a(x, \alpha)\rangle$$

where $a \in \{c, u\}$ and $(x, \alpha) \in \mathcal{M} \times \mathcal{N}$. We will assume space-time coordinates to be included in the definition of a psychological type, which is a reasonable thing to do since such issues are space-time dependent; on short distance scales of a few meters, space-time may be neglected altogether in the definition of $\mathcal{M}$, but on larger distance scales it has to be taken into account. Classically, the relevant theory is therefore a double Lorentzian theory which has in general an ill posed initial value formulation in the sense that it is not necessarily possible to have a foliation by means of hypersurfaces which are spacelike for *both* metrics. More generally, this is a well known fact for ultrahyperbolic metrics; what is possible, however, is to obtain a proper boundary value formulation and the study of such issues is part of current research in alternative gravitational

[2]Synge's function is usually not uniquely defined globally.

[3]A curve is o_a respecting if and only if the scalar product of the tangent with o_a is negative.

theories. In a classical framework, it is still possible to develop "quantum" theories of interaction. This would require a higher consciousness than that of us, humans; the idea of how human consciousness has been formed from processes between elementary monads has been explained in [1].

As a physicist, one might suggest that psychological types behave quantum mechanically, something which has been done by Penrose and Hameroff, and that therefore the geometry should behave quantum mechanically as well. It is currently unknown what this should mean precisely even for a single Lorentzian geometry, so the problem of a double one is even further open; for some ideas in that direction, the reader may consult [1] and references therein. I hold it entirely possible that ideas regarding noncommutative geometry a la Connes or Noldus [1] could serve as an appropriate mathematical framework for such enterprise.

5 Comments and criticisms.

The most daring assumption in this paper is that every signal is send and recieved either consciously or unconsciously by any observer; in physics, only conscious sending and observations are made; in all other cases, nothing is observed. Here, we assumed that if a signal is not observed consciously, then it remains unconscious but not necessarily trivial or void as is the case in physics. This suggests one to enlarge our reasoning and drop the completeness assumption by allowing for *no* reception, apart from conscious or unconscious. This, by itself, breaks the S-R symmetry inherent in *our* framework since every reasoning goes as "if I send a signal, then how is it recieved?". It would suggest a different geometry than a Lorentzian one, or at least a different rule to delineate the regions of unconscious reception and no reception respectively. Even in our S-R symmetric case, the theory for signals cannot be a traditional field theory defined by a second order hyperbolic partial differential equation with a second order term defined by one of the metrics $g_a(x, \alpha)$ since that would respect the causality defined by that metric (Hawking and Ellis) and the region of "opposite reception" would effectively be one of "no reception". However, one can modify the definition of the second order term by including the field and its covariant derivatives with respect to $g_b(x, \alpha)$ to modify this causality result and obtain a natural zone of alike reception, opposite reception and no reception, at least this is true for second order equations (Leray).

Of course, one should first try out classical theories before engaging in the more speculative quantum framework; specific interactions will again be of the gauge type and research in that direction is something for the future. It will take of course a long time before social sciences will reach the level introduced in this paper since physicists do not fully comprehend yet the much more simple case of a single Lorentzian geometry and elementary gauge type interactions. So, one can rightfully ask at this point in history what the fundamental importance of the sociological pseudo-sciences really is. Is there a point in doing zoology when one does not really understand the fundamental underlying mechanisms and therefore is prone to drawing the wrong conclusions about suggested models of how to organize society? The question is a political one indeed and policies

should be based upon *facts* and not wishful thinking about ones personal dream world. Such course of action would be very undemocratic indeed. In life, you need to learn to walk first before you use a bicycle, likewise should one first invest much more money in good physics before one dares to tackle the question of human interactions on a scientific level.

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References

[1] Johan Noldus, Foundations of a theory of quantum gravity, Vixra and Arxiv.