

Chapter 4

A Physical Process Underlying “Alternative” Vision: Spin Supercurrent

4.1. Introduction

As of 2015 [42], there were an estimated 253 million people with visual impairment worldwide. Of these, 36 million were blind and a further 217 million had a moderate to severe visual impairment.

All kinds of vision impairment are categorized into two groups: vision impairment with an integrity of eyes and vision impairment with a loss of eyes as a result of an accident. Scientists and physicians do their utmost for the treatment of people of the first category, develop medicines and conduct complex operations using the latest technologies. But people of the second category can hold out little hope for a miracle to acquire the ability to recognize colors or see objects without eyes. However, such miracles can be found sometimes in the history of mankind. As far back as in the 17th century, famous scientist P. Boyle [43] published for the first time a story of the man who became blind at the age of two; however, he could distinguish colors of the objects by merely touching them with his fingers. Since then, the studies of the possibilities of dermo-optical perception have been conducted constantly [44]. In 1962-63 Bongard and Smirnov [45] at the Institute of Biophysics of the Russian Academy of Science (RAS) were investigating outstanding capabilities of Rosa Kuleshova (at the age of 22). She was sighted, but while using a lightproof blindfold she could read, distinguish colors and reproduce drawings, having not been given a preliminary training by anybody. The uncommon vision was successful when, first, Rosa Kuleshova touched the study object by fingers of the right hand, and, secondly, the experimentalists were calm and showed goodwill to her. If somebody descanted critically or somebody's behavior became too nervous, Kuleshova's capability could disappear for some days. As Rosa Kuleshova touched a study object by fingers of her hand, Bongard and Smirnov called her uncommon vision by "skin" vision.

A unique phenomenon was observed in 2000 at the RAS Institute of Human Brain by RAS academician N. Bekhtereva. She observed the performance of many visual functions (after training using Bronnikov's techniques [46]) by a 30-year old woman whose eyes were put out by bandits 20 years before [47].

Further experiments carried out by Bekhtereva showed that visual functions could be performed by sighted people wearing lightproof masks on their faces (they could read, distinguish colors, reproduce drawings and walk in the rooms filled with pieces of furniture). A brief characteristic of the test subjects is given below.

The number of test subjects was 7 at the age from 10 to 17; out of this number 4 subjects were males, 3 subjects were females. Two subjects had problems with their vision; the rest of the subjects were healthy. All subjects were trained using Bronnikov's techniques.

Pictures demonstrated to test subjects were displayed on the screen of a portable computer using Power Point software. In total, 48 pictures were shown. The computer was placed in such a way that none of the people present could see the picture. There was a usual natural ambient illumination in the room.

In EEGs tests for uncommon vision and especially in tests for reading, a pronounced decrease in α -rhythm and the presence, mainly in frontal areas of brain, of β -rhythm with frequency exceeding 20 oscillations/s were observed. It was discovered that measured values of changes in α -rhythms and β -rhythms were similar for all test subjects, although initial values of these rhythms were different. It follows that the phenomenon in question is not unique, but is reproducible, and can be achieved through a training process.

Based on the results of these studies, Bekhtereva concludes as follows [47]: "The phenomenon exists, it is reproducible". Bekhtereva called this vision an "alternative" vision.

Thus, the "alternative" vision can take place in people independently on whether they have eyes (healthy or affected) or not, and whether they were preliminarily trained or not. This speaks in favor of the existence of a physical process responsible for "alternative" vision.

It is shown in this Chapter that spin supercurrent can be the physical process that underlines "alternative" vision. In this case, the energy of external "primary" light is transformed into the energy associated with spin supercurrent, and then the latter is transformed into the energy of "secondary" light detected by brain's visual cortex of a human subject, without projection

of the image to the eyes' retina [48]. (The properties of spin supercurrent used in this Chapter are considered in Section 1.2).

In this Chapter the mechanism of transformation of the “primary” light into the “secondary” light with the use of spin supercurrent is considered in detail. The mechanism is based not only on the experiments conducted by Bongard with Smirnov and the group of Bekhtereva, but also on the experiments conducted in 1931 by Hieronymus (USA) [49,50] and demonstrating the possibility of growing plants without sunlight in the dark. All considered phenomena can be characterized by one property: the perception of sunlight without its direct action.

4.2. The Transformation of the “Primary” Light into the “Secondary” Light in Experiments with Plants

Let us consider the experiments conducted in 1931 by Hieronymus [49,50], demonstrating the possibility of growing plants (grain) without sunlight in the dark; in detail (see Figure 4.1).

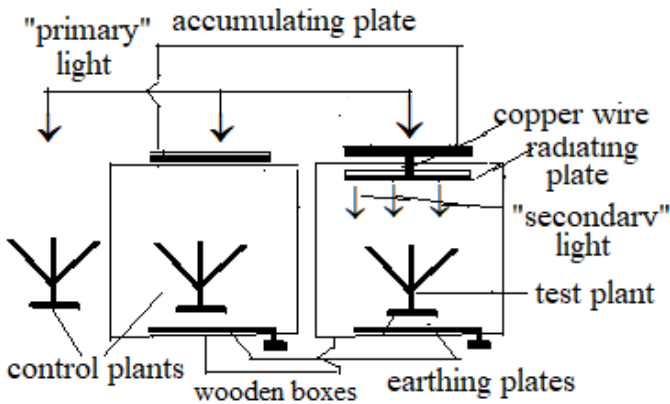


Figure 4.1. The diagram of the experimental setup in the experiment by Hieronymus.

Hieronymus placed the test-plant in a wooden lightproof box containing two aluminum foil's plates inside. The first plate called “radiating” was placed above the plant; the second earthing plate was placed under the plant. Besides, one metallic plate called “accumulating” plate was placed above the wooden box and was connected with the radiating plate (inside the box) by a metallic insulated wire (“waveguide”). The control plants were used in these

experiments as well: one control plant was outside the box, the other control plant was in the box without the radiating plate.

After opening the box, it appeared that the plant which was in the box with the radiating plate was properly developed, produced chlorophyll and was of green color like the control plant outside the box. The control plant placed in the box without the radiating plate, but with the accumulating plate, was “thin”, “pale” and “without formation of green color”. Thus, it can be said that the plants placed in the light-proof box could “see” the light (we will refer to the radiation emitted by the radiating plate as “secondary” light). Thus, in the experiments by Hieronymus the transformation of the external “primary” light into the internal “secondary” light took place.

At present, there is no physical explanation (no physical process was proposed) or biological explanation (according to contemporary biology only some bacteria, water plants or moss are capable to produce chlorophyll in the dark) of results of Hieronymus’s experiments.

In this work it is shown that the transformation of the “primary” light into the “secondary” light can be accomplished by spin supercurrent and it has three stages [48].

The first stage.

The photons of external “primary” light interact with quantum objects of the accumulating plate. It is essential that this plate is metallic, because metals contain “free” electrons creating virtual photons with nonzero total spin, which in the second stage interacts with virtual photons created by electrons of the radiating plate.

As a result of the interaction of a photon with an electron of the accumulating plate, the energy of the electron increases by $\hbar\omega_{ph}$, where ω_{ph} is photon’s frequency. According to Eq. (1.6), the frequency of precession ω_a of spin of a virtual photon created by the electron is determined by the expression:

$$\omega_a = \left(kT + \hbar\omega_{ph} \right) / \hbar, \quad (4.1)$$

where kT is the energy of thermal motion of electron, k is the Boltzmann constant, T is the Kelvin temperature. At “room” temperature $T \approx (273 + 20)$ K (which is responsible for frequency $kT / \hbar \approx 4 \cdot 10^{13}$ Hz)

and in the range of visual spectrum (frequencies $\omega_{ph} \approx (2.5 \div 5.0) \cdot 10^{15}$ Hz) one can accept that, according to Eq. (4.1), in all visual spectrum:

$$\omega_a \approx \omega_{ph}. \quad (4.2)$$

The second stage.

According to Eq. (1.12), spin supercurrent should emerge between spins of virtual photons created by quantum objects of the accumulating plate, on the one hand, and those of the radiating plate, on the other hand. As a result of the action of spin supercurrent, according to Eqs (1.15), (1.18), and (4.2), we obtain the following:

$$|\beta_a - \beta_r| \geq |\beta'_a - \beta'_r|, \quad (4.3)$$

$$|\omega_{ph} - \omega_r| \geq |\omega_{ph} - \omega'_r|, \quad (4.4)$$

where: β_a and β'_a are the values of the spin deflection angle of a virtual photon created by a quantum object of the accumulating plate, respectively before and after the action of spin supercurrent; β_r and β'_r are the values of the spin deflection angle of a virtual photon created by a quantum object of the radiating plate, respectively before and after the action of spin supercurrent; ω_r and ω'_r are the values of the spin precession frequency of a virtual photon created by a quantum object of the radiating plate respectively before and after the action of spin supercurrent.

The third stage.

As a result of the action of spin supercurrent, according to Eqs (4.3)-(4.4), spin's characteristics of a virtual photon created by a quantum object of the radiating plate are changed: the angle of deflection changes as $\beta'_r - \beta_r$, the frequency of precession changes as $\omega'_r - \omega_r$. It follows from Eq. (1.8) and Fig. 1.1 that the change in projection $\Delta(S_v)_{\omega_r}$ of virtual photon spin \mathbf{S}_v on the direction of precession frequency ω_r (assume $\omega_r \uparrow \uparrow \omega_r$) is determined to be: $\Delta(S_v)_{\omega} = S_v |\cos \beta_r - \cos \beta'_r|$. With taking into account the equalizing action of spin supercurrent on spins' orientation of virtual photons of radiating plate the total change in projection of virtual photons spins of radiating plate on the direction of precession frequency ω_r , $(\mathbf{S}_v)_{tot}$, is determined to be:

$$(S_v)_{tot} = nV_r S_v \left| \cos \beta_r - \cos \beta_r' \right|, \quad (4.5)$$

where V_r is the volume of the radiating plate, n is a specific number of free electrons (and, consequently, virtual photons created by them) of the radiating plate.

According to Eq. (1.5), the change in virtual photon spin S_v means the change in electric field E_v . Thus, according to Eqs (1.5)-(1.6) and (4.5) the total electric field connected with total spin $nV_r S_v$ of radiating plate changes and performs precession motion. Consequently, the following inequality is valid in the volume of the radiating plate:

$$nV_r \partial E_v / \partial t \neq 0. \quad (4.6)$$

Thus, the electromagnetic oscillations with frequency ω_r' can emerge in the radiating plate. According to Eq. (4.4), ω_r' can be written in the form:

$$\omega_r' = \omega_{ph} \pm |\Delta\omega|, \quad (4.7)$$

where

$$|\Delta\omega| \leq |\omega_{ph} - \omega_r|. \quad (4.8)$$

In the experiments conducted by Hieronymus, the following phenomena were observed.

1) The optimal relation between the sizes of the accumulating and radiating plates is the following:

$$V_r / k_1 \leq V_a \leq V_r k_2, \quad (4.9)$$

where V_r is the volume of the radiating plate, V_a is the volume of the accumulating plate, $k_1 = k_2 = 2$. If $k_1 > 2$ the plant can be underdeveloped; if $k_2 > 2$ the plant can be burned.

It can be shown that Condition (4.9) is essentially a condition of optimal value of spin supercurrent emerging between the virtual photons of the accumulating plate, on the one hand, and the virtual photons of the radiating plate, on the other. With this aim, using the variable n from Eq. (4.5) and for the accumulating plate, Condition (4.9) is rewritten in the form:

$$nV_r / k_1 - nV_r \leq nV_a - nV_r \leq nV_r k_2 - nV_r$$

The difference between the number of the virtual photons of the accumulating plate and of the radiating plate ($nV_a - nV_r$) influences the difference between the values of the total spins of virtual photons created by electrons respectively of accumulating and radiating plates and, consequently, according to Eq. (1.12), influences the value of spin supercurrent emerging between these plates.

Thus, an increase in k_1 ($k_1 > 2$) means a decrease in the minimal admissible value of spin supercurrent and, possibly, a change in its sign; an increase in k_2 ($k_2 > 2$) means an increase in the maximal value of spin supercurrent. In the first case, the plant can be underdeveloped, in the second case the plant can be burned.

2) The magnetic field can influence the energy passed between the accumulating and radiating plates.

The magnetic field acting on spin magnetic moments of quantum objects constituting interacting plates acts, according to Eq. (1.10), on the spins of virtual photons created by the quantum objects. As the value of the spin supercurrent is determined by the characteristics of spins of virtual photons created by quantum objects of the interacting plates (according to Eq. [1.12]) magnetic field can influence the spin supercurrent emerging between the interacting plates.

3) The energy passed in a copper wire between the accumulating and radiating plates is not electric, though it has common properties with electricity and light.

This property is in accordance with the properties of spin supercurrent. On the one hand, according to Eq. (1.12), spin supercurrent is not of electric and magnetic origin and is determined only by the characteristics of spins of interacting virtual photons; on the other hand, according to Eq. (1.5), spin supercurrent has common properties with electricity. Besides, spin supercurrent takes part in transformation of the “primary” light into the “secondary” light.

4) Independence of the “law of the distance square”.

This property is in accordance with property 8 of spin supercurrent: a weak dependence of the effectivity of the action of the current between the virtual photons on the distance between them (if the situation described in property 7 is missing).

Thus, the phenomena accompanying the experiments and demonstrating the possibility of growing plants without sunlight in the dark, are explained by the properties of spin supercurrent.

4.3. The Transformation of the “Primary” Light into the “Secondary” Light in a Biological System in “Alternative” Vision

The “alternative” vision of human subject (taking place without projection of the image to the eyes’ retina) can be performed according to the same mechanism as the emergence of light in a light-tight wooden box in the experiments by Hieronymus (see Figure 4.1). That is, it can be due to the transformation of the outer “primary” light into the “secondary” light as a result of the action of spin supercurrent. In this case, the role of virtual photons created by quantum objects of the accumulating plate can be fulfilled by virtual photons created by quantum objects of human’s skin. The role of virtual photons created by quantum objects of the radiating plate can be fulfilled by virtual photons created by quantum objects of human’s organism.

Let us analyze the experimentally observed properties of “alternative” vision.

1) Under the twilight emission, the perception of the senses decreases; in the dark it can be altogether lost [45].

This is in accordance with the proposed model: the light taken by the test subject emerges as a result of the transformation of external “primary” light.

2) If a multi-layered aluminum foil is used as a screen between the “primary” light and the test subject, the “alternative” vision can disappear [45].

This property is in accordance with property 7 of spin supercurrent. The multi-layered aluminum foil (as a metal) consists of a great number of free electrons which create respectively a great number of virtual photons. Two situations are possible in this case: (1) according to Eq. (1.21), the total spin supercurrent in this case is negligible; (2) spin supercurrent will mainly emerge between virtual photons created by quantum objects of accumulating plate and virtual photons created by quantum objects of the multi-layered aluminum foil, not between the virtual photons created by free electrons of the accumulating plate, on the one hand, and the virtual photons created by free

electrons of the radiating plate, on the other hand. In both cases the transformation of the “primary” light into the “secondary” light is missing.

3) The light’s colors registered by “alternative” vision are usually analogous to the outer light’s colors. At the same time, the cases exist when the person with “alternative” vision sees objects that radiate infrared or ultraviolet light and these cannot be seen by “ordinary” vision.

The light’s colors registered by the “alternative” vision are determined by Eqs (4.7)-(4.8). It follows from Eq. (4.7) that if registered frequency $\omega_r = \omega_{ph} + \Delta\omega$ is in the range of visual spectrum, then the test subject can perceive external light, the frequency ω_{ph} of which is not in the range of visual spectrum. If $\Delta\omega > 0$, ω_{ph} can be a frequency of infra-red light, if $\Delta\omega < 0$, then ω_{ph} can be a frequency of ultraviolet. If the “alternative” vision can function simultaneously with ordinary vision, the human subjects would see objects simultaneously in the range of visual spectrum and in infra-red or ultraviolet spectrum. For example, known Polish-American biochemist Krzysztof Palczewski working at the University of California, Irvine wrote that he could see in infra-red light [51].

4) A spontaneous capacity of a human for “alternative” vision is a very rare phenomenon. All men and women taking part in the experiments conducted by Bekhtereva [47] acquired “alternative” vision only after special training.

According to the discussed model of “alternative” vision, the effectivity of transformation of the “primary” light into the “secondary” with the use of spin supercurrent is determined by Eqs (4.5) and (4.7)-(4.8); that is, it is directly proportional to the value $(S_v)_{tot}$ and inversely proportional to the value $\Delta\omega$ determined by the properties of interacting quantum objects. Both values depend on the characteristics of virtual photons created by quantum objects of human organism where this transformation takes place.

One of the methods to increase the effectivity of the transformation is to increase the total spin of virtual photons created by quantum objects of human organism. The latter can be achieved in two ways: (1) by using external factors; (2) by using internal possibilities of human organism.

The external factors can include the use of magnetic field or/and the rotation of a test subject. Magnetic field fulfills magnetization, that is, spin polarization of quantum objects and, consequently, according to Eq. (1.10),

spin polarization of virtual photons created by the objects. The rotation of human organism, due to the Barnett effect [17] also leads to the uniform orientation of spins of quantum objects and, consequently, according to Eq. (1.10), to spin polarization of virtual photons created by the objects.

One of the methods of activation of internal possibilities of human organism is using the known successful training by Bronnikov [46].

The possible principle of the principles of construction of a device helping to acquire the “alternative” vision

This device can be analogous to the experimental setup of Hieronymus. The role of the accumulating plate can be fulfilled by test subject’s skin; the metallic radiating plate and wire connecting the accumulating and radiating plates can be fulfilled, for example, by means of Fe nanoparticles and be delivered (as targeted drug delivery) to the organs of visual cortex inside the human’s brain. It is known that the use of nanoparticles is a method for transporting drug molecules across the blood-brain barrier (BBB) to the brain [52]. According to Maher [53], the magnetite particles which are $< \sim 200$ nm in diameter can enter the brain directly via the olfactory bulb. Their presence in the brain, experimentally detected, proves that the externally sourced iron-bearing nanoparticles can be transported directly into the brain. Note that only iron-bearing nanoparticles are used in this case, not “eye implants” [54].

It should not be excluded that the effectivity of the device can be higher if a metallic plate is attached to the test subject’s skin as an additional accumulating plate. (That is, wearing metallic bracelets can increase the effectivity of “alternative” vision.)