BINOCULAR RIVALRY TERMINATED

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Abstract- Scientists reportedly had been reporting that indefinite stable termination of stable binocular rivalry (BR) is impossible; namely, the frequency of the rivalry must follow the gamma distribution. This is a manifestation of binocular rivalry data (Levelt, 1965; Fox & Herrmann, 1967; Logothetis, 1998); a signature that is used to discover the neural substrates of binocular rivalry. In this report, however, against the common agreement of the statistical representation of the BR data that includes but not limited the effect of voluntary action on binocular rivalry (see Blake, et al. 2007); we provide several exhibits that reveal indefinite stoppage against binocular rivalry; and thus, the literature of binocular competition should be revisited. We superficially principle 'the hidden dynamics' behind these phenomenal terminations, and this should shed the light on the importance of Dönner, 2008, 2013 articles. It also casts attention on the essence of Walker, 1998 article, where binocular cross-orientation suppression is not found in the striate cortex, but prior the conversion of the two monocular streams. Since no retinal studies are established in binocular rivalry experiments, we therefore believe that the governors of the perceptual rivalry cannot be concluded. But since the results of our psychophysical experiments disobey the statistical representation of the BR data; we suggest that the rivalry could not happen without an extra physical layer as an affirming playground to these hidden dynamics 'the governors of the perceptual rivalry'. We end this statement by offering applications that shall benefit medicine and engineering through the utilization of that phenomenal stoppage.

Navigating The Literature

Binocular rivalry, a bistable visual awareness in which human visual perception flatulates between different visual stimuli presented to each eye, is an outstanding psychophysical approach to quantify the human consciousness. Interesting to say, both kinds of attention, involuntary or voluntary, assist in increasing the visual consciousness dominance duration of the corresponding stimulus. In another word, attention controls the human visual awareness to some extent. Strength (Levelt, 1965), saliency

(Engle, 1956), spiral motion (Malek, 2012), higher spatial frequency (Fahle, 1982), duchenne expressions (Malek, 2018), are all having 'attractive' visually stimulating features, namely, they all trigger automatic attention; therefore, they all dominate the visual awareness over 'non-attractive' ones. Voluntary attention also play roles in binocular rivalry; namely, perceptual attention to certain details to a certain stimulus elongates the awareness dominance duration of the stimulus (Lake, 1978). Executive attention also do the same thing when action is performed (Blake, 2007); however, the authors reported that its effect on perception also follows the gamma distribution but with different frequency of alteration. There is a

common scientific agreement that visual rivalries, whether it is monocular, or binocular have highly correlated temporal patterns of oscillations, see Carter, et al. 2003. Since motion induced blindness illusion can be considered as a visual rivalry (a stimulus is suppressed and then

reappeared is closer to what happens in binocular rivalry); the implication of 2008 and 2013 published by Dönner, et al. are therefore assistive to the present article. Namely, the authors shows similar pupil dilations during the MIB illusion trial (consciously removed stimulus) in comparison with a replay trial (physically removed stimulus). This implies that the pupil dilation during MIB does not reflect the endogenous neural processes that initiate the spontaneous perceptual switch in the MIB illusion. Walker, et al. 1998, however, cast attention on the fact that binocular cross-orientation suppression does not occur in the striate cortex, but before the conversion of the two monocular streams. Since no retinal studies are setup in binocular rivalry experiments, we therefore believe that the governors of the perceptual rivalry cannot be concluded. This article, however, presents a perspective to explain how the rivalry is not entirely endogenous neural process, and how the brain entangledly adheres the visual stimuli, see 'Hidden Dynamics Principalized' section.

Engineering Consciousness: Binocular Rivalry Terminated!

In the laboratory for consciousness, we were able to setup four experiments, two of them was about to stop

the rivalry indefinitely; another experiment is proven to stop the rivalry indefinitely through the mathematics of Kalman filter; and the last experiment is noticed to produce indefinite stoppage in a individual who claimed to be in a meditative state. The four experiments are as follow:

Voluntary Blinks Stop Binocular Rivalry:

See reference 1: We noticed that when we blink voluntarily, a specific stimulus appear and then reappear after each blink but not the other; we therefore established a formal experiment and questioned twelve human subjects. They all had noticed that after each blink, there must be unchangeable stimulus reappears in the visual awareness, but not the other; the unchangeable stimulus, however, varies from subject to another. We had noticed that the bars are getting much wider, and the image is getting clearer of the visually dominant stimulus, before it returns to its initial state, and afterwards, the suppressed stimulus will start to invade the visual awareness. We therefore had utilized these observations into our design, by asking the human subjects to blink just before the dominate stimulus tries to return to its initial state; and to continue to blink whenever this scenario is willing to happen; a process to avoid the appearance of the rivalrous stimulus. Noticeably, the twelve subjects had observed the 'same' stimulus, but not the other, must reappear after every 'voluntary' blink, regardless which stimulus dominate the awareness prior the blink. The timing of the voluntary blinks must be considered as a very critical issue, otherwise, the indefinite stoppage will collapse. Need to emphasize, the human subjects have to blink just a few hundreds of milliseconds after the dominate stimulus returns back to its initial state, otherwise, the suppressed stimulus will start to invade the awareness. For simplicity we set threshold five minutes to see the effect of blinks, and it was confirmed that voluntary blinks were able to stop the rivalry for the entire five minutes. We emphasize that the stoppage can go to infinity; but the threshold is set to comply to the declaration of Helsinki.

Involuntary Ultimate Stoppage Against the Rivalry:

See reference 2: The author noticed that when a centralized moving strip of black and white equal rectangles is installed inside one of the two BR stimuli, that stimulus will be able to dominate the visual awareness indefinitely when its speed exceeds (21) twenty-one DVA with no single intervention from the suppressed unmoving stimulus. But since the laboratory for consciousness ultimately comply to the declaration of Helsinki, we developed a stimulus that allows more dynamical neural processing to occur in the color blobs in the striate cortex's hyper-columns (more information can be found in Hubel and Wiesel Cat experiments, and for advanced details see Wurtz, 2009); information related to color blobs can be found in Livingstone and Hubel (1984)). We therefore intentionally altered the stimulus which will be tested by the human subjects given the fact that this specific

experiment is involuntary, see more information in 'Hidden Dynamics Principilized' section.

Eventually, we applied a rainbow strip into black and white grating into one of the rivalrous stimuli shown in page 1; the application also aims to magnify the visual information of that stimulus against the other one. The aforementioned rainbow strip is to be stationary then to move with different speeds. Twelve human subjects were recruited in this experiment. Astoundingly, all of the human subjects notice ultimately stable binocular rivalry for the stationary condition, and ultimate stable termination of the rivalry when the speed of the rainbow strip moves at the speed of twenty-one (21) degrees visual angle per second making the stimulus that includes the rainbow strip to dominate the visual awareness indefinitely. To reiterate, the twelve human subjects notice neither invasion from the other stimulus nor invasion caused by mixed percepts in their visual awareness in the entire trial.

Hand Movements & Ultimate Access to The Visual Awareness:

See reference 3: In binocular rivalry settings, we noticed that when voluntary hand movements are orientationally harmonized with the gratings of a rivalrous stimulus; that stimulus will be ultimately promoted in the visual awareness, but the disharmonized stimulus will be ultimately suppressed. Twelve human subjects, with average pupils, were recruited to participate in this study. Each circle in each stimulus subtends exactly 8.76 DVA, namely, 3.7 centimeters, on the screen, whereas the human subjects are 24 centimeters away from the screen, with 9.25 diopters base-out glasses. we had requested from the human subjects to draw vertical versus horizontal lines on a board (0.25 X 0.25 meter²); whereas the drawing process shall be achieved on a perpendicular plan to the subjects' faces to remove any possible influence of the drawing on the eye movements. The experiment has the two trials, normal trial which has two steps; the first step is one minutes without voluntary movements of the limb. The second step is based on the dominate view, the human subjects are requested to draw vertical or horizontal line on the aforementioned board which is located in the mousepad area for twenty minutes. The entire trial has to be repeated for five times. The second trial is the counterbalancing trial; and it also has to be repeated for five times. Clicky pen & recorder had been used to be notified when the expected dominate view had been change during the drawing process.

The paper concludes that vertical voluntary movement of the hand had a great ability to ultimately elongate the dominance duration when the vertical lines stimulus is dominating the visual awareness in a way that the other stimulus is suppressed with some human subjects for the entire trial; and similarly, for the horizontal scenario. Such activations and suppressions raised serious neurophysiological questions which will be discuss later in the 'hidden dynamics' section; but we must mention that the dorsolateral prefrontal cortex is an essential player in

this phenomenon. Notice that the experimental setup is not perfect, and it has a limited drawing space; Kalman filter, however, expects indefinite stable stoppage of the rivalry if a perfect experiment is established.

Deep Breathing & Ultimate Control of The Visual Awareness:

See reference 4: We noticed deep beathing ultimately control the binocular rivalry, and therefore statistically speaking, the rivalry exactly follows the deep breathing distribution when deep breathing is performed. We report this article in this review, however, we notice a special case in our study, a female human subject has reported that deep breathing stops the rivalry. This notification is unexpected, the subject therefore is interviewed, and we have learnt that she is in mediative state. We are unsure whether the stoppage is because of the meditation only or the human subjects require to have both mediation and deep breathing to stop the rivalry. We state that because previous study (Carter et al., 2005) had noticed that only (3) three Tibetan Buddhist monks out of seventy-six (76) are able to stop the rivalry; we therefore assume that these three, but not the rest perform deep breathing along with their mediation. Meditation is still unsolved paradigm, but we're trying to approach it through the mathematical description for tachyonic dynamics.

Hidden Dynamics Principlized:

Throughout our experiments, we are trying to touch the boundaries aiming to discover the undiscovered through our 'psychophysicist nano-electrodes'. As shown in our representative stimuli, we have used straight lines high contrast stimuli, but not circular low contrast stimuli; and we did that intentionally to magnify the neural signal in the targeted orientation column. The rivalrous stimuli has to be orthogonal to eliminate the inter-columns interference neuro-signaling (see the captured signals from Hubel and Wiesel experiments). This is because we wanted to indirectly investigate the existence of tachyons through creating 'potentially' impossible neurophysiological processes. For example, the indefinite stoppage against the binocular rivalry reported in our experiments shall indefinitely activate specific orientation column intersected with a specific ocular dominance column in the striate cortex, also it shall indefinitely suppress specific orientation column intersected with a specific ocular dominance column; mathematically speaking, this indefinite activation of the intersecting column could be physiologically impossible. Intuitively, the neurons of these intersecting columns which are responsible for processing the indefinitely dominating stimulus (due to the indefinite stoppage against the rivalry) shall be extremely tired out, and that shall result to force the rivalry to return back to its original dynamics by stopping termination of the rivalry (thus another intersecting column will be activated); however, our experiments confirm the occurrence of the opposite. Our experiments are therefore counterintuitive; and the search for the hidden

dynamics become a must; especially when no solid neuroscientific theories are offered to explain several perceptual phenomena, e.g., the invisible Gorilla, the attentional blink, and many other paradigms. We previously theorized the theory of visual entanglement which states that there are specific neurons emits two entangled physical particles that shall travel faster than light in extra physical dimensions in correspondence to the super-string theory, and one of these entangled particles will bind with a stimulus photon & the other with will bind with the corresponding photoreceptor; and once the photon reach to the corresponding photoreceptor, the entangled wave function will collapse and the visual awareness will start to emerge, namely, we state that the human brain is a tachyonic emitter; the retina and its sisters are however tachyonic receivers, see reference 20. Connecting further neurophysiological reasons, in addition to the aforementioned reasons altogether; the validation of the tachyonic emissions could be confirmed; the other reasons however will be articulated in future conveyance.

The existence of tachyons can be easily proven through our thought experiment. In case of the readers are not following our previous work, we here provide a simplified theoretical proof of the physical existence of tachyons according to the well-established theoretical physics: Imagine the Laser Interferometer Gravitational-Wave Observatory 'LIGO system' but with extremely short two tubes, namely, the tubes' length has to be the laser's wavelength; the LIGO detector will therefore detect a zero; and this seriously violates the energy conservation principle. To resolve the aforementioned violation; we suggested that the energy were conveyed to extra physical dimensions, but since the super-string theory assumes that these extra dimensions are too small; thus, the momentum of the particles travelling through these dimensions have to be way smaller than the photons. But we have to be attentive here, because if these particles' momentum have to be way smaller, then their speed must be way faster; otherwise, the energy conservation principle will be again violated, see the following energy equations for better illustration:

$$E_{\text{Before destructive interference}} = E_{\text{After destructive interference}} \quad (1)$$

$$x = \det(P_{\text{photo}} \times C) = w = \det(P_{\text{tachyon}} \times Y) \quad (2);$$

Where the dot product of vectors x , and $w \rightarrow 0$; C and Y are the speeds of light, and tachyon respectively, and P is the momentum; but the readers have to be again too careful that these are just mathematical illustrations; but our mathematical description for the tachyonic dynamics will be provided in a further notice. But it's very notable that the scientists had been searching for the "unknown" particles in incorrect manners; to understand the reasons, let's see the Planck's equation:

$$\text{Energy} = \text{Planck's constant} \times \text{Frequency} \quad (3);$$

But remember that because the LIGO detector shall detect a zero according to our thought experiment; therefore, the resultant particles will have zero value of the frequency; namely, the resultants' wavelength will be infinite. This suggests that scientists had been

looking into the wrong planes and dimensions, namely, the Large Hadron Collider 'LHC system' will never be able to directly detect tachyons, unless their dynamics are considered in the detection design.

The stable termination of stable binocular rivalry, however, considers the usage of **'the mathematical description for tachyonic dynamics.'**

We theorized that tachyons require gates sized way smaller than yoctometers to enter the extra physical dimensions; thus, the speed of light barrier can be penetrated; see the 'quantum foam' to acquire closer picture. Within that description, several dynamics of physical phenomena were explained, for example the quantum tunneling, the quantum entanglement, as well as the 'generic gravity'; whereas graviton are assumed to be a special version of the tachyon.

Chapter To Be Concluded: Suggested Applications

The stable stoppage of binocular rivalry is extremely important discovery not only to validate the existence of tachyonic dynamics, but it shall assist in several engineering and medical applications such as:

- 1- In experiment 3 for example, some human subjects who performed harmonized hand movement with the dominate stimulus noticed that the dominance duration lasts for the entire trial without a single visual invasion from the other stimulus. This phenomenal experience can be used for several possible applications: The first application is a medical one, namely, biomedical scientists may utilize the finding to possibly recover lazy eyes' symptoms. Through printing plaid stimulus (vertical or horizontal lines) on the lazy eye's corresponding external diopter lens and requesting from the patient to draw correlated lines; the patient might gradually cure his/her amblyopia. The second application is for safe driving, namely, we now know how action may inhibit a certain eye from signaling the brain and the human visual awareness. Engineers and law makers should consider this fact when designing the vehicles, roads, & most importantly the traffic laws.
- 2- Taking monocular rivalry into the applications account, we may applaud that engineering visual stimuli may assist in the brain strokes recovery. Interestingly, this is consistent with our findings related to the duck-rabbit perceptual rivalry; namely, when we tried to suck some oxygenated hemoglobin in the V4 visual area (through a red background); the rabbit face had been vanished. Rabbit but not duck should receive grater oxygenated hemoglobin in the FFA to be perceived by human subjects. This is an example of how the visual stimuli can be used to activate/deactivate a targeted brain region; thus, possibility to recover mild brain strokes without transcranial magnetic or direct current brain stimulations, see reference 21, and 22.

To determine essences for the tachyonic dynamics, however, we had achieved two investigative experiments, and both of them will require surgical implementations of nano sensors in a macaque's retina. If the sensors detects distinguished signals from the retina to the brain during

the monkey's REM sleep, then tachyons must be ultimate true, and the constants can be affirmed, see reference 23 for more information. Tachyons' existence will assist in proving our entanglement theory of vision, which states that there might be entanglements between the visual stimulus and the retina; to prove this theory, the monkey has to undergo a binocular rivalry experiment. Namely, if there is no weak signals coming from the retina to the brain when the stimulus doesn't access the visual awareness, then the entanglement theory is true; and future constants can be affirmed.

Essential Notifications

The author would like to invite the readers to visit our lab. The laboratory has some special inventions to approach the constants of the mathematical description for tachyonic dynamics, affirming the constants is however extremely costly. Readers who would like to collaborate in the completion of the present project shall be informed about our binocular rivalry glasses that's compatible with every brain imaging machines. Readers who have accessible eye-tracker and ECG facilities are welcome to collaborate. Surgeons who have hand-on experiences in retinal and brain surgeries are extremely welcome. Enquiries shall be sent to the author.

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