VIRTUAL REALITY AND CREATIVE GAMES: CEREBRAL ASYMMETRY AND FUZZY CATEGORIES

PART 1

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Abstract

The approach to working on the computer creative games on the base using the methodology of the virtual reality and the specifics of the cerebral asymmetry mechanisms on fuzzy categories basis is presented. The concrete examples of the computer realization are contained.

1. Methodology Basis

1.1. Methodology of the Creative Games

The perspectives of the humanity's development are determined by a considerable extend of the culture's state, ability to the conducting of a dialogue, broadening of one's outlook at the socium and concrete humans. These factors are connected with the necessity of the perception and understanding of the imagery knowledge and creative formation of result (P-U-F) [1].

Some demands for the creative games (CG):

-the personal orientness (preferable sensorical channels, age, experience, profession) in the procedures (P-U-F);

-the socio-cultural and traditional specifics of socium;

-the development of the spatial-temporary and historical fancy;

-the development as the logical so unlogical (low probabilities) forms of interconnections of the processes, objects and events;

-the development of the interconnections of the metatext's different forms (vision, printed, audio) for processing of the imagery knowledge [2].

The development of imagery perception and understanding of both children and adults provides the opportunity and steady capability to

orientate in the various environmental situations, to develop one's professional skills and to enjoy the world of arts and nature. Besides that, not only logical-combinatoric procedures, which may be suffuciently developed by modern education, and even more by computing, but it is also some unconscious mechanisms and processes that make it easy to study and understand the "Ego in the world" of an individual and to support its development that are involved.

That is the main difference of our approach to the computer games from the traditional one.

Such an approach provides the opportunity to take in account psychological and emotional characteristics of an individual to diagnose the psychical state and to choose the appropriate means of curing the boundaring states using indirect methods of correction in a pleasant, slight manner.

It makes possible to use the synthesis of the elements of "Ego" (unconscious memory, replacement, evaluation of the nightdreams etc), proposed by S. Freud [3], breaking the limits of the discriptional approach.

Another option provided by our method is the exposing and using of such a peculiar human feature as the sense of humour. This approach is based on the H. Bergson's ideas that laughter is realised by repetition (multiple coincidence), inversion, interference of the previous two, and the same situation may be interpreted in two different ways at once owing to the presence of the sence of humoure [4].

Our methodology of the CG is based on the following proposition.
1. The main goals of our method are the following:

    -the development of the skills in operating the fuzzy categories and their determination;

    -the development of creative imagination;

    -the development of the sence of rythm;

    -the development of the sence of colour;

    -the development of the sence of form and shape;

    -the development of phantasy;

    -the development of logical thinking;

    -the development feeling of the emotional and sensoric contents of the arts, media;

    -understanding of the connections and mutual dependence between the artistic media and emotional nature of different kinds of artistic (creative activity);

    -learning concrete objectives, terms, elements and their visual equivalents;

    -understanding of the general and particular on the samples from the arts history (style and its elements, artistic image and the means of its creation);

- the ability to make the propper choice for gaining the proposed result;
-skills in designing and combining.

2. The pupils are offered the following types of task in different artistic media (from simple to complex):

-from indetermined to the determination of the emotion (from indetermined to determined);

-from concrete emotional state to its abstract depiction;

-from the abstract part to concrete whole;

-from the offered whole unit to the contained elements and characteristics, presented by means of colour, line, form, sound, word etc;

-transformation of the abstract image to a concrete one and/or of the concrete image to an abstract one or another complex one including the first as one of the elements;

-name or word and image:

a) from image to name (letter, sound ect);

б) from word or name image.

-image - situation - emotion (the expression of the creature's emotional state by means of the artistic media);

-development of process, event (text may be included):

a) following the inner logic of users with the result unknown a priori;

б) in the set up direction with the result known a priori (the choise determined by the result).

-designing of the set up image object in a peculiar style by the combining of the elements and details;

-rythmical tasks, including lines, forms, colours, some concrete artistic elements, both seperately and in different combinations. The tasks for better understanding the idea of rythm in music, architecture, painting, sculpture, graphics, costumes ect. Rithm is the basis category of arts and (music play, picture) and life (biology).

Proposed results:

-learning to operate with the fuzzy categories by means of every sensoric channel and to use these skills for general evaluation of works of art, natural, environment ect;

-learning to compare and analise emotional and formal patterns in the process of creative activity;

-seeing and understanding the connections between general and particular, whole and part, word and image, emotions and image, concrete actions in process and the final result, cause and effect;

-logical thinking;

-learning to combine, to choose the propper elements for combining and to exclude inappropriate ones;

-learning about the idea of style and the formal and imagery elements of different styles;

-understanding the rythmical nature of arts and life.

Examples:

-transformation of an elephant to a wardrobe;

-transformation of a flower to a girl;

-mimical changes owing to the emotional state (using only characteristical elements of face such as eyes, eyebrows, mouth) - grief, joy, happiness, lost, sadness, fear, dream, hurry, wondering, self conviction, frightening, gloomy, grining, indespair, hesitating, fallen in love ect.

The working of the CG needs of the computer ensuring in some approaches, in detail:

-the transformation of the images of one type to the images of another types;

-the operation of the dynamics of objects;

-the understanding and formation of the multisignificant imagery knowledge;

-the comfortable man-machine interface for the different types of information's beares;

-the means of "entry in the problem".

The realization of this approaches is based on the Virtual Reality (VR) technology.

1.2. Bases of the Virtual Reality's Problems

The formation of the creative activity's procedures is determined by the human and computer aspects. The human aspect is based on the high level thinking's specifics (intellectual curiousity and variety mental) and includes the following approaches [2]:

-the multiplane view on the image;

-the ability to find and form several meanings in the text;

-the ability to change the importance of the meaning in correlation (or in spite) of the context;

-the ability to use the low probability combinations of the pattern's elements;

-the ability to use the once again or exhaustive combinations of the pattern's elements;

-the ability to use and form the harmony (or disharmony) on base of the data of several sensorical channels.

The computer aspect hase to provide the realization of the many "intellectual" functions, as traditional (classification, qualitative estimation of elements and their features, decision making in uncertain environment), so untraditional (dischange of some, for example, the low probability or the most bright elements, which are presented by the different sensorical channels; formation of the different views on the structure of pattern - "view from the inside" and "view from the outside" etc). The human and

computer procedures of the creative activity are realised by means of the new stage of the intellectual systems - the VR.

The complex problem of the virtual reality (VR) determines the new level of the intelligent technology, which presents the new possibilities of the cognition and employments of the creative knowledge and processing in the new types of man-machine systems. The base of the VR is the computer presentation in the "Cybernetics Space", both the global picture, which is presented by means of the polysensorical information, and some details and their combinations (for example, "the interior vision"), using the specifics of the brain, the analysis of the dynamics and decision making.

The methodology of VR is based on the several propositions [1]: the personal orientness ("Ego in the World"). The World is characterized by the multilayer medium (the noosphere, ecology) and polysubject communicative system (the personal, socio-cultural and traditional specifics of the every subject); the polysensorness of the pattern's and feedback's presentation; the dual (different-functional) procedure of the understanding; the creative interpretation of the input pattern and formation of the new knowledge on the base of the principle "the meaning - text - meaning"; the formation of the results on the base of the "weight" of each sensorical channel; the formation of the results on the base of the personal vision ("the interior vision") of the World; the specifics of the neurocomputing are used in the U- procedure.

1.3. Specifics of the Cerebral Mechanisms in Formation and Creation of Imagery Knowledge

The information about the World is presented by means of one or several forms of the metatext {T} (for example, different sensorical channels $\eta=(1, \ldots, N\eta)$. The set of meanings $\{S\eta_1, \ldots, S\eta_{N\eta}\}$ is presented by means of every concrete form of metetext $(T\eta)$. The concrete form of metatext presents the set of meanings $\{S\eta_1, \ldots, S\eta_{N\eta}\}$ which determines the set of the knowledge "shades". In the description of knowledge about the World different types of uncertainty (uncomplete of data and knowledge, mistakes of measurement and observation; logical unlinearness; probabilities; unorderness, fuzzy) are contained in the processes of perception of data, their understanding and formation of results of the dual procedure is used.

The specifics of mechanisms of the cerebral asymmetry are determined by the preferences of function which are realized : the left (LH) hemisphere (the logical-combinatory and probability-analytical procedures, numerical calculations, analysis of the grammatical constructions, perception of "There and then", centre and concentration of attention, semantical and classificational memory etc); the right (RH) hemisphere (the procedures of

the Gestalt's whole embrace and estimation, implicit presentations about the Gestalt and their "shades", perception of "Here and now" outlying area and distributed attention, episodic and contextual memory etc [1, 5, 6, 7]).

In the concrete systems by means of the LH-procedures are presented: the determination of characteristics of arbitrary visual images by the linear approximation [8], the determination of omit letter in the text or word in the " hard" text (instruction) for the concrete subject field and the incomplete information about so-communicants in the dialogue (incomplete data and knowledge): the determination of the probable appearance of the concrete intonations in the dialogue ("the subject probability"; the diminishing of reactions on the "word-stimule"). In these systems by means of the RH- procedures are realized: the interpretation of word in the artistic text, the increasing of number of statements on the "word-stimule"; the understanding of metaphors; the implicit estimation of the intonations and shades; the outcome of the new knowledge on base of the whole estimations of diverse options.

The specific of the personal dual procedure for the input pettern's processing (the degree of interaction between LHP and RHP) especialy in the cognition problems is shown. In these problems are demanded the consideration of the interconnections of details and the whole picture which are based on the personal interpretation of the scientific, technical and cultural achievements.

The realization of the "RH-algorithmical procedures" is based on two "right hemisphere principles" (RHP) which are apparent in the "living systems" [1, 9]: the multiconnectionness and the whole scope of the low probability combinations of the elements. The realization of the RHP is based on using of the "space of estimation multiconnectionness" in which every pettern is presented by the global parametrs (for example, the degree of complexity, asymmetry, harmony). This way allows to make the essential step to realization of the RHP [9].

The using of the dual procedure and these principles of formal presentation of the neural processes (and fuzzy categories [10]) increases the class of tasks. To such tasks are related, for example, the processing of multisignificant images: the interpretation of the metaphors [9], expression of the face [1] and intonational characteristics of the speech [11], polysensorical sensitivity ("robot-conductor") etc.

1.4. Fuzzy Categories in the Imagery Knowledge's Processing

The fuzzy categories are the most general type of the uncertainty in the man-machine systems and specially in the systems in which the creative procedures are realized. The fuzzy categories have the professional, problemal, personal and situational-orientation. It is necessury for the

realization of the personal creative games. The formalized fuzzy categories are the very effective method of the whole estimation of the Gestalt and it features (shade) by means of the qualitative scales and their combinations. It is important for the realization of the procedures of the VR and the CG. In these procedures the fuzzy categories are used for the realization of the following local problems: the implicit keeping of the personal presentations about spesifics of the World (the processes, phenomenons, events, the characteristics of so-communicants); the formation of the multisignificant images ("interior etalon"); the personal explicition of the characteristics of image's features; the investigation of the neural's processes.

The LHP are realized by means of the combination of the qualitative estimations on the base of scales, the qualitative production rules, the membership surfaces etc. These procedures are very well working. But the RHP are very perspective for the investigation of the whole estimation of the Gestalt. These procedures are used for the estimation and uderstanding of the polysensorical data about the world and the feedback. The RHP are used for the qualitative estimation of the Gestalt's characteristics and the dynamics of the neural networks [2]. The realization of the similar procedures are based on the processing of the output data of the polysensorical instruments (audio, vision) and the user's reaction in the operational, verbal (printed text and speech) and sing (pictures) forms. In the VR-systems the dual (LHP and RHP) procedure of the processing of the polysensorical multisignificant image [2] is used.

The polysensorical presentation of the data creates the new aspects of the problem of the formal interpretation of the fuzzy categories. The procedures of the formal interpretation of the meaning of the printed text is worked out[5]. In the tasks of the VR and the CG different sensorical channels and their combinations are used. The problems of the discovery and formal interpretation of the fuzzy categories are of particular complexity for the multisignificant images which are presented by means of the visual (the shades of colours, the composition of the pictures's elements), audio (the intonation characteristics of speech of music play, rustle of grass) and tactile (the cold floor, hold sand) channels. Similar problems contain, for example, two aspects: the synchronization of data and the formation of the image's intonations. The problems require the new methods of the formal interpretation of the fuzzy categories for the concrete task and the concrete human.

1.5. Short Description of the System's Structure

The system of rational recommendations on the virtual reality basis (SRRVR) has the block-function structure [2]. This principle is used for the situational model of the rational recommendation (SMRR) in uncertain

conditions [12, 13]. The SRRVR contains the three functional subsystems in which the (P-U-F) functions are realized, the technology subsystem, the subsystem of the intellectual interface and base of knowledge. Each subsystem consists from the functional macroblocks in which are realized the concrete function. For example, the SS-P contains the macroblocks in which are realized the procedures of the polysensorical (video, audio) perception (MBVR, MBAP) and the presentation of pattern (MBPP), the selection of their elements (MBSEP) and their features (MBSFP); the SS-U contains the macroblocks of the estimation of features (MBEFU) and elements of pattern (MBEEPU), the global estimation of pattern (MBGEPU), and also the macroblocks of the formation the space of estimation of the multiconnectionness (MBFSEMU), the estimation of the Gestalt (MBEGU), its interpretation (MBIGU), the associative memory and the learning (MBLU); the SS-F contains the macroblocks of formation of the result (MBRF), the discovery of the preferable sensorical channel (MBPSCF), the presentation of result (MBPRF), the analysis and explanation of result (MBAERF). The procedures of the synchronization of the sensorical channels, the synthesis of speech or presentation of picture, and also of the numerical calculations of the physical-chemical lows goverings nature, the reflection of results in the TSS are contained. In this structure are realised the polysensorical P-procedure and the dual (U-F) procedures.

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