The goal of this article is to expose some of results, which were obtained by the author last year and which may be interesting to a general reader. So the technical details (such as experimental data processing and their analysis) are omitted or reduced whereas the conceptual aspect is enforced and clarified.

I. What is known [1]

1.1. Experimental detection of interactive phenomena. Let us consider a natural, behavioral, social or economical system $\mathcal{S}$. 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 $\mathcal{S}$. However, the function $\Phi$ may depend on time, it means that there are some hidden parameters, which control the system $\mathcal{S}$ 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 $u^o_i$. One of them is the integrodifferential filtration of the controls $u^o_i$:

$$u^o_i = F_i([u^o_i], [\varphi]).$$

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

$$u_i = u_i(u^o_i, \varphi)$$

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 $u_i = u_i(u^o_i, [\varphi])$ may be represented in the form

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

where the dependence of the interactive controls on the arguments $u^o_i$, $[\varphi]$ and $\varepsilon_i$ is known but the $\varepsilon$-parameters $\varepsilon_i$ are the unknown or incompletely known functions of $u^o_i$, $[\varepsilon]$. 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 $V_\alpha$:

$$v^o_\alpha = V_\alpha([\varepsilon], [\varphi]),$$

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

$$\varepsilon_i = \varepsilon_i(v^o_1, \ldots, v^o_m, [\varphi])$$

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 $L_\alpha$. 
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:

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

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

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

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

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

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 $v^\circ = (v_1^\circ, \ldots, v_m^\circ)$ or $u^\circ = (u_1^\circ, \ldots, u_n^\circ)$, 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. The choice of a picture is an action of our attention: it is concentrated on the personal subjects in S-picture (*the self-conscious attention*) whereas it is concentrated on the impersonal desires in D-picture (*the creative attention*).

1.4. **Verbalization of SD-pairs and the transpersonal synlinguism. Nastroenie.** The main problem is to interrelate the S- and D-pictures of the system $S$. One way is a *verbalization* of SD-pairs. Let us remind a definition of the verbalizable interactive game.

An interactive game of the form

$$\dot{\varphi} = \Phi(\varphi, u)$$
with $\varepsilon$-represented couplings of feedbacks

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

is called verbalizable if there exist a posteriori partition $t_0 < t_1 < t_2 < \ldots < t_n < \ldots$ and the integrodifferential functionals

$$\omega_n(\xi(\tau), \varphi(\tau)|\tau \leq t_n),$$
$$u_n^*(u^*(\tau), \varphi(\tau)|\tau \leq t_n)$$

such that

$$\omega_n = \Omega(\omega_{n-1}, u_n^*; \varphi(\tau)|\tau \leq t_n),$$

quantities $\omega_n$ are called the words.

Let us now consider the SD-pair and suppose that both S- and D-pictures are verbalizable with the same $\omega_n$. The fact that $\omega_n$ are the same for both S- and D-pictures is called the transpersonal synlinguism. One may characterize it poetically by the phrase that “the speech of real subjects is resulted in the same text as a whisper of the impersonal desires”. The existential character of the transpersonal synlinguism should be stressed. Really it is not derived from the fact that the objective states $\varphi$ of the system $S$ are the same in the S- and D-pictures. The transpersonal synlinguism interrelates the different $\varepsilon$-parameters of existential nature in both pictures.

The transpersonal synlinguism is involved into psychophysical nature of mutual understanding of the independent subjects of a dialogue communication. In this situation it allows to identify the personal interpretations with the impersonal ones, unraveling the role of impersonal desires as bearers of the objective sense and its dynamics.

The words $\omega_n$ in the transpersonal synlinguism are interrelated by the recurrent formulas

$$\omega_n = \Omega(\omega_{n-1}, u_n^*; \varphi(\tau)|\tau \leq t_n),$$

the parameter $w_n^*$ will be called nastroenie*. The sequence $\{w_n\}$ may be correlated as with $u(t)$ as with $v(t)$, the first type of correlations will be called the impression correlations and the second type will be called the inspiration correlations.

There is a lot of various, sometimes technically very sophisticated procedures to verbalize interactive game or SD-pair.

1.5. 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.

---

*“Nastroenie” is the Russian for English “mood” or “humour” and for French “humeur” or “disposition”, however, its meaning has some nuances. First, its root is associated with Russian verb, which may be translated into English as “to build”, “to construct” and “to create”, thus, expressing the active character of “nastroenie” in contrast to completely passive “disposition”. The root “stroï” being treated as a noun means “order”, “system” and also “harmony”. The related adjective “stroïnyi” means “well-proportioned”, “well-composed”, “shapely”. Second, the nearest Russian word of the same root (“nastroİka”) should be translated as “tuning” into English, thus, introducing additional harmonic, melodious overtones into the meaning. These facts expain the choice of the Russian term.
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.

1.6. 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 integrodifferential 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 integrodifferential 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 (see below).

II. Questions and answers

The described picture contains some moments, which should be clarified:

- What is the origin of the complementarity of S- and D-pictures? Can it be described precisely?
- What is the nature of nastroenie? Is it possible to describe its dynamics and teleology?
- What is the attention? What is its role?

We shall try to answer these questions below.
3.1. Subjects as massive particles of the universal psychophysical string field at alternative vacuum. Quantized desires may be treated as interacting particles at the main vacuum of the universal psychophysical string field. However, this field may possess an additional vacuum of very massive (and, hence, almost classical) and almost free particles. We shall identify subjects with such particles. Because the spectrum of particles at different vacua is a dynamical property of the quantum field, it depends on the manner of observation. The different choice of vacua corresponds to the complementary observations. This fact explains why S- and D-pictures are complementary and allows to describe the complementarity precisely if the structure of universal psychophysical string field is known.

3.2. The universal psychophysical string field as perturbed free field of nastroenie. One may suspect that the universal psychophysical string field may be treated as a perturbed free field so that its action is represented as a free field action perturbed by a potential of self-interaction, which exponentially tends to zero at infinity. The initial vacuum of free field disappears and perturbation creates two new vacua (of subjects and of desires). It is reasonable to think this initial free field as a field of nastroenie. It means that instead of the discrete quantities $w_n^*$ we shall consider the quantized field $w(t)$, whose dynamics is described by the perturbed free field action. However, the problem of its teleology is more difficult, claims a well-elaborated technique to be defined, which, therefore, will not be exposed in this article.

Note that there are no arguments to suppose that the initial free field has a string nature, in particular, is a free string field.

3.3. Three types of attention as three forms of internal observations in the quantum string field psychophysics. Three forms to represent the universal psychophysical string field, namely, as series in the main or the alternative vacua or as a perturbed free field, corresponds to three forms of observation. They were defined as attentions. Two of them are self-conscious and creative attention. The form of attention specifies the dynamical properties of the universal psychophysical string field that is expressed as a choice of picture. One should mention that the attention is attributed to any subject and should be treated as a form of intention. Therefore, we have deal with the internal observations.

References

[1] Juriev D., Experimental detection of interactive phenomena and their analysis: math.GM/0003001; New mathematical methods for psychophysical filtering of experimental data and their processing: math.GM/0005217; Quantum string field theory and psychophysics: physics/0008058.