ŚRĪYANTRA—THE ANCIENT INSTRUMENT TO CONTROL
THE PSYCHOPHYSIOLOGICAL STATE OF MAN

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The Śrīyantra is a Tāṇtric ritual drawing used for meditation and concentration. From ancient times the Śrīyantra is interpreted as the symbolic representation of deep cosmogonical and psychophysiological concepts which finds some striking analogies in modern scientific knowledge. From the viewpoint of modern anatomy, physiology and neurology, the whole composition and separate elements of the Śrīyantra are precisely adjusted to the mechanisms of human perception and nervous activity up to neuron system structure. Owing to such properties the Śrīyantra can be successfully applied for inducing special psychophysiological states or for selection of individuals with peculiar type of nervous system. The Śrīyantra also displays a tendency to induce the dominance of right cerebral hemisphere that is necessary to attain the mystical states of consciousness in some schools of religious practices.

The Śrīyantra, the ancient Tāṇtric ritual drawing (Fig.1), in addition to the highly complicated geometrical properties1 possesses a deep and detailed cosmogonical and psychophysiological interpretation. Such a duality is the outcome of the basic Tāṇtric idea about the close relationship between microcosmic and macrocosmic processes.

According to the Tāṇtric concepts2 each of the enumerated cycles of cosmic evolution starts with the splitting of Śiva-Śakti (the Supreme Consciousness - the Supreme Power), the primordial unity, which is the out-of-time and out-of-space and non-material stage. At the beginning of the genesis the categories of time, space, causation and matter are born and they develop to more and more complicated and differentiated forms. Nevertheless, at some point this process
of development is transferred to opposite, *i.e.*, to destruction or involution which leads again to the state of Śiva-Śakti unity. The concentric levels of the Śrīyantra (the circles encircling the triangles, lotuses and lines) are the symbolic descriptions of different stages of this evolution-involution process, starting from the central point bindu (the Śiva-Śakti unity) to the outer square bhūpura (the full manifestation of the Universe).

Such ancient Tāntric ideas which lately have been developed in Purānic tradition compared to the cosmogonical myths and concepts developed in other ancient regions, correspond more closely to the modern Big Bang and Hot Universe theories. Moreover, they agree with the Pulsate Universe Model which now acquires more and more theoretical and experimental supports. The fact that these total cosmodynamic concepts existed in ancient India is extraordinary, especially if we compare it with the Western scientific thought propagated within the ideas of stability of all the natural processes since the Middle Ages up to the second part of the 19th century. In the available literature we have not yet come across a satisfactory scientific explanation of such an ancient foresight and perspicacity.

On the other hand, the concentric levels of Śrīyantra represent the main energetic centres or cakras which are localized along the spinal column, from the lowest Mūlādhāra cakra at the coccyx up to the Sahasrāra at the head. The Mūlādhāra cakra is the residence of the Śakti energy named kuṇḍalinī associated with the bhūpura of Śrīyantra. The Sahasrāra is the residence of the Śiva consciousness principle associated with the bindu.

In ritual Tāntric practice the Śrīyantra is employed as a general map or symbolic description for initiation and control of the movement of kuṇḍalinī along the spinal column, while the different elements of the Śrīyantra mark and point out the required acts for the adept. The final goal for the devotee is to awaken kuṇḍalinī which, piercing through the ājña cakra (centre of eye-brows) moves into Sahasrāra to merge the Śiva and Śakti principles in unity. Owing to such a merger, an adept achieves (according to the Tāntric views) a great expansion of consciousness and acquires a direct and immediate knowledge about the Universe, because the kuṇḍalinī movement is associated with cosmogenesis.

The localization of the cakras conforms to the important plexus in central and vegetative nervous systems. Thus, ancient India possessed the deep intuitive knowledge of human anatomy and physiology which in the Western science took shape only at the beginning of the 20th century. On the other hand, the kuṇḍalinī energy and its dynamics proclaimed in the Tantra does not till now find a direct analogy with any known psychophysiological processes.

Based on the knowledge of modern anatomy, neurology, psychology and physiology, we tried to analyse the properties of the Śrīyantra, determining its leading part in Tāntric rituals. The whole geometrical composition of Śrīyantra
is characterized by its unusual charm and beauty, and after prolonged gazing it strongly attracts the attention of an observer.

We began our consideration with the elements of the Śrīyaṇtra architecture. As it is known, the special neuronal structures (so-called detectors of elementary signs — lines, curves, colours, etc.) play the leading part in the processing of visual information. The detection and transformation of visual information begins in retina, continues in the corpus geniculatum and completes in the visual cortex area. Even the structure of the corpus geniculatum (the special subcortex formation) contains the simple detectors which react to appearance of patches or concentric circles of different contrast in the visual area. The visual cortex (the main region for transformation of visual data) possesses the column structure, recently discovered, where each vertical column of neurons performs a strictly defined operation of transformation-detection. After such a classification, the information goes to associative areas of cortex where further analysis and synthesis with other kinds of information (audible, tactile, etc.) are performed.

First of all it is necessary to elucidate why such geometrical elements and colours were chosen in ancient times for the construction of Śrīyaṇtra. As it has been stated in the recent investigations, the triangle and the parallelogram, that is the main components of the Śrīyaṇtra central star structure, are the most stable geometrical figures which are reliably recognized even in presence of a hard distortion of their outlines, as well as in the event of considerable degeneration in the visual cortex of experimental animals. Besides, as has been recently demonstrated, a whole multi-coloured world of man is created as a result of the activity of only three types of colour detectors, i.e. 'red-green', 'blue-yellow' and 'white-black' ones, and such basic colours are also the fundamental components of Śrīyaṇtra drawing (see Fig.1).

Owing to such geometrical elements and their multiform orientation, a large number of visual detectors become excited. That induces a general change of psychophysiological state of a man and leads to superexcitation of the nervous system followed by a deep inhibition of all processes responsible for outward perception. In relation to a number of activating detectors the Śrīyaṇtra, thus, far exceeds any other yantra and it really deserves the epithet Śrī — the Great or Supreme.

If we consider the general architectural characteristics of Śrīyaṇtra, we should first of all direct our attention to the lattice and repeated type of its structure. The drawings of this type, which in the modern investigations of visual perception are called 'rythmical gratings' or 'oversaturated pictures', induce some visual illusion and a fast coming fatigue of the nervous system. During prolonged gazing at these pictures, they act as rhytmical light flashes which cause the bilateral supersynchronization of alpha-rhythm (i.e. a resonance
in the cerebral activity) that is typical for shallow stages of sleep and for prehypnotic states.

Such an effect can be achieved owing to concentric character of the Śrīyantra structure designed for the fixation of eyes at the central point. As it is known, one of the indispensable requirements for a proper visual perception is the continuous motion of a visual image across the retina. For maintaining such conditions in visual system there is a mechanism of periodic spasmodic eyes movement with low and high amplitudes. If by some means we force an image-fixation at the retina, then in 20-30 sec a man ceases to see a real object. If eyes-fixation is performed by will, a change of colour perception, the object motion illusion, and a transitory disappearance of an object from the visual area take place as consequence. A man, who is a regular observer of these phenomena and who is not informed of the aforementioned physiological mechanism, can come to a conclusion of supernatural properties of the act of eyes-fixation.

In addition, we point out the very close correlation between the sizes of Śrīyantra elements in direction from the centre to the periphery (increasing in size) and the structure of retina, where the cells with a high distinctive and colour-sensitive ability are dominant in the centre, but the 'white-black' receptors with low distinctive properties are predominant at the periphery.

Thus, the Śrīyantra successfully combines a number of properties responsible for special psychophysiological influences which are also widely used in modern therapeutic suggestive methods.

For verification of the foregoing suppositions we performed a series of experiments in which the task of fixing attention for 1 minute at chosen parts of the test pictures was given to the volunteers. These test pictures are: a) the coloured Śrīyantra (Fig.1); b) a coloured drawing produced by a random intermixing of the Śrīyantra elements—"pseudoyantra" (Fig.2); c) a black and white picture with concentric circles drawn according to the levels of the Śrīyantra circles (Fig.3) and d) a set of black rays on white background intersected in the common centre (Fig.4). The main purpose of the three additional pictures was to check the specific features of the Śrīyantra architecture which may play a key role in the general psychophysiological effect. We selected for our experiments only such persons who had no practice in relaxation and meditation techniques. They were not informed either of the significance of the experimental pictures or of the aims of the experiments. We supposed that if there existed some objective and universal effect of Śrīyantra, it should appear under the most usual conditions. During each experiment electroencephalographic (EEG for the left and right occipital cerebral regions) and electrooculographic (for eyes movement) recordings were undertaken.

Here it is necessary to emphasise the fact that the recording and analysis of cerebral electric activity is one of the most precise methods for diagnosis of the functional state or a vigilant level of a man, or a level of subjective contact with the
external world. During a state of passive vigil (a man is sitting in a comfortable pose with closed eyes and he is not solving any mental task), the EEG is characterized by a prevalence of sine-like waves with 30-80 mV amplitude and 8-12 Hz frequency (the so-called "alpha-rhythm"). On inhibition of the vigil level (a shallow somnolence), components of lower frequency appear in the EEG. On the other hand, at the state of intensive mental work with open eyes, strong desynchronization, viz., frequent waves without a stable rhythm and with a low amplitude (10-20 mV), appears in the EEG. Alpha-rhythm can also take place when eyes are open, but in such moments the ability for external perception is decreased. During some stages of contemplation and meditation EEG also displays the alpha-rhythm and even more slow rhythm.

In all the experiments performed, we observed that the reaction to the Śrīyāntra strictly differs from the reactions to the other three pictures, and the reactions appear in two opposite forms. For subjects of the first type who said that the Śrīyāntra induced a tranquil effect, during gazing at the Śrīyāntra the alpha-rhythm appeared in EEG more quickly as compared to while gazing at the other pictures, and was stable. Such an effect shows a sufficiently more decrease of the vigil level and of subjective contact with the outer world. For subjects of the second type, who found the Śrīyāntra as an irritable object, a substantial decrease of alpha-rhythm was noticed (that indicates a highly excited state) with intense movement of eyes, and that too in spite of the experimenter's command to concentrate on a look. Indeed, as we can see from the EEG findings (Table 1), the process of gazing at any of the additional pictures induces a general excitation for all the subjects (as it should to be) but for the subjects of 'tranquil' type this excitation was lower and it found its minimum in the case of the Śrīyāntra. Moreover, during the final stage of eyes closing after looking at the Śrīyāntra the volume of alpha-rhythm further diminished, although it usually increases in such a situation. For the subjects of the 'excited' type the general cerebral activity was higher during the whole experiment and especially for the Śrīyāntra. After eyes closing the process of renewal of alpha-rhythm took place and the content of alpha-rhythm exceeded the initial level (a peculiar 'discharging').

<table>
<thead>
<tr>
<th>Type of subjects</th>
<th>Initial eyes closing</th>
<th>The circles</th>
<th>experimental rays</th>
<th>pictures pseudo-yantra</th>
<th>Śrīyāntra</th>
<th>Final eyes closing</th>
</tr>
</thead>
<tbody>
<tr>
<td>'tranquil'</td>
<td>52%</td>
<td>32%</td>
<td>22%</td>
<td>14%</td>
<td>35%</td>
<td>19%</td>
</tr>
<tr>
<td>'excited'</td>
<td>50%</td>
<td>8%</td>
<td>7%</td>
<td>4%</td>
<td>2%</td>
<td>72%</td>
</tr>
</tbody>
</table>

TABLE 1

Contents of alpha-rhythm in EEG for the two types of subjects in different experimental stages.
Thus, the Śrīyāntra demonstrates an ability to effectively change the basic psychophysiological state for subjects of the first type in the direction of relaxation and peacefulness and for the subjects of the second type in the direction of general excitation. The level of such an effect is determined not by some separate peculiarities in the drawing but by its overall totality. From this standpoint we can consider the Śrīyāntra as a unique composition. The character and level of the effect of the Śrīyāntra is determined by individual features of the nervous system as well as by preliminary management of motivating factors. It would, therefore, appear that during the century-old practice in India it produced the extraordinarily effective and controlled instrument, the Śrīyāntra, which can be applied for achieving a required state of a man by preliminary management of psychophysiological aim or for selection of individuals with a peculiar type of nervous system organization.

As we can notice, the geometrical elements composing the Śrīyāntra structure are widely spread and can be found in a vast range of ancient and modern ritual objects, not only in Indian and Buddhist yantras and maṇḍalas, but also in other religions, e.g., in the ornaments of Moslem monuments and carpets, in the decorations of shaman’s tambourines and clothes, among Kabbalistic signs, in the Christian iconography, etc. Triangles of the pattern found in the Śrīyāntra have also been found in the paintings on spherical surfaces of Central Asiatic neolithic ceramics13 (30-50 cent. B.C.). These might indicate the existence of a wide cultural-historical community, if we take into account the fact that the tradition of drawing yantras originates from the ritual symbolism of Harappa and Mohendjo-daro cultures, where a wide range of stamps with geometrical symbols were found. Here is undoubtedly a wide virgin area for study by historians and psychologists.

In spite of the distinctive differences amongst the abovementioned religions and rituals, all of them display a tendency to lead participants to some psychophysiological state which they can subjectively identify, but often cannot express or describe in the form of words, i.e., cannot verbalize. Such a state is achieved by a deep concentration on some external or internal object accompanied by a deep distraction from all other signals. Simultaneously, the senses of a superwide vision, of a superunderstanding of the world (the whole world, and not just only the nearest surrounding) as well as a sense of some superabilities, of some superpower over the things and phenomena, spring up. For all-round scientific analysis we indicate the fact that such world sensations not so infrequently take place14 in men whose left cerebral hemisphere is put on the brakes or is dead owing to a pharmacological preparation, a surgical operation or as a result of pathological process.

Indeed, from the standpoint of modern neurology, for most people the left cerebral hemisphere is specialized in functions connected with speech and analytic, discrete, logical thinking. The right hemisphere carries out the functions of the world perception in unverbal (visual, audible, etc.) forms. In
Fig. 1. The Śrīyantra and its traditional colors: 1 — red; 2 — blue; 3 — yellow; 4 — light-green; 5 — dark-green.

Fig. 2. "The pseudoantra" — the picture for psychophysiological test.
Fig. 3. "The circles"—the picture for psychophysiological test.

Fig. 4. "The rays"—the picture for psychophysiological test.
other words, the left hemisphere establishes contacts with the things so far as those things have names and it manages things by logical laws expressed in words. Furthermore, owing to such a ‘familiar’ environment its activity has a positive emotional tint. The right hemisphere is connected with the original nature of things and it operates with their real or imaginary properties, despite of whether the names of properties and actions are known or unknown. So, its activity has a neutral or negative emotional tint.

Usually the two hemispheres have an intense communication between them and the left one dominates over the right one. The activity of right hemisphere cortex and subcortex is normally hidden from a man and it manifests itself only in the form of intuition, creative foresight, etc. In this situation the decision comes before substantiation and explanation. Often a man applies a great endeavour to make clear for others (to verbalize) something that is absolutely clear for himself. One of the striking examples of such phenomena is the opinions of prominent mathematicians about the mechanism of their creative activity.  

According to reported data, the primary activation of the right hemisphere takes place during perception of complicated but monotonous and homogeneous pictures and of rhythmic low sounds with predominance of long vowel sounds. Such an effect is reinforced by a general relaxation which transforms into a light drowsiness. As we can see, similar elements are in use in most of the rituals. The process of concentration on yantras is always accompanied by repeating of mantras in which prolonged vowels and voiceless consonants predominate. As a consequence, a new and highly capable channel for transition of information (audible) comes into activity. Investigation of its additional effect may constitute a special task for researchers. Moreover, as all the Śrīyantra elements are linked with definite philosophical and world outlookings semantics, supreme parts of cortex are drawn into the process of contemplation and this can lead to the strengthening and coordination of the whole effect. In our investigation the effect of these factors were not taken into account.

As a result of inhibition of the left hemisphere accompanied by an activation of the right one, things of the outer world appear in front of a man with their full multi-sided nature but without the usual and habitual envelopes of words and without the known sequences of actions. So, the way for interpretation of this absolutely new world is determined by ideology, cultural tradition and personal views. By superactivation of the right hemisphere and deep inhibition of the left one, the whole situation acquires a negative emotional colouring. Therefore, for producing a positive emotional background it is necessary to keep some minimum level of activation of the left hemisphere. Thus, the significant regulative role played by a teacher or guru in mystical practices becomes clear.

Rituals of two kinds were used since the ancient times for creation of an
alternative state of consciousness. In one kind (e.g. in the meditative practice) stable poses, relaxation and concentration on immovable pictures with addition of prolonged sounds are used. Rituals of the other kind include a motion with accelerating rhythm, with accompaniment of abrupt sounds and with encirclement of repeated and unexpected visual stimulus—a swing adorning, flashes of light, etc. (e.g. shaman’s and sorcerer's rituals). At the first look these appear as two strictly opposite and incoherent forms of practice, but in reality they represent the two possible physiological opportunities to reach the single goal, the abnormal correlation of the left and the right hemisphere activation. In one case this goal is achieved by a volitional calming, by ceasing the feeding of information to the left hemisphere and by simultaneous loading of the right one. In the other case such an effect is obtained by overloading of the left hemisphere followed by its superdeep inhibition as a reflex physiological outcome.

The universal status of these two methods is illustrated by their prevalence in different cultural regions which had no contacts amongst themselves in ancient times. Moreover, some ancient cultures attained the outstanding perspicacity in understanding the mechanism of appropriate methods. For example, Mesoamerican Indians clearly distinguish the two forms of world perception, the so-called 'tonal' and 'nagual', and they use the system of elaborate methods (which are traditionally rooted in Toltec culture) aimed at 'saturation' of 'the tonal with information' (i.e. the left cerebral perception of the world) or at 'stopping the internal dialogue' (i.e. the left cerebral activity) in order to reach 'the collapse of tonal' (i.e. to reach the state of a deep right hemisphere dominance).

The functional distribution between the left and the right hemispheres has also been confirmed in our experiments (Table 2) where the Śrīyantra, in contrast to the other pictures, induced a higher activation of the right hemisphere (less of alpha-rhythm) as compared to that of the left one (a ratio of 0.78). We assume that this could play a significant role in Śrīyantra rituals.

### TABLE 2

Ratio of alpha-rhythm for left/right cerebral hemisphere in different experimental stages

<table>
<thead>
<tr>
<th>Type of subjects</th>
<th>Initial eyes closing</th>
<th>The circles</th>
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<th>Śrīyantra</th>
<th>Final eyes closing</th>
</tr>
</thead>
<tbody>
<tr>
<td>'tranquil'</td>
<td>1.00</td>
<td>1.05</td>
<td>0.91</td>
<td>0.83</td>
<td>0.78</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Thus, the separate elements and the whole composition of the Sriyantra were constructed in ancient India with precise adjustment to the mechanisms of human perception and nervous activity up to neuron organization. If we distinguish between two ways of development of science—on the one hand the 'explanatory' approach of modern science based upon directed experiments, and on the other hand the way of 'recipes' of the ancient science based upon century-long selection from day-to-day experience, then we can treat the Sriyantra as a peculiar 'crossing', wherein the ancient achievement can be understood only in terms of the latest physiological and neurological data.

NOTES AND REFERENCES

4 The scientific idea concerning the global cosmodynamic arises from the two events—in 1922 Soviet mathematician A. Friedmann solved Einstein's gravitational equations for instationary models of Universe; in 1929 British astronomer E. Hubble announced his investigation of red light shift for remote cosmosgonical objects interpreted as galactic expansion. But these results found their real significance only on the ground of Hot Universe theory worked out by the American physicist G. Gamow in 1948. See : Jerry B. Mrion, Physics and Physical Universe, N.Y., 1971.
5 These analogues are not discussed even in such a peculiar publications as F. Capra. The Tao of Physics, Colorado, 1980.
While recommending the publication of the article, the referee made some interesting observations. These were brought to the notice of Prof. Kulaichev, and the learned Professor expressed his views on these. Considering the importance of the subject, the views of the referee and of the author are printed. The title of the article has been changed from Sri Yantra the Ancient Instrument to Manage the Psychophysiological State of Man to Sriyantra—the ancient Instrument to Control the Psychophysiological State of Man.

Referee’s Comments:


1. The paper starts with a brief but significant introduction of the cycle of cosmic evolution-involution process referring to two meaningful tantric concepts of i) Bindu, the central point, (Siva-Sakti Unity) and ii) Bhupura, the outer square (the full manifestation of the universe) and such process finds correspondence to modern Big Bang and hot Universe theories and coincides with the pulsate Universe Model.

2. The concentric levels of Sri Yantra represent the main energetic centres of chakras located in human body. In this context the problem of awakening of Kundalini is raised but not thoroughly discussed. Or in other words geometrical shape and properties of the Sri Yantra and its explanation in terms of chakras or energy centres—Kundalini dynamics proclaimed in Shakta-Tantra cannot be fully explained by known psychophysiological processes.

3. The elements of this Yantra are linked with the definite Philosophical and world outlook geometry semantics, a supreme part of cortex is drawn into the process of contemplation and that can lead to the strengthening and coordination of the whole effect. This point is mentioned in the paper but not properly investigated.

4. Analysis of the functions of the elements of the Sri Yantra structure from the point of the modern anatomy, neurology, psychology and physiology is adequate.

5. The discussion of the functions of the left and right cerebral hemisphere together with the cortex and the visual information received about the
action and reaction of the optical nerves, on fixing one's attention to Sri Yantra, are satisfactory.

6. The ancient tantric ritual drawing of the Sri Yantra (The great Yantra, the outward expression of the inner core of the Mantra, constitutive of the circle of triangles, lotuses and lines .........etc.) and interpretation of its effects on human being, from psychophysiological point of view is upto the mark.

7. Elements of Sri Yantra architecture—its analysis with neuronal structure—visual information and ultimately in cerebral activity—the cerebral electric activity measured by E.E.G. during some stages of contemplation and meditation ........ etc., different functional state of vigil levels of man are compared with Sri Yantra stages; the discussion is interesting.

8. At a time when positive science dealing with physicobiological phenomenon and meta-science dealing with spiritual experiences are trying to meet at a common point, the paper under notice is a bold attempt in this direction. This is stated in the paper, 'If we distinguish between two ways of the development of the science : the explanatory approach of modern science basing upon directed experiments on the one hand and the way of 'recipes' of the ancient science basing upon century-long selection from day to day experiences on the other, then we can treat the Sri Yantra as a peculiar crossing i.e., the ancient achievement can be understood only in the terms of the latest physiological and neurological data'.

9. The paper is properly authenticated.

10. There are some minor typographical spelling mistakes. In view of the above, the paper entitled 'Sri Yantra The Ancient Instrument for Management of Psychophysiological State of Man'— by Alexey Pavlovich Kulaichev and Dina Mikhailovna Ramendic may be published in your journal, Indian Journal of History of Science.