The goal of this article is to formulate hypothesis of an existence of the universal quantum string field for all interactive phenomena and to clarify its practical value.

I. Quantum string field theory and interactive phenomena [1]

1.1. Experimental detection of interactive phenomena. Let us consider a natural, behavioral, social or economical system $S$. It will be described by a set $\{\varphi\}$ of quantities, which characterize it at any moment of time $t$ (so that $\varphi = \varphi_t$). One may suppose that the evolution of the system is described by a differential equation

$$\dot{\varphi} = \Phi(\varphi)$$

and look for the explicit form of the function $\Phi$ from the experimental data on the system $S$. However, the function $\Phi$ may depend on time, it means that there are some hidden parameters, which control the system $S$ and its evolution is of the form

$$\dot{\varphi} = \Phi(\varphi, u),$$

where $u$ are such parameters of unknown nature. One may suspect that such parameters are chosen in a way to minimize some goal function $K$, which may be an integrodifferential functional of $\varphi_t$:

$$K = K([\varphi_\tau]_{\tau \leq t})$$

(such integrodifferential dependence will be briefly notated as $K = K([\varphi])$ below). More generally, the parameters $u$ may be divided on parts $u = (u_1, \ldots, u_n)$ and each part $u_i$ has its own goal function $K_i$. However, this hypothesis may be confirmed by the experiment very rarely. In the most cases the choice of parameters $u$ will seem accidental or even random. Nevertheless, one may suspect that the controls $u_i$ are interactive, it means that they are the couplings of the pure controls $u_i^0$ with the unknown or incompletely known feedbacks:

$$u_i = u_i(u_i^0, [\varphi])$$
and each pure control has its own goal function $K_i$. Thus, it is suspected that the system $S$ realizes an interactive game. There are several ways to define the pure controls $u_i^\circ$. One of them is the integrodifferential filtration of the controls $u_i$:

$$u_i^\circ = F_i([u_i], [\varphi]).$$

To verify the formulated hypothesis and to find the explicit form of the convenient filtrations $F_i$ and goal functions $K_i$ one should use the theory of interactive games, which supplies us by the predictions of the game, and compare the predictions with the real history of the game for any considered $F_i$ and $K_i$ and choose such filtrations and goal functions, which describe the reality better. One may suspect that the dependence of $u_i$ on $\varphi$ is purely differential for simplicity or to introduce the so-called intention fields, which allow to consider any interactive game as differential. Moreover, one may suppose that

$$u_i = u_i(u_i^\circ, \varphi)$$

and apply the elaborated procedures of a posteriori analysis and predictions to the system.

In many cases this simple algorithm effectively unravels the hidden interactivity of a complex system. However, more sophisticated psychophysical procedures exist.

Below we shall consider the complex systems $S$, which have been yet represented as the $n$-person interactive games by the procedure described above.

1.2. Functional analysis of interactive phenomena. To perform an analysis of the interactive control let us note that often for the $n$-person interactive game the interactive controls $u_i = u_i(u_i^\circ, [\varphi])$ may be represented in the form

$$u_i = u_i(u_i^\circ, [\varphi]; \varepsilon_i),$$

where the dependence of the interactive controls on the arguments $u_i^\circ$, $[\varphi]$ and $\varepsilon_i$ is known but the $\varepsilon$-parameters $\varepsilon_i$ are the unknown or incompletely known functions of $u_i^\circ$, $[\varepsilon]$. Such representation is very useful in the theory of interactive games and is called the $\varepsilon$-representation.

One may regard $\varepsilon$-parameters as new magnitudes, which characterize the system, and apply the algorithm of the unraveling of interactivity to them. Note that $\varepsilon$-parameters are of an existential nature depending as on the states $\varphi$ of the system $S$ as on the controls.

The $\varepsilon$-parameters are useful for the functional analysis of the interactive controls described below.

First of all, let us consider new integrodifferential filtrations $V_\alpha$:

$$v_\alpha^\circ = V_\alpha([\varepsilon], [\varphi]),$$

where $\varepsilon = (\varepsilon_1, \ldots, \varepsilon_n)$. Second, we shall suppose that the $\varepsilon$-parameters are expressed via the new controls $v_\alpha^\circ$, which will be called desires:

$$\varepsilon_i = \varepsilon_i(v_1^\circ, \ldots, v_m^\circ, [\varphi])$$

and the least have the goal functions $L_\alpha$. The procedure of unraveling of interactivity specifies as the filtrations $V_\alpha$ as the goal functions $L_\alpha$. 

\[2\]
1.3. **SD-transform and SD-pairs.** The interesting feature of the proposed description (which will be called the *S-picture*) of an interactive system \( S \) is that it contains as the real (usually personal) subjects with the pure controls \( u_i \) as the impersonal desires \( v_\alpha \). The least are interpreted as certain perturbations of the first so the subjects act in the system by the interactive controls \( u_i \) whereas the desires are hidden in their actions.

One is able to construct the dual picture (the *D-picture*), where the desires act in the system \( S \) interactively and the pure controls of the real subjects are hidden in their actions. Precisely, the evolution of the system is governed by the equations

\[
\dot{\varphi} = \tilde{\Phi}(\varphi, v),
\]

where \( v = (v_1, \ldots, v_m) \) are the \( \varepsilon \)-represented interactive desires:

\[
v_\alpha = v_\alpha(v_\alpha^o, [\varphi]; \tilde{\varepsilon}_\alpha)
\]

and the \( \varepsilon \)-parameters \( \tilde{\varepsilon} \) are the unknown or incompletely known functions of the states \( [\varphi] \) and the pure controls \( u_i^o \).

D-picture is convenient for a description of systems \( S \) with a variable number of acting persons. Addition of a new person does not make any influence on the evolution equations, a subsidiary term to the \( \varepsilon \)-parameters should be added only.

The transition from the S-picture to the D-picture is called the **SD-transform**. The **SD-pair** is defined by the evolution equations in the system \( S \) of the form

\[
\dot{\varphi} = \Phi(\varphi, u) = \tilde{\Phi}(\varphi, v),
\]

where \( u = (u_1, \ldots, u_n), v = (v_1, \ldots, v_m) \),

\[
\begin{align*}
u_i & = u_i(u_i^o, [\varphi]; \varepsilon_i) \\
v_\alpha & = v_\alpha(v_\alpha^o, [\varphi]; \tilde{\varepsilon}_\alpha)
\end{align*}
\]

and the \( \varepsilon \)-parameters \( \varepsilon = (\varepsilon_1, \ldots, \varepsilon_n) \) and \( \tilde{\varepsilon} = (\tilde{\varepsilon}_1, \ldots, \tilde{\varepsilon}_m) \) are the unknown or incompletely known functions of \([\varphi] \) and \( v^o = (v_1^o, \ldots, v_m^o) \) or \( u^o = (u_1^o, \ldots, u_n^o) \), respectively.

Note that the S-picture and the D-picture may be regarded as complementary in the N.Bohr sense. Both descriptions of the system \( S \) can not be applied to it simultaneously during its analysis, however, they are compatible and the structure of SD-pair is a manifestation of their compatibility.

1.4. **The second quantization of desires.** Intuitively it is reasonable to consider systems with a variable number of desires. It can be done via the second quantization.

To perform the second quantization of desires let us mention that they are defined as the integrodifferential functionals of \( \varphi \) and \( \varepsilon \) via the integrodifferential filtrations. So one is able to define the linear space \( H \) of all filtrations (regarded as classical fields) and a submanifold \( M \) of the dual \( H^* \) so that \( H \) is naturally identified with a subspace of the linear space \( \mathcal{O}(M) \) of smooth functions on \( M \). The quantized fields of desires are certain operators in the space \( \mathcal{O}(M) \) (one is able to regard them as unbounded operators in its certain Hilbert completion). The creation/annihilation
operators are constructed from the operators of multiplication on an element of $H \subset \mathcal{O}(M)$ and their conjugates.

To define the quantum dynamics one should separate the quick and slow time. Quick time is used to make a filtration and the dynamics is realized in slow time. Such dynamics may have a Hamiltonian form being governed by a quantum Hamiltonian, which is usually differential operator in $\mathcal{O}(M)$.

If $M$ coincides with the whole $H^*$ then the quadratic part of a Hamiltonian describes a propagator of the quantum desire whereas the highest terms correspond to the vertex structure of self-interaction of the quantum field. If the submanifold $M$ is nonlinear, the extraction of propagators and interaction vertices is not straightforward.

1.5. Quantum string field theoretic structure of the second quantization of desires. First of all, let us mark that the functions $\varphi(\tau)$ and $\varepsilon(\tau)$ may be regarded formally as an open string. The target space is a product of the spaces of states and $\varepsilon$-parameters.

Second, let us consider a classical counterpart of the evolution of the integro-differential filtration. It is natural to suspect that such evolution is local in time, i.e. filtrations do not enlarge their support (as a time interval) during their evolution. For instance, if the integro-differential filtration depends on the values of $\varphi(\tau), \varepsilon(\tau)$ for $\tau \in [t_0 - t_1, t_0 - t_2]$ at the fixed moment $t_0$, it will depend on the same values for $\tau \in [t - t_1, t - t_2]$ at other moments $t > t_0$. This supposition provides the reparametrization invariance of the classical evolution. Hence, it is reasonable to think that the quantum evolution is also reparametrization invariant.

Reparametrization invariance allows to apply the quantum string field theoretic models to the second quantization of desires. For instance, one may use the string field actions constructed from the closed string vertices (note that the phase space for an open string coincides with the configuration space of a closed string) or string field theoretic nonperturbative actions. In the least case the theoretic presence of additional “vacua” (minimums of the string field action) as well as their structure is very interesting.

II. Psychophysical quantum–string Weltdrama

2.1. Psychophysical quantum string fields as quantized intention fields. Note that one may assume that $\varepsilon$-parameters are history-independent functions of states $\varphi$ and desires $v$ after an introduction of an explicitly time-dependent classical string field $\Xi$:

$$\varepsilon = \varepsilon(\varphi, v; \Xi).$$

If it is so, the classical string field is just an intention field and the obtained quantum string field may be regarded as a quantized intention field. The formalism of intention fields and their second quantization was described in [2].

An interpretation of quantum string fields as quantized intention fields allows to avoid an introduction of a new additional concept and clarifies the relation between desires and intentions.

It should be marked that an effective way to manipulate the intention fields is to visualize them. Concrete procedures of visualization of intention fields by use of the so-called overcolors were discussed by the author many times. Such visualizations, which identify intention fields with “latent lights”, preserve the algebraic structure
of the intention fields. Some practical applications of this scheme were described in [3].

2.2. Hypothesis of the universal psychophysical quantum string field. In the article [4] it was supposed that all intention fields have the common dynamical nature and some discussion of this nature was performed.

Therefore, it is reasonable to believe that all quantum string fields, which appear in interactive phenomena, can be derived from one universal quantum string field, which will be called the universal psychophysical quantum string field. Precisely it may mean that the string field algebras of concrete quantum string fields are certain subalgebras of the string field algebra of this universal psychophysical quantum string field.

If the tactical aspects [5] are also taken into account, the universal psychophysical quantum string field would describe the dramatic structure of the Universe and would represent the least as psychophysical quantum–string Welt drama.

Its existence and explication of its nature will allow to use the simple and more than inexpensive experimental data, obtained from analysis of interactive computer games (especially, various perception games), to more sophisticated, less accessible and more important interactive phenomena.

References

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