Foundations of Hedonistic Orientation/Choice Theory

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Abstract

This paper presents a "Hedonistic Orientation/Choice Theory" (HOCHT) that will yield new, simple, closely integrated mathematical models of attitude, desire, need, attention, and will as facets of a process of orientation or choice governed by the hedonistic strive of pleasure maximization.

Keywords: Attention, attitude, choice, desire, happiness, love, need, pleasure, will

The Universal Criterion Of Orientation or Choice: Pleasantness - Acceptability, Its Structure and Formation

"... the process of orientation is a major part of every form of the psychic activity and psychic life as a whole:..." (Galperin (1976, p. 96, trans. by AJO)

Why choice is necessary? Process of orientation.

A subject faces an infinite world and perceives a variety of different phenomena simultaneously that are 'parallel' in time. There is also an endless assortment of responses that can be made at every single moment. Yet, a subject facing these infinities has limited abilities and finite resources. This contradiction dictates to a subject the necessity of constantly choosing which phenomena to perceive and what courses of action to take.

The necessity and importance of choice making is based on the most general characteristics of animal life including humans (henceforth - subjects) as open, active and limited systems.

• Subjects are open systems, their interactions with the environment, the flow of substances, and information are essential for their survival and well-being. Some of this flow is necessary and useful for a subject and some is harmful or useless. Therefore, choices have to be made constantly between 'good', 'bad' and 'indifferent' phenomena.

• Subjects are active systems and as such, require continuous selection of every type of action they undertake from a vast repertoire of behavior.

• Subjects are, in a sense, limited systems. Only God is almighty, not God's creatures. Every ability of an organism, physical or mental, has its limitations and this reveals another reason for the existence and importance of the process of choice making (Hogarth (1987, p. 4), Miller (1956, p. 186). A subject has to choose because one cannot possibly pursue all the available beneficial opportunities and resist all the harmful influences at once (Boden 1990, p. 13).

These limitations are largely responsible for the general algorithm of the process of choice, which basically consists of an appraisal of the available elements of choice one by one, and comparing and choosing between them. It is focused attention that allows a subject to be able to appraise simultaneously perceived phenomena separately, in 'sequential mode'.

This work will show, that many important aspects of conscious experience, including attitude, belief, desire, need, attention, and will are aspects of the process of choice. This means that consciousness is to a significant extent an apparatus of choice and, conversely, that choice is an important (if not the primary) function of consciousness. Choice of an objective and a course of action, together with the corresponding action, constitute an essential part of animal and human behavior. To a great extent, the above processes define behavior. Behavior is choice and its implementation; it can be symbolically written as:

\[ B = C + I \]

I will often speak about choice making as a process of orientation. The term orientation as used in this work has two meanings corresponding to the two main aspects of choice: an appraisal of the elements of choice one by one, and the comparison of the elements resulting in a choice being made. The appraisal of a single element of choice is also an act of orientation of a subject to it that can be 'positive' or 'negative', 'toward' or 'away' from it.

Comparison of elements in choice is also an act of orientation, this time between the objects of choice. The terms 'orientation' and 'choice' are used in this work interchangeably. However, the word 'orientation', being a choice of direction in the broad sense of it, carries a directional or vectorial connotation that
enhances the meaning of this work.

**Existence of the universal intentional/orientational quality**

Any choice is made by comparison. A comparison can be made only between compatible entities. But in reality there is an endless variety of different types of incompatible objects. The subject may face all kinds of ‘apples’ and ‘oranges’ that a subject might face in any combination at any moment. At the same time, it is crucial for a subject to always be able to choose from the mixture of perceived things, regardless of their nature and combination. This means that a subject must somehow be capable of comparing any object against anything else so as to put them in some kind of “order” (Damasio 1994, p. 199).

At this point, consider the idea that this comparison is made possible by the existence of a universal quality ascribed to all phenomena perceived; this common quality serves as the universal criterion for comparison and choice. Looking to economic life, for example, provides a good illustration of the universal criterion of choice. People needed to compare numerous, individually incompatible entities of their economic life and thus fabricated the universal mediating compatible - money. Money allows a person to compare, trade, and exchange anything that can be assigned a monetary value.

The introduction of a concept of a universal, quality serving as the universal criterion in choice is one of the major steps in understanding choice as explored in this work. It is not a new idea, on the contrary, one of the oldest trends in the explanation of the human orientation is found in hedonism. Cabanac (1992) proposed a theory “… according to which pleasure is this common currency” (p. 173) and showed an experimental proof of it (Johnston 1999, pp. 172, 173).

Hedonism considers human orientation to be a function of pleasure and only pleasure. All other goals are considered to be intermediate. If happiness is the only human goal and is the ultimate pleasure, then acceptance of the hedonic principle also means in mathematical terms that the laws of orientation can and should be expressed in the end as functions of one ‘common currency’, one variable - pleasure. It may look like an oversimplification, but it will be shown here that this ultimate variable reduction is possible, and that the basic features and fundamental aspects of orientation such as attitude, desire, need, attention, and will can be described in simple mathematical formulas as functions of this one variable. This utter simplicity in the number of variables is contrasted by its intricate nature.

**Vectorial character and two types of intentionality/orientation**

Brentano (1889) rediscovered at the end of the nineteenth century that phenomena belonging to human consciousness possess dynamic, directional, intentional components. He pointed out that a certain analogy exists between two fundamental classes of psychological phenomena, namely between judgment and emotions

“In the case of the judgment there is the opposition of affirmation or acceptance, on one hand, and denial and rejection, on the other. In the case of the emotions there is the opposition between love and hate or, as we may also put it, the opposition between inclination and disinclination, between being pleased and being displeased” (p. 17).

This goes right along with Aristotle (1993 edition): “What affirmation and negation are in the realm of thought, pursuit and avoidance are in the realm of desire” (pp. 147-148).

These common qualities directing or orienting a subject ‘toward’ or ‘away from’ perceived phenomena were the objects of study in the philosophy of intentionality since Brentano. Defining intentionality John R. Searle (1983) wrote, "Intentionality is that property of many mental states and events by which they are directed at or about or of objects and states of affairs in the world” (1); "Intentionality is directedness;…" (p. 3).

But how many directions of the ‘intentionality-directedness’ exist? The preferred answer here is that there are two directions of intention, orientation, and action of a subject for any phenomenon – ‘to’ or ‘from’ it, inclination or disinclination, acceptance or rejection, approach or aversion, an aspiration to continue and maximize the perception of a phenomenon or to minimize and stop it. These two types of intention or orientation of a subject will be referred to as a ‘positive’ and ‘negative’. Embree (1992) summarizing Husserl’s views on the intuitive process in terms of “positing” describes three types of it - "positive", "negative" and "neutral" (pp.163-169). The neutral type, however, does not have to be considered as a separate type, because it represents an absence of positive and negative types or their negligibly small presence.

There is an obvious but often ignored parallel between intentionalism and hedonism, because the property described above (i.e. directedness) is involved with what is usually called pleasantness/unpleasantness. Brentano himself refers to pleasantness and unpleasantness in this way by speaking about “being
pleased and being displeased” as “inclination and disinclination” (see his quote above). Edwards (1979), who considered pleasure and pain to be “intentional concepts” (p. 87), wrote: “I am not maintaining here, however, that all species of pleasure and pain involve intentionality, though most of them do” (pp. 88, 89).

The fundamental fact of the matter is, that senses, perception, and consciousness as a whole are given to animals including humans as major tools of their ‘navigation’ or orientation. Perception is not a passive process. A subject does not just reflect the world like a mirror, but gets actively involved in interaction with it. A subject is oriented to the phenomena perceived. An act of orientation is a directional or vectorial interaction of the subject with the object(s) of orientation. As with any vector, it is characterized by its quantity and direction.

The quantity of orientation of a subject to a phenomenon describes its intensity, activity or magnitude. Though the diversity of the phenomena perceived by a subject is endless, there are only two primary directions of orientation, two types of intention, and thus two basic courses of orientation and action for a subject with any phenomenon - 'to' or 'from' it, attraction or repulsion, approach or aversion, an aspiration to continue and to maximize the perception of a phenomenon or to minimize and stop it. For example, Olds & Olds (1964) have acknowledged, “We may consider the basic directions of behavior as toward some things and away from others,...” (p. 23). Kahneman (1999) pointed to the multiple sources supporting this point of view. He summarized them as follows:

“All these lines of evidence, from the introspective to the biochemical, point to the existence of a continuous evaluative process, which manifests itself in physiological responses at several levels, in expressions of affect and in an immediate propensity to approach or to avoid (p. 8).”

Contemporary theory of attitude as a summary evaluation of the object considers these evaluations to be used “to make innumerable decisions about which to approach and which to avoid” (Fazio, 2000, p. 1). The Young’s second Objective Principle of Experimental Hedonism (1959) states, “An affective arousal orients the animal toward or against the stimulus object” (p. 122). Again, these two types of orientation will simply be referred to in this work as ‘positive’ and ‘negative’. Indifferent orientation does not have to be considered a separate type of orientation, because it represents an absence of positive or negative orientation.

There are voices against the significance of this distinction. One of the latest arguments known to me belongs to Graig DeLancey (2002). He acknowledges that,

“Many have suggested that affects are states that are either negative or positive appraisals (of something, such as the organism’s situation). It is extremely common in psychology to group emotions into groups with “negative” and “positive” valence” (p. 7).

He, however, rejects it, by saying,

* Pleasure/displeasure, comfort/discomfort, positive/negative, and various degrees of satisfaction of a desire are all too crude to tell us anything interesting about many of the emotions and the behaviors that typify them (p. 7).”

I consider this distinction to be fundamental rather than “crude” and join the majority of the psychologists finding it interesting. In fact, this entire book is dedicated to what can be derived from this principal division. It must be of some interest to DeLancey too, because he dedicates number of pages of the same book of his to describe a lot of research on the “Emotional Congruence in Social Judgment and Perception or Categorization” (p.190-195), on the “Affective Influence on the Formation and Recall of Memories” (p. 196-198) that widely uses distinction between pleasure/displeasure, comfort/discomfort, positive/negative.

DeLancey’s arguments against this distinction are as follows:

“For example, the notion that an appraisal or state is “positive” is too vague. What makes an appraisal positive? Ultimately, if the notion of a positive or negative appraisal is not to be vacuous, it must either yield some measurable feature of the body, or, better yet, it must reveal something about the kind of behavior that such an appraisal results (such as approach or avoidance). One supposes that joy, for example, is positive (as per colloquial usage of “positive”) and that it leads to approach (in some sense). But what about anger and fear? Colloquial usage would make them negative; but one can lead to approach of the emotion’s object (in attack), the other to retreat from it (in flight). Given such distinct behaviors, the categories just do not explain anything” (p. 7).

From the hedonistic point of view as well as from the point of view of the common sense there is no inconsistency or contradiction here because both approach of the negative emotion’s object (in attack) and retreat from it (in flight) serve the same hedonistic goal of stopping or minimizing an unpleasant
experience by one feasible way or another. The simple fact of the matter is that one can reach this goal in many different ways. For example, one can stop an unpleasant effect of the overly bright lamp by covering one’s eyes, turning head away, walking out of the room, turning the light down or completely off by unplugging the lamp, unscrewing or even breaking the light bulb if switch does not work and a plug is not accessible. Though the physical movements of the agent can be very different, can even have an opposite direction, their purpose is the same. “Fight and flight” both work against the negative, unpleasant experience, serve to avoid, reject it; they both are different manifestations/results of the negative orientation toward the object, both are consistent with its negative appraisal. In this hedonistic sense, “fight” and “flight” are two types of ‘avoidance’ in the broad sense of it, meaning the negating interaction with the negatively appraised object. This approach is perfectly consistent, carries quite a bit of the explanatory power, and offers a very neat scheme. The substance of the matter is that the goal of the hedonistic system is internal, so one can’t argue that if different or even opposite in some sense external actions like “fight or flight” can serve this goal then it proves that it inconsistent or meaningless.

Orientation possesses both quantity and direction. It qualifies the orientation of a subject ‘to’ a phenomenon or ‘away’ from it to be considered as a vectorial variable or a vector. The vector of orientation of a subject (S) to the phenomenon or the object of the orientation (O) can be graphically represented by an arrow drawn along a straight line connecting two points representing S and O. The arrow starts from S and points toward O in the positive orientation or away from O in negative orientation:

\[
S \rightarrow O \quad S \leftarrow O
\]

+ orientation - orientation

The length of the arrow represents the magnitude or the ‘strength’ of an orientation, i.e. strength of an aspiration experienced by a subject toward the phenomenon.

The best metaphor or physical analogy is a ‘force’ ‘applied’ to a subject and directed along the ‘line’ between the subject and the object of orientation (Lewin, 1935, chapter 4). This tempting analogy is very illustrative and was used more than once. An excellent name for these ‘forces’ was introduced by Bentham (1789/1970), who called them ‘springs of action’. They really act like simple spiral springs placed between a subject and an object. Like a spiral springs they create ‘forces’ of attraction or repulsion, ‘pulling’ subject and object closer together or ‘pushing’ them away from each other. For Bentham himself, P and U were synonyms for and the basis of his springs of action. In his Observations 60 and 69 (1815/1983), he wrote,

“60. Pleasure is a spring of action no other than an action is regarded as a means of obtaining it – and so of pains, putting avoidance instead of obtainment (p. 10).

69. Pleasures and pains, the basis of all the Springs of Action. Pleasures and pains exist without the springs; not vice versa (p. 11).”

Of course, P or ‘spring of action’ is not a physical force but just a useful analogy, a metaphor illustrating the mechanism of intrinsic preferences. Though this mechanism engages at the level of perception, sense and emotion, it steers decision making from the sensory input all the way to action as the final outcome of choice.

When speaking about the P of senses and emotions, we are talking about a fundamental quality of psychological experience, about its ‘elementary particles’, that are not reducible to anything simpler at the psychological level. That is why we cannot detail pleasantness or describe it as well as shape or color, but can only provide associations or metaphors like ‘force’. However, we can denote a meaning for P/U experiences by giving them a meaningful label: the meaning of P is ‘acceptability’, and U has negative ‘acceptability’.

Why are there only two types of orientation, two basic courses of action, two basic directions of behavior of a subject toward a phenomenon? The underlying reason for it, in my understanding, is the sequential mode of human information processing, determining that at any given time a subject deals with the one phenomenon that occupies the center of attention. The interaction between a subject (S) and a singled out for attention object (O) can be described as a linear one, taking place along the ‘line’ between the two points represented, as shown on the graphs above. As geometry teaches us, movements along such a line have only two levels of freedom - toward or away from the end of the line. Therefore, physical or psychological distance between S and O can either decrease or increase. The ‘movement’, behavior, or course of action of a subject can be directed only toward or away from the object, and orientation of the S can be either “positive” (toward the O) or “negative” (away from the O).

**Self-perception and terminology of intentionality/orientation**

The forces of attraction and repulsion are subjectively
perceived by the individual experiencing them as something pulling toward a phenomenon or pushing away from it. These tendencies are opened to the subject's perception, and are named and described by human language. The vocabulary characterizing orientation reflects its bipolar quality. The terminology of orientation exists in antagonistic pairs, positive and negative entities like attraction and repulsion, pleasure and pain, love and hatred, like and dislike, good and bad, right and wrong, belief and disbelief, etc. These terms are, to a great extent, overlapping and interchangeable. The same +/- orientation of a subject X toward the phenomenon Y can be described by saying that X feels an attraction/repulsion toward Y or that X likes/dislikes Y or that Y is pleasant/unpleasant to X or that Y brings joy/sadness to X, that X is 'good' or 'bad' and so on.

Types of orientation are always the same: positive, negative, or indifferent. However, the same orientation to different types of phenomena can be described by different words. Positive orientation or an attitude toward an activity is often characterized by using the more specialized term interest, but can also be described using more general terms naming the activity as likable, or as something the subject likes or loves. This positive/negative orientation or attitude toward a thought is called belief/disbelief and a thought being accepted/rejected is labeled right or wrong.

**Definition of ‘acceptability’.** Positive and negative acceptability as a meaning of pleasantness and unpleasantness (‘P’ and ‘U’ in short). Pleasantness - Acceptability.

P and U are one of many antagonistic pairs of expression commonly used to describe orientation to a phenomenon. A subject constantly experiences some kind of orientation to the phenomenon perceived - positive, negative or indifferent. At the same time, everything observed is experienced as either P, U or indifferent to the subject. This is true for any perceived phenomenon – smell, taste, sight, sound, person, activity, feeling, memory, etc. The only attribute that is common for all the numerous P/U phenomena is the +/- orientation of the subject toward them. This attribute or quality of phenomena is usually labeled ‘pleasantness’ and ‘unpleasantness’. This is the meaning of P/U. As Kant (1798) has asserted,

"Enjoyment is pleasure through the senses, and what delights the senses is called agreeable. Pain is displeasure through the senses, and what produces it is disagreeable. ... We can also describe these feelings in terms of the effect that the sensation of our state produces on our mind. What directly (by the senses) prompts me to leave my state (to go out of it) is disagreeable to me - it pains me. What directly prompts me to maintain this state (to remain in it) is agreeable to me - it delights me (p. 99)."

Referring to pleasure, Edwards (1979) says,

"Rather it means "the set of all feelings for which we have a psychic tension or attraction," and no circularity is involved. Similarly, "pain" in the generic sense means "the set of all feelings against which we have a psychic tension or aversion (p. 95)."

The disposition to continue or to interrupt the current experience, to approach or avoid, an action tendency to go on or to stop, are the common features of pleasant or unpleasant experiences. A similar position is taken by Kahneman (1999) toward a definition of pleasantness, utility, and the basis of a Good /Bad dimension. In some primal form, the mechanism of a positive/negative orientation exists in the most primitive of organisms, because any life form, regardless of its level of complexity has to be involved in selective exchange with its environment, i.e. choice or orientation (see Rado, 1964, p. 260; Johnston, 1999, pp. 66 - 67).

"Pleasantness" and "unpleasantness" are considered in this work to be the most common terms used to describe an intentional or orientational quality of attractiveness/repulsiveness or the two existing types of intention or orientation. Almost anything can be called pleasant or unpleasant - smell, taste, sight, sound, feeling, thought, person, activity, memory, etc. An exception is the case of the orientation to thoughts and the derivation of their acceptability. The terms right/wrong, belief/disbelief are usually used in this incidence in order to label thoughts as being accepted or rejected by a subject. The use of the terms P/U would seem semantically incorrect in this case. This is one reason to use a more general term for describing the orientational quality that would be applicable in every case. My choice for this term is ‘acceptability’. It is the most general term used herein order to describe orientational quality. It is interesting to note that the root corresponding to the word ‘pleasantness’ in the Russian language literally means ‘to accept’. Other feasible terms would be “agreeableness” (Kant, 1929 edition, p. 290), or “agreeability” (Edwards, 1979, p. 43), because the meaning of P/U of x is positive/negative acceptability, agreeableness, or agreeability of x.

The acceptability or P/U of a phenomenon to a subject are terms indicating a +/- orientation of a subject toward the phenomenon. They are labels for the tendencies of the attraction/repulsion felt by a subject.
toward the phenomenon. They describe a vector of orientation so they are in turn vectors themselves. Their magnitude describes the degree or 'strength' of orientation. Their positive or negative designation describes the direction of orientation - toward or away from the object. Acceptability is a meaning of pleasantness; pleasantness/unpleasantness of x means positive/negative acceptability of x. In the rest of this work I will often use the term 'pleasantness - acceptability' (P-Acceptability in short) instead of just 'pleasantness' in order to make clear the meaning of the word 'pleasantness' in this context.

**Fallacy of not distinguishing between an ‘absolute’ and ‘comparative’ P-Acceptabilities**

There is a seemingly common sense argument against defining P as an acceptability. This argument points to the fact, that,

- pleasant things (theoretically acceptable by the definition in question) are sometimes rejected by a subject;
- unpleasant things (unacceptable by definition) are sometimes accepted by a subject.

Following this logic one can ask, “If U objects can be accepted by a subject then should we not rename them as P and vice versa, in order to be in sync with original definitions of P and U?” The following simple examples will explain how the above argument is fallacious.

- If one chooses from a few good or acceptable apples, s/he also rejects the others. Does this mean that the apples which were not chosen are bad? Of course not, rejection or non-acceptance of an object as a result of choice does not mean that rejected elements of choice are unacceptable by themselves.
- Conversely, if someone is starving and chooses to eat one of some bad apples, only one bad apple was accepted and the others were rejected. Does this mean that the chosen bad apple is now good? Of course not, it is still the same bad apple for a subject, but it is the best available to him/her.

Acceptance or rejection as an outcome of choice is always a result of comparison made by a subject; it depends on a comparative P-Acceptability of elements available and hence, characterizes only comparative P-Acceptability. On the other hand, P-Acceptability of an element by itself is a result of its evaluation made in isolation at the center of attention of a subject; this type of acceptability can be called ‘absolute’, versus the comparative one. Here we must look at what logicians call the ‘fallacy of ambiguity’. According to Jevons (1890), “Perhaps the most common cause of bad reasoning is the use of ambiguous terms, which mean one thing in one place and another thing elsewhere. A word with two distinct meanings is really two words” (p. 114).

The ambiguous word in our case is ‘acceptability’. It can be either absolute or comparative. Any phenomenon can possess both of these characteristics and yet they do not have to correspond to each other. One characteristic can be positive, meaning an acceptance of this phenomenon by itself and another can be negative, meaning rejection of it by comparison. These two meanings of the term ‘acceptability’ correspond to two phases of the process of choice:

- An appraisal of elements of choice isolated by attention one by one for determining the P-Acceptability of each by itself,
- A comparison of elements of choice resulting in acceptance or rejection of one by a subject.

With U or “negative acceptability” of itself, phenomenon X can still be chosen or accepted because X is the least unpleasant choice available at the moment, or is ‘the lesser of evils’ to a subject. On the other hand, with P or “positive acceptability” of itself, phenomenon Y can be rejected simply because there are more pleasant choices available at the time. There is no contradiction here either to our definition of P or to the hedonistic principle of maximization of P. Further along it will be demonstrated that the comparative acceptability of X for a subject is in fact simply the desirability of X. It will also be shown in simple mathematical terms how this comparative acceptability (or desirability) determines choice.

**Basic qualities of pleasantness/unpleasantness (P/U)**

Is X pleasant or unpleasant to you? Most people have no difficulty in answering this question, because P and U are qualities of one’s feelings, or of one’s inner state. In the perception of a subject, P and U are usually attached to the objects they are produced by or associated with. One says: ‘unpleasant view’, ‘pleasant voice’, ‘unpleasant event’ but P/U does not really belong to the view, voice or event itself, these are qualities of one’s inner state of perception, recall or imagination. This explains why:

- phenomena different in nature can be perceived by a subject as having the same P or U quality. Those phenomena belong to the same P or U class along with numerous different other ones because they are sorted not by their own qualities but by the similar +/- orientation to them, placing them in the same P or U category;
- the same phenomenon can be P to one individual
and U to another because different individuals can experience a different orientation and feel differently about it;

• the same phenomenon can be P to the same individual at one time and U at another, because the same individual can experience a different orientation and feel differently about the same phenomenon at different times.

As Spinoza (1674/1955) proposed, “Different men may be differently affected by the same object, and the same man may be differently affected at different times by the same object”. “We thus see that it is possible, that what one man loves another may hate,….” (Prop. LI, p. 163). Many authors share this opinion (for example: Kant, 1798, p. 99; Troland, 1926, p. 132; Beebe-Center, 1932, p. 7; Russell & Carroll, 1999).

I believe that P and U represent positive and negative values of the same variable. Generally speaking, positive and negative values of the same variable are assigned to properties that neutralize or minimize each other in interaction. It is true for positive and negative numbers in algebra, for debit and credit in economics, for positive and negative electric charges and opposing to each other forces in physics, etc. To express it a bit differently, positive and negative values of the same variable are assigned to properties that summate algebraically. This is exactly what happens with pleasantness and unpleasantness. According to Plutchick (1980) “hedonic process summate algebraically” (115). ‘Hedonic integration’ is analyzed in more detail later in this chapter. The existence of hedonic integration is my reason for considering pleasantness and unpleasantness to be positive and negative values of the same variable. P and U are often represented graphically using the so-called “hedonic continuum” (Young, 1961, p. 153).

<table>
<thead>
<tr>
<th>unpleasant indifferent pleasant</th>
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P and U will be viewed in this work as positive and negative values of the same variable - pleasantness. U is going to be considered as ‘negative pleasantness’ (U = -P). Therefore, the mention of P in this text refers to both of its sides. Accordingly, the ‘hedonic continuum’ is considered to represent positive and negative values of one variable – pleasantness:

\[
\begin{array}{c}
-0 \\
-P \\
P (pleasantness) \\
+P
\end{array}
\]

**What is pleasant and where? Aristotle’s error.**

The foundation of the mechanism of a subject’s orientation is that the subject experiences ‘an immediate propensity to approach or to avoid’ (Kahneman, 1999, p. 8). These, in turn, are experienced as either attraction or repulsion, an aspiration to continue and maximize or to stop and minimize them, that is, as a tendency toward acceptance or rejection. The modalities of these orientational propensities belong to the different senses and emotions and are quite different in their neurophysiology and in their specific perceptual qualities. Structurally, there are orientational or vectorial components of those senses and emotional states and they are undoubtedly factors of a specific nature. Each and every one of these factors however, has the same polar organization, the same function of attraction and repulsion, of the positive and negative orientation. This commonality allows senses and emotional states, regardless of their origin, to be labeled as more or less acceptable, that is pleasant or unpleasant.

Here I am compelled to present an argument against Aristotle’s point of view that each human sense has its own pleasure. According to Aristotle (1993 edition), “For each sense, and similarly all thoughts and study, has its own pleasure and is pleasantest when it is most complete;”. “That there is a pleasure for each sense is obvious, for we speak of sights and sounds as being pleasant;” (p. 208). I will here argue that each sense does not have its own pleasure, and that only five out of the seven human senses (emotion, inner senses, taste, touch, smell) possess their own pleasantness, while the remaining two (vision and hearing) do not.

What exactly tells a subject that something is P or U? What represents or “carries” P and U in human consciousness? In order to answer this question we can analyze the orientational qualities of the basic components of the stream of consciousness one by one.

**Stream of consciousness and its nine components**

Information is presented to the human consciousness at least in nine different ways by the following components of the stream of consciousness: algic (pain), auditory, emotional, gustatory, olfactory, spatial, tactile, thermal, visual. Let us summarize it in the form of a table1:

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<th>See Illustration 1</th>
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It has been proposed that audio and visual sensations do not possess a vectorial quality of P/U by themselves, they are purely scalar. Hence,

• There are also two scalar components in the stream of consciousness – audio and visual sensations;
  • algic (pain), gustation, olfaction, spatial, tactile, thermal sensations are vectors as well as emotions.
There are a total of seven vectorial components of the human stream of consciousness or seven 'springs of action', using Bentham's (1789/1970) terminology. (A more developed and formalized analysis of the space of human consciousness is presented at the end of this chapter).

These components are the building blocks of the images for all perceived and imagined phenomena. These distinguishable components or qualitatively different types of data that move into the stream of human consciousness can be called independent variables. Each of them has a distinct quality (Cabanac, 2002) and can be experienced independently from others or together with any of sensations one by one. They are 'independent' in the sense that none of them can be reduced to others or fully expressed by or through the others.

For example, it is impossible to explain thoroughly to a blind person what the color blue is or to a deaf person what the sounds of music are. However, these components of the stream of consciousness are ever interacting with each other, influencing one another, and are functionally dependent each on the others. For example, things that people hear, see, smell, taste and touch affect their emotions.

**Direct and mediated P**

What tells a subject that something is P or U to them? Where are P and U located? What are their psychological carriers? In some cases it is easy to answer these questions, when "...these pleasures have a definite bodily location, ..." as John Hospers (1961, p. 112) has noted. Good examples of it are provided by algic (pain), gustation, olfaction, tactile, and thermal sensations. It is also easy to distinguish the P/U of emotions such as joy or sadness and anger or fear, etc. P/U of emotions are felt 'within', as is often said, 'in the heart'. Science qualifies their location as "thoracical" (Young, 1961,p. 149). "Inner" (Damasio, 1999, p. 9) or internal body (spatial) sensation is usually unpleasant. According to Rozin (1999):

" We can add to Troland's conception that while the surface and aperture inputs signal both positive and negative affect, the internal, evaluative inputs indicate primarily that something is wrong, that is, they give rise almost entirely to pain (from the viscera, joints, or muscles). In a way, this can be interpreted to mean that for the body interior the normal state is neutral and only malfunction is signaled. From the perspective of the body interior, "no news is good news" (p. 110). "

Inner senses are often not accounted for, probably, because they generally report the abnormal state of an organ in pain and therefore can be excluded from the first approximation analysis of healthy, normally functioning individuals. So, in summary, the algic, gustation, olfaction, spatial, tactile, thermal sensations and emotions each possess their own or direct P/U.

Auditory and visual images are certainly labeled as P or U by a subject. However, where is this P/U felt - in the eyes and ears? Certainly not, except for some rare cases of harmful effects caused by very bright light or extremely loud sound (Tomkins, 1962, V. I, p. 30). Otherwise, auditory and visual sensations do not carry their own P quality in and of themselves. This means that their P/U is indirect or mediated, that P of the audio and visual images is obtained through association with some mediator(s), and this was used and proven by I. P. Pavlov long ago in his classical experiments on conditioning. The visual and acoustic (conditional) stimuli of the flashing light or ringing bell affected behavior of the dogs in his experiments only if they were associated with unconditional stimuli, positive or negative "reinforcement" - something P (like food) or U (like pain). Cabanac came to a similar conclusion studying changes of pleasantness of the internal state of a subject in reaction to different stimuli (thermal, gustatory, olfactory). He gave a process of such changes a special name - “alliesthesia”:

**P of the auditory and visual sensations.**

The proposed mediator of orientation to visual and acoustic images must satisfy the following conditions:

1. it must possess an orientational quality or P by itself, directly;
2. it must be present while the visual and acoustic images are experienced;
3. its P must be a function of remote senses - it must change together with the visual and acoustic images, otherwise it can not adequately represent them.

The choice of candidates for such a mediator is very limited. There are seven of them satisfying the first condition - algic, gustation, olfaction, spatial, tactile, thermal sensations and emotions that possess P directly, by themselves. However all of them except for emotions do not satisfy either the second or the third condition or both: P of the visual and auditory sensations can be experienced in the absence of algic, gustation, olfaction, spatial, tactile, and thermal sensations and, therefore, they can be responsible for P of the remote sensations only occasionally, when they are experienced simultaneously. Also, P of the visual and acoustic sensations on one side and P of algic, gustation, olfaction, spatial, tactile and thermal sensations on another are quite independent of each other.

Accordingly, only emotion satisfies all 3 conditions.
because:
1. emotions possess P directly by themselves;
2. a subject is always experiencing emotions of some degree of P, including those times when acoustic or visual images are perceived;
3. P of the subject’s emotions reacts with what s/he sees and hears, i.e. it is a function of remote sensation of acoustic or visual images.

Vision and hearing are major suppliers of information for humans with normally developed senses because most phenomena are perceived by these remote senses. The fact that the P of an Emotional State (henceforth, PES) is largely responsible for the P of these senses indicates the importance of emotion in the process of the formation of P and in the process of orientation.

Why beauty is NOT in the eyes of beholder?

Beauty is customary defined through pleasure associated with the phenomenon/object of beauty. For example, Webster Dictionary (http://www.merriam-webster.com/dictionary/beauty) defines it as follows: “the quality or aggregate of qualities in a person or thing that gives pleasure to the senses or pleasurably exalts the mind or spirit”. I argue that pleasure associated with visual images is not experienced in the eyes. By doing so I deny that pleasure defining beauty is experienced in the eyes of beholder, i.e. pleasure and therefore beauty is not experienced in the eyes. It is needless to say that I challenge this very beautiful saying only on the literal, anatomical level, not on its metaphorical one, that means that sense of beauty is subjective, depends on the individual beholder rather than only on the object of beauty itself.

P of the Emotional State (PES) as a function of all sensations. Algebra of masochism

Not only visual and auditory sensations can affect PES. All others can do it too. Algic (pain), gustation, olfaction, spatial, tactile and thermal sensations can certainly affect one’s PES. According to Damasio (1994),

"We should distinguish at least two components in pain and pleasure. In the first, the brain plots the representation of a local state change, which is referred to a part of the body. This is somatosensory perception in the proper sense. It derives from the skin, or from a mucosa, or from part of an organ. The second component of pain and pleasure results from a more general change in body state, in fact an emotion" (p. 262-263).

The PES of a subject can be influenced by a taste of delicious candy or the disgusting flavor of medicine, by a whiff of a scent fair or foul or by touch, tender or violent. PES is a function of all other eight existing human sensations. This means that algic, gustation, olfaction, spatial, tactile, and thermal sensations possessing their own P/U generate P/U twice:
1. in the form of their own direct specific P/U experienced at their bodily location;
2. by generating an associated with them PES.

P/U created by these sensations has two components:
P_sensation = P_direc + P_emotional

A good illustration of this dualism can be provided by masochism, as described by Trigg (1970).

"How could he (masochist – AJO) take pleasure in the opposite of pleasure, pain? But in fact there is no puzzle at all: infliction of pain on his body causes him (for reasons familiar to psychoanalysts) to experience pleasure, whereas such pain causes most persons displeasure.... The infliction of the pain is precisely what gives him the pleasure. To say that pain is pleasant sounds paradoxical: but the paradox disappears when we distinguish the double sense of pleasure (p. 159)."

Though the feeling of pain itself is probably always unpleasant, this is not always true in those cases where the simultaneously experienced emotion generated by pain is fulfilling. Unpleasant by itself, pain generates pleasant emotions for a masochist. As Reik (1957) observes, “The discomfort is not desired as such, but it institutes the price of pleasure” (p. 123).

The P of the emotion generated by pain apparently overcomes the U of the physical pain for the masochist.

To summaries, we propose that PES reacts to all other sensations, including algic (pain), audition, gustation, olfaction, spatial, tactile, thermal, visual. PES is also affected by memory, self-esteem and thought process, etc:
PES = F(algic, auditory, gustatory, olfactory, spatial, tactile, thermal, visual sensations, memory ...)

Pleasantness of the Emotional State (PES) and Hedonic Integration

The above formula presents PES as a function of multiple variables. A measure of PES reflects all current influences on a subject through the sensations. PES is also affected by past experiences stored in the P-memory and associated with current experience. All of these variables simultaneously influencing PES are summarily reduced to the one measure of PES existing in any given moment. Each influence only changes PES in a positive or negative direction as
PES is not recreated every time from scratch. This means that PES possesses an integrative, generalizing quality. PES integrates by yielding a single value for P that summarizes all current influences of sensations and the corresponding memories. Plutchik (1980) wrote in the description of the Objective Principles of Experimental Hedonism of Young that "hedonic process summate algebraically" (p. 115). According to Beebe-Center, Kulpe and McDougall as well as Young’s teacher Titchener were of a similar opinion (Beebe-Center, p. 115). Hedonic Integration was more recently investigated by Klitzner (1977):

"Suppose that the subject is to judge personal value of sandwich-drink combination. An obvious hypothesis is that the value of the combination equals the sum of the values of sandwich and drink. This hedonic integration (Klitzner, 1975) may be written symbolically as \( R = Sandwich + Drink \)" (p. 348).

Cabanac (1992) used an idea of the hedonic integration in his experiments analyzing the "algebraic sum of affective ratings of pleasure and displeasure" (p. 182). Kahneman (1999) referenced other sources supporting this point of view (p. 5).

At the first approximation, level of PES behaves like the level of the reservoir while water is added to and taken from it at the same time. Another illustration would be a bank account to and from which money is flowing. The level of water, money, and PES at the end of any time period will equal the total of the initial level (at the beginning of the period) and the sum or integral of all changes which occurred during it. Using mathematical symbols it can be expressed for the period of time from \( t_0 \) to \( t \) as follows:

\[
PES(t) = PES(t_0) + \sum_1^n \Delta PES
\]

where \( PES(t) \) is PES at the end of the period of time from \( t_0 \) to \( t \); \( PES(t_0) \) is PES at the beginning of that period; \( \Delta PES \) is a sum (\( \sum_1^n \)) of all the \( n \) changes (\( \Delta \)) of PES during this time period.

PES constantly changes with time, it goes up and down. It can be described mathematically by the formula \( PES = F(t) \), where PES is some function of time. Using a symbol of integral, PES can be described as follows:

\[
PES(t) = PES(t_0) + \int_{t_0}^{t} d\left(PES\left(t\right)\right)
\]

PES is a common (reflecting all current influences on the subject, as well as the associated past ones), integrating (possessing integrative quality) measure of P. In other words, PES is a common and integrating orientational measure.

There is a concept of the psychological structure very similar to PES both in its composition and functionality. It has been declared by James Russell (2003) and called a “Valenced Core Affect”. Russel’s colleague Feldman Barrett elaborated on the Valence of the Core Affect in the article “Valence is a basic building block of emotional life” (2006) where she further developed an idea of the existence of the invariant psychological construct – a valenced core affect. According to Feldman Barrett (2006), while the core affect itself is considered to be a neurophysiological state, it “…is available to consciousness and is experienced as feeling pleasant or unpleasant (valence)...” (p. 40). “In a sense, core affect is a neurophysiologic barometer of the individual’s relationship to an environment at a given point in time and self-reported feelings are the barometer readings. Feelings of core affect provide a common metric for comparing qualitatively different events” (p. 40). The above description of the function of the “feelings of the core affect” as a “common metric” converges with Cabanac’s “Pleasure: the Common Currency” (1992).

Storage and retrieval of pleasantness - acceptability by memory. Hedonic Memory

Memory provides the ability to save and retrieve information that is used for appraisal and choice in the process of orientation. The memory of animals, including humans, saves and retrieves not only modality-specific scalar components (visual, acoustic, etc.) of the images of the perceived phenomena but also their ‘orientational images’, their P-Acceptability or P/U. Spinoza (1674/1955) proposed that

“A man is as much affected pleasurably or painfully by the image of a thing past or future as by the image of a thing present” (Prop. XVIII, p. 143).

Johnston (1999) wrote,

“... the hedonic consequence of a behavior--a reward or deterrent--is always stored as the expected outcome of a learned behavior” (p. 106).

“... memories of the past do not take the form of pictures; they are semantic memories, in the form of stored hedonic outcomes...” (p. 164).

Arnold (1970) called this kind of memory an ‘affective memory’. Let us refer to the memory of P/U as ‘P-memory’. 
Major features of the P-memory

1. Automatic, effortless and immediate action of P-memory: Perception, remembering or imagining a phenomenon by a subject automatically, effortlessly, and immediately triggers the retrieval of the P/U experience associated with the phenomenon by the perceiving subject. Such a P/U recollection does not require any conscious effort of the subject. According to LeDoux (1996), “…the learning that occurs does not depend on conscious awareness and, once the learning has taken place, the stimulus does not have to be consciously perceived in order to elicit the conditioned emotional responses” (p. 182).

2. PES as the predominant form of the P/U recollection: What is the carrier or vehicle of retrieval of P? In what form is P retrieved? P exists only in the form of P of contact/inner senses and emotions. So, when I refer to P-memory I am talking about the storage and retrieval of P of contact/inner senses and emotions. It is notable that the pleasure components of the contact and inner senses are inseparable from the senses themselves, in the actual experience as well as the memory of it. To re-live the direct P of smell, taste or tactile sensation one has to re-live the smell, taste or tactile sensation itself. Contact and inner senses are not as easily retrievable, though the ability to retrieve them differs between individuals. When remembering physical pain or pleasure, a subject is not really able to fully reproduce the repellant or pleasant smell, taste or tactile sensation. Abilities of this type, if they existed, would be quite self-destructive for a subject, even dangerous in the case of pain.

By contrast, PES can be quite fully and easily revived by memory. A child remembering or imagining a painful visit to the doctor does not actually experience the pain of the shot again, but re-lives a hedonically negative (PES < 0) fear and emotional distress. My understanding is that P-memory, first and foremost, stores and retrieves pleasure in the form of PES. This means that PES represents P of all the senses in both memory and perception. In conclusion, the Hedonic or P-Memory is predominantly an emotional memory. This again stresses the importance of the “imaginative emotions” (Green, 1992, pp. 35, 36), and the role played by PES in the formation, storage, and retrieval of P/U.

3. The sign and size of the P-memory recall usually correspond to the P of the initial experience: The perception and remembering or imagining of phenomena by a subject automatically triggers changes of the PES corresponding to the sign and, to some extent, the magnitude of the P of the experiences stored in P-memory and associated by the subject with these phenomena. Troland (1926) stressed the importance of the “Hedonism of the Past” for current appraisal and for choice making:

“Of course, the things which have given us pleasure in the past are likely to continue operative in this way in the present and in the future. … If golf has been a pleasure in the past, the idea of it will ordinarily be pleasant to-day; pleasant anticipation - and anticipation of pleasure - will follow naturally from memories of pleasant experiences” (p. 139).

Hedonic memories, however, like other types of memory are not static and unchangeable but rather dynamic and alterable. Arnold (1970) has noted,

“When we speak of memory, we usually refer to this modality-specific type. But we also re-live the pain, the joy, the sorrow, the delight, we have felt in the past. Of course, this is not the same experience we have had the first time (but a memory picture after all, is different from an actual visual experience, also), but is, like the original appraisal, a positive or negative reaction” (p.17).

Kahneman (1999) has summarized his research on the distortions of hedonic memories and powerfully stressed its significance by stating that “… the sovereign masters that determine what people will do are not pleasure and pain, but fallible memories of pleasure and pain” (p. 20). These distortions, though, ought to work with the sign (positive/negative) of the original experience, otherwise, it would unavoidably create in a subject emotional reactions, attitudes, desires, etc., that would be opposite to the initial experience. Such a creature would avoid the pleasures of the past and be attracted to the pains of the past, and would react with a smile to a known threat and show ‘fight or flight’ reaction to a previously experienced joy. This kind of behavior defies common sense and, if noted, is interpreted as a serious symptom of mental illness. Last but not least, such a behavior is self-destructive and simply not survivable.

4. The imageless character of P-memory: There are some serious reasons why recalling (modality-specific) images of past experiences associated with current ones doesn’t and shouldn’t always happen. The images or experiences initially associated with the recalled P-memories aren’t necessarily retrieved in the process of remembering. As Arnold (1970) has noted, “A child that has been bitten by a dog may avoid dogs for a long time, whether he remembers the incident or not” (p. 176). To the contrary, it is often difficult to even trace the past events and experiences which have initially caused P-memories. It can take a lot of time
and effort, sometimes years of psychotherapy, to track down the original source of strong, persistent emotions. Johnston (1999, p. 93) concurs, writing:

"When a new event has acquired the ability to evoke a positive or negative feeling, this relationship may persist for a lifetime. In the case of a conditioned fear developed during childhood in response to the sight of a furry animal, the sight of fur may continue to evoke fear into adulthood. The adult, however, may have no specific memory of the events that led to these disturbing emotions. Psychiatrists spend a great deal of time treating anxiety disorders that may have arisen from chance associations that were formed in early childhood and are now long forgotten. Associations that are formed in a young child, before sensory discrimination is fully developed, will inevitably have a great deal of generalization. Both a child and an adult may not only fear a specific furry animal, but have a generalized fear of all furry objects or even the environmental context in which the fear was first experienced. In the modern world this process appears to be maladaptive, but it had potentially adaptive consequences in ancestral environments. A child bitten by a rat may have been well served to be frightened by all rats and perhaps other similar animals or environments. It may also have been adaptive to maintain this fearful attitude into adulthood" (p. 93).

In the first place, the recollection of images (visual, acoustic, etc.) from past experience that are associated with current experience is not necessary for an adequate orientation of the subject to the current situation. It is not necessary for two main reasons:

- Recalling P-memory of the past emotional experience is sufficient for this primary goal.
- Acoustic and visual images are scalar and therefore do not affect orientation by themselves.

It isn’t essential for a child to remember being bitten by a dog to maintain an attitude against dogs. With or without the memory, the child can still experience negative emotions around dogs and therefore retain negative orientation to them, i.e. dislike, fear and avoid dogs. Even if the child remembers an unpleasant encounter with a dog, the recollection of the initial experience doesn’t necessarily recur when that child is reminded of dogs and recalls the negative feelings associated with them.

Secondarily, recalling visual or acoustic images of past experiences associated with a current experience is counterproductive in regard to the process of the orientation of a subject. If such recollection takes place it can distract subject’s attention needed in the here and now. It slows the subject’s reaction and the process of orientation. A subject may have a tremendous amount of memories associated with the current situation. This can be true of people with other people, dogs with other dogs, people with dogs, dogs with people, etc. In contrast with P-memories, mode-specific memories (like visual or acoustic) cannot be quickly integrated. In these cases remembering takes much attention and time.

To illustrate this point, let us consider the opposite: what if it was required to recall everything associated with currently perceived phenomena? The response time of such a ‘memory monster’ would be proportional to the amount of memories one has. The more memories recalled, the slower the reactions are. The more experience one obtains with age, the slower would reactions become, because one would have so much more to remember. Luria (1987) studied people with an extraordinary strong modality-specific memory. He described, for example, their process of reading as extraordinarily slow because they had to visualize everything they read about and then compare it with the previous images they had created while reading.

Something similar to the ‘memory monster’ described above was actually created by the Artificial Intelligence. As Dreyfus (1992) noted,

"Indeed, AI researchers have long recognized that the more a system knows about a particular state of affairs, the longer it takes to retrieve the relevant information, and this presents a general problem where scaling up is concerned. Conversely, the more a human being knows about a situation or individual, the easier it is to retrieve other relevant information. This suggests that human beings use forms of storage and retrieval quite different from the symbolic one representationalist philosophers and Lenat have assumed (p. xxii)."

Dreyfus (1992, p. xlv), also correctly pointed out the right direction in which this problem is resolved.

More on Pleasantness of the Emotional State (PES) and Hedonic Integration:

The previous formulation of PES has to be updated to include memory as another factor:

\[ \text{PES} = F(\text{CONTACT \\& INNER SENSES, REMOTE SENSES, MEMORY, ...}) \]

The above formula presents PES as a function of multiple variables. A measure of PES reflects all current influences on a subject through the senses. PES is also affected by past experiences stored in the P-memory and associated with current experience. All of these variables simultaneously influencing PES
are summarily reduced to the one measure of PES existing in any given moment. Each influence only changes PES in a positive or negative direction as PES is not recreated every time from scratch. This means that PES possesses an integrative, generalizing quality. PES integrates by yielding a single value for P that summarizes all current influences of sensations and the corresponding memories.

Plutchik (1980) wrote in the description of the Objective Principles of Experimental Hedonism of Young that "hedonic process summate algebraically" (p. 115). According to Beebe-Center, Kulpe and McDougall as well as Young’s teacher Titchener were of a similar opinion (Beebe-Center, 115). Hedonic Integration was more recently investigated by Klitzner (1977, p. 348). Kahneman (1999) referenced other sources supporting this point of view,

"The concept of this chapter is that an observer could evaluate Helen’s objective happiness in March on the basis of a continuous record of her status on the Good/Bad dimension, along the lines of figure 1.1. This approach is hardly new. More than a century ago, the economist Francis Edgeworth (1881) wrote of using a "hedonimeter" in just this way. A natural way to use such a record is to define the total utility experienced during an interval of time by the temporal integral of instant utility. The temporal integration idea was formulated by Edgeworth (1881), more recent statements of it can be found in Parfit (1984), Broome (1991), and Parducci (1995), and it is invoked implicitly."

The level of PES behaves like the level of the reservoir while water is added to and taken from it at the same time. Another illustration would be a bank account to and from which money is flowing. The level of water, money, and PES at the end of any time period will equal the total of the initial level (at the beginning of the period) and the sum or integral of all changes which occurred during it. Using mathematical symbols it can be expressed for the period of time from \( t_0 \) to \( t \) as follows:

\[
PES(t) = PES(t_0) + \sum_{i=1}^{n} \Delta PES
\]

where PES\( (t) \) is PES at the end of the period of time from \( t_0 \) to \( t \);

PES\( (t_0) \) is PES at the beginning of that period;

\( \Delta PES \) is a sum \( \left( \sum_{i=1}^{n} \right) \) of all the \( n \) changes \( (\Delta) \) of PES during this time period.

PES constantly changes with time, it goes up and down. These changes can be displayed graphically using a PES and time axis. It can be described mathematically by the formula \( PES = F(t) \), where PES is some function of time. Using a symbol of integral, PES can be described as follows:

\[
PES(t) = PES(t_0) + \int_{t_0}^{t} d (PES(t))
\]

PES is a common (reflecting all current influences on the subject, as well as all associated past ones), integrating (possessing integrative quality) measure of P. In other words, PES is a common and integrating orientational measure.

This quality of PES describing a very important function of emotion can serve as a basis for this definition of emotion: emotion is a component of the stream of human consciousness whose orientational quality or pleasantness plays the role of a common and integrating orientational measure.

There is a concept of the psychological structure very similar to PES both in its composition and functionality. It has been declared by James Russell (2003) and called a "Valenced Core Affect". Russel’s colleague Feldman Barrett elaborated on the Valence of the Core Affect in the article "Valence is a basic building block of emotional life" (2006) where she further developed an idea of the existence of the invariant psychological construct – a valenced core affect. According to Feldman Barrett (2006), while the core affect itself is considered to be a neurophysiological state, it “...is available to consciousness and is experienced as feeling pleasant or unpleasant (valence)...” (p. 40).

"In a sense, core affect is a neurophysiologic barometer of the individual’s relationship to an environment at a given point in time and self-reported feelings are the barometer readings. Feelings of core affect provide a common metric for comparing qualitatively different events" (Russell, 2003, p. 40).

The above description of the function of the “feelings of the core affect” as a “common metric” converges with Cabanac’s “Pleasure: the Common Currency” (1992) and with the explanation of the main function of the PSS below.

**Pleasantness of the State of a Subject (PSS)**

There are seven P/U or vectorial components of the stream of consciousness: PES and P of algic (pain), emotional, gustatory, olfactory, spatial, tactile, thermal, sensations. All of them at once or any of them in any combination can be experienced by a subject at the
same time. This is one good reason to look for more precision and clarity while referring to pleasure and pain - indeed, to clarify which one you are referring to. It makes sense to utilize an inclusive characteristic or a measurement of the combined or total P-Acceptability of the state of a subject that includes all P/U components of a subject’s state. I will call their combination or aggregate a ‘Pleasantness of the State of a Subject’ (PSS in short). PSS is a sum of all vectorial or P components of the stream of consciousness.

\[ PSS = P_{\text{PSS}} + P_{\text{algic}} + P_{\text{gustatory}} + P_{\text{olfactory}} + P_{\text{spatial}} + P_{\text{tactile}} + P_{\text{thermal}} \]

We can ‘add’ different types of P to the formula above because the same quality - pleasantness is added up and because P ‘summates algebraically’ (Plutchick, 115). PSS possesses an integrative quality at least because one of its parts, namely PES, possesses an integrative quality itself. Johnston (1999) wrote:

"In summary, human feelings appear to provide the important value system that underlies all human decisions. The shared element of feelings - hedonic tone - allows many different feelings to be combined and hence supply an overall assessment of the value associated with the various possible outcomes of a decision problem" (p. 179).

PSS is a sum of all the P/U components of the stream of consciousness. By this definition PSS combines all the P/U, orientational or vectorial components of the stream of consciousness. Therefore, any influence on orientation must work through PSS. PSS is my answer to John Searle’s (1984) question, "What Is an Intentional State". PSS is the Integrative Intentional State, because PSS contains all intentional/orientational components of the stream of consciousness. PSS is analogous to the Husserl's noema because, "By ‘noema’ Husserl means the intentional correlate of any act" (Dreyfus, 1984, p. 109). PSS is the embodiment of the 'the intentional correlate of any act' and perception because it contains all carriers/vehicles of intentionality.

**Principle of hedonism. Definition of happiness.**

A connection between pleasure and happiness is obvious and unavoidable. “Therefore, the highest good (i.e. happiness - AJO’s) is some sort of pleasure, ...” (Aristotle, 1993 edition, 208). According to Locke (1690/1824), “Happiness then in its full extent is the utmost pleasure we are capable of, and misery is the utmost pain...” (p. 245, Book 2, § 41, Edit 12). Using the definition of PSS, it is easy to create a compact expression of the hedonistic principle and a definition of happiness. The formulation of the hedonistic principle is as follows: A subject is constantly striving to maximize PSS. The process of the maximization of PSS can’t be unlimited, it must have an upper limit, and this limit is called happiness, i.e. happiness is the upper limit of the maximization of PSS. It must be stressed that this is a definition of what happiness is, not what causes it. Being an upper limit of the integrative state of a subject, namely of PSS, happiness itself is a certain state of a subject. As Hospers (1961) has noted, “The whole is composed of the parts, and happiness consists of the aggregation of pleasant states.” (p. 116). Using the above definition of happiness we can reformulate the hedonistic principle: A subject is constantly striving to maximize PSS or to reach for one’s own happiness.

This definition of the hedonistic principle as striving for the maximization of the Pleasantness - Acceptability of the State of the Subject and not just striving toward pleasant and away from unpleasant is very important. It eliminates a skin-deep ‘common sense’ argument against hedonism that points out that people select and do unpleasant things as well as pleasant ones. The response of hedonism is that these are cases of acceptance of a 'lesser evil' - the least unpleasant (i.e. the most pleasant algebraically) option while all the available alternatives are unpleasant or consequently negative. Following Hedonistic principle does not contradict altruism if it is understood as inclusive of an ability to get pleasure from making others happy. Damasio (1994, p. 176). The above definition of the hedonic principle shares the dynamic, maximizational feature of other definitions. One of them is Freud’s (1923, p. 21) formulation of the pleasure principle. Cabanac (1992) experimentally tested hypotheses of maximization of “the algebraic sum of pleasure aroused by the combination of stimuli” (p. 182).

**Vectorial and scalar components of the stream of consciousness**

Let us summarize what is presented above about the components of the stream of consciousness in the form of a table.

<table>
<thead>
<tr>
<th>sensation</th>
<th>vector (P/U) or scalar (no P/U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio</td>
<td>scalar</td>
</tr>
<tr>
<td>algic (pain)</td>
<td>vector</td>
</tr>
<tr>
<td>emotional</td>
<td>vector</td>
</tr>
<tr>
<td>gustatory</td>
<td>vector</td>
</tr>
<tr>
<td>olfactory</td>
<td>vector</td>
</tr>
<tr>
<td>spatial</td>
<td>vector</td>
</tr>
<tr>
<td>tactile</td>
<td>vector</td>
</tr>
<tr>
<td>thermal</td>
<td>vector</td>
</tr>
</tbody>
</table>
The nine-dimensional space of the human consciousness

There is a concept of multidimensional space in mathematics. Every point of such a space is fully described by the values of as many independent variables as there are dimensions in the space. For example, a straight line is an example of the one-dimensional space; a geometrical plain is a two-dimensional.

The values of all nine components or nine ‘coordinates’ of the stream of consciousness must be known in order for one to get a complete description of the stream of consciousness of an individual at a certain moment in time. Therefore, the space of human consciousness is normally nine-dimensional. It is 8-dimensional for a blind or deaf person and 7-dimensional for a blind and deaf one.

Full, scalar and vectorial image of consciousness

The space of consciousness can be defined as a multidimensional space where a stream of consciousness flows. The aggregate of values of all components of the stream of consciousness should be called a ‘Full Image of Consciousness’ (FIC in short). At any given moment FIC fully describes the stream of consciousness at that moment. Such a ‘time-slice’ or an instant ‘photograph’ of the stream of consciousness (a momentary FIC or \( FIC_t \)) can be represented by a single ‘point’ in the nine-dimensional space of consciousness. Such a point, like any point in any space is described by an aggregate containing the current values of all the components or dimensions of that space. For the geometrical plane a point is defined by the values of X and Y. For the physical space it is defined by X, Y, and Z. The point of the nine-dimensional space of consciousness is defined by values for all nine components.

Movements of the point representing a momentary FIC and a ‘line’ created by connecting these movements characterize the changes in the content of the subject’s consciousness. As in any natural process, changes of FIC are happening in time, so time can be accepted as an eighth dimension of FIC.

Vectorial and scalar subspaces of consciousness

It has been established earlier in this chapter that there are seven vectorial and two scalar components in the stream of consciousness and, therefore, in the FIC. Space of consciousness (SC) can be subdivided into 2 subspaces - Scalar Subspace of Consciousness (SSC) and Vectorial (or, maybe, Conative) Subspace of Consciousness (VSC):

\[
SC = SSC + VSC.
\]

These subspaces can be defined as domains of existence of Scalar Image of Consciousness (SIC) and Vectorial Image of Consciousness (VIC). Orientation is determined by VIC and takes place in the VSC. Division between SIC and VIC corresponds to Husserl’s (1964) distinction between noesis and noema because, “By “noema” Husserl means the intentional correlate of any act” (Dreyfus 1984, p. 109.), versus the noesis that is the non-intentional correlate of an act.

Full Image of Consciousness represents the combined Scalar Image of Consciousness (SIC) and the Vectorial Image of Consciousness (VIC):

\[
FIC = SIC + VIC
\]

SIC contains all scalar components of the stream of consciousness. VIC combines all vectorial or P/U components of the stream of consciousness, that is the P/U of all seven one cycarriers of orientational factors affecting a subject. VIC contains all the orientational input of the stream of consciousness, this is the vectorial or orientational portion. At any moment (t), VIC represents a total combined Pleasantness - Acceptability of the State of the Subject at that moment (PSS). PSS is just a different name for the same formation we called VIC but reflects by its name a slightly different point of view.

PSS Lemma

By its definition PSS/VIC contains all the orientational components of the stream of consciousness. Therefore, PSS is wholly responsible for orientations because it contains all the orientational factors. This means, that orientation toward any object has to employ PSS, must be processed using PSS, i.e. the only way for any phenomenon to influence orientation is by having an effect on PSS; any phenomenon perceived by a subject affects orientation of this subject only as much as it affects PSS. Any influence on the orientation of a subject must work through the subject’s PSS; orientation to any object has to employ PSS and be processed through PSS. We will call this important supporting principle as "PSS Lemma".

Appraisal Of an Element Of Choice

Application/attribution of the orientational factors to objects

In the previous chapter we identified all the orientational (P/U) factors that possess their own pleasantness-acceptability. The main question we
address in this chapter is how orientational factors are attributed to different objects/phenomena or how pleasantness/unpleasantness is assigned to phenomena. In a sense, this question converges with Searle’s (1984) question, “What is the relationship between the Intentional state and the object of the state of affairs that it is in some sense directed at?” (p.4).

The question of how and what determines a subject’s orientation toward a given phenomenon or object is addressed in contemporary psychology by theories of attitude. In the terminology of attitude theory this becomes a question of how attitude is formed, how a perceived phenomenon is assigned a value and becomes an object of attitude rather than a passive reflection. I will show that major aspects of the contemporary approach to the structure and function of attitude correspond to the views included in this work.

**Central phenomenon and its Pleasantness – Acceptability. Hedonic Recognition**

A subject perceives a variety of different phenomena simultaneously that are ‘parallel’ in time (Sloman, 1990, p. 232). However, their appraisal is performed one by one or ‘serially’ due to a subject’s limited information processing capabilities. Attention enables a subject to appraise simultaneously perceived phenomena separately and to establish orientation to them in sequential mode. This isolation by attention is a necessary condition for the separate appraisal of a phenomenon or for orientation to it, though it is an act of abstraction from a boundless reality. As Searle (1983) has noted, “The world does not come to us already divided up into objects; we have to divide it...” (p. 231). This act of separation is often described as a positioning of a phenomenon into the subject’s ‘center of attention’. A simpler term ‘central phenomenon’ will be used in this work, in place of ‘phenomenon in the center of attention of a subject’.

Isolation of the central phenomenon is one of the most important steps in the process of choice. There are two immediate momentous results of this act. The first one is formation of an attitude toward the central phenomenon and the second is the formation of desire toward this central phenomenon. We consider them to be two parts of the process that we call “Hedonic Recognition”, that goes hand in hand with Object Recognition. Hedonic Recognition determines orientation to an Object.

In this chapter, our analysis will be restricted to the evaluation of (or orientation to) a single or (in the above sense) ‘isolated’ central phenomenon. The principal questions here put are:

1. What determines orientation of a subject to the phenomenon in the center of attention?
2. What defines the P/U or acceptability of the central phenomenon?

My understanding of P-Acceptability as a characteristic of orientation makes these two questions one. I believe that together with the process of Object Recognition also takes place a process of Hedonic Recognition categorizing X as more or less pleasant/unpleasant, acceptable or not acceptable. Whatever determines the P-Acceptability of the central phenomenon belongs to the subject’s PSS (Pleasantness - Acceptability of the State of a Subject). That’s because PSS, by its definition, combines all P/U or vectorial/orientational components of the stream of consciousness. According to the PSS Lemma, any influence on the orientation of a subject works through the subject’s PSS; orientation to any object has to employ PSS and must be processed through PSS. This means that Pleasantness - Acceptability of the phenomenon in the center of attention of a subject, at any given time is determined either by components of PSS in the moment or by PSS as a whole.

**Difficulties of identification of current orientational/PSS factors**

What components of the current PSS influence the P-Acceptability of the central phenomenon? I ask this question because the phenomenon at the center of attention is only one of several factors currently influencing PSS. Therefore, a central phenomenon can only be responsible for part of the simultaneous influences on PSS, not the whole of them. Though attention can single out a phenomenon, PSS as a whole is determined by a multitude of factors, including those beyond the central phenomenon. These peripheral factors may have nothing to do with this phenomenon except that they influence the PSS of the subject in the same moment. If peripheral factors influence the P-Acceptability of the central phenomenon, this means that the qualities of that phenomenon and its P-Acceptability or orientation to it do not quite correspond to each other as cause and effect. As Spinoza (1674/1955) wrote, “Simply from the fact that we have regarded a thing with the emotion of pleasure or pain, though that thing be not the efficient cause of the emotion, we can either love or hate it” (Corollary to Prop. XV, 141). Over 300 hundred years later Damasio (1994) addressed the same kind of ‘breakdown’ between cause and effect: “If a given entity out in the world is a component of a
scene in which one other component was a "good" or "bad" thing, that is, excited an innate disposition, the brain may classify the entity for which no value had been innately preset as if it too is valuable, whether or not it is. The brain extends special treatment to that entity simply because it is close to one that is important for sure. You may call this reflected glory, if the new entity is close to a good thing, or guilt by association, if it is close to a bad one. The light that shines on a bona fide important item, good or bad, will shine also on its company" (p. 117).

There are two major reasons why it cannot be otherwise:

1. There are always factors influencing PSS besides the central phenomenon itself.
2. It is, to a great extent, impossible for a subject to separate elements of the individual factors influencing PSS due to its summarizing integrative nature. This is especially true for that important component of PSS, the Pleasantness of Emotional State (PES). Furthermore, it is simply too difficult to identify all the factors influencing a subject's PES. Therefore, a subject can never quite separate those parts of PSS created by the central phenomenon and other peripheral phenomena.

The influence of the P-Acceptability of the contact and inner senses on the subject's PSS is easier to recognize because their P-Acceptability bears the clear signature of the P/U modality experienced at the specific body place. It's a different story with PES.

It is especially difficult to identify the emotional P-memory factors of PSS because of their imageless character discussed in the previous chapter. It was established there that images of the initial experiences creating P-memories are often not retrieved in the process of P-memory recall. It is often difficult to even trace the past events and experiences that initially caused P-memories. It can take time and effort and sometimes years of psychotherapy to dig some of these out.

As a consequence, a subject is presented only with the end result of this hedonic integration in the form of an entire PSS, a sum first integrated at the emotional level. One can only guess about some components of PES and their values. What the components of this continuously changing sum are and how each of them influences PES, and therefore PSS is a tricky question indeed. As Schwarz (2000) noted, "Because it is difficult to distinguish one's pre-existing feelings from one's response to the target at hand, individuals are likely to evaluate about a target more positively when they are in a happy rather than sad mood." (p. 433-434).

The point here is that at the time of perception, a subject cannot clearly identify and separate PES and therefore, PSS components because:

1. One cannot know all of the factors influencing PSS;
2. All PSS components are 'mixed' together or integrated in the total PSS.

**Principle of Synchronicity**

If one has no way of knowing exactly what factors affect his/her current PSS then obviously one cannot know how much these factors affect it. Thus far, the conclusion was that the P-Acceptability of the phenomenon in the center of attention of a subject was determined by components of PSS in that moment. The realization that those factors currently affecting PSS cannot be clearly discerned means that they act together as a whole and that whatever affects one's PSS in any given moment also influences the P-Acceptability of the phenomenon in the center of attention at that moment.

Everyday experiences as well as psychological and psychiatric observations support this conclusion. For example, it is common knowledge that recent events, pleasant or unpleasant, sugar and/or alcohol blood levels, fatigue, mood swings, depression or mania can affect PSS, orientation and attitude toward whatever gets subject's attention at that time triggering patently 'unreasonable' behavior. Braking dishes or furniture while angry is a good example. Galperin (1976) gives an example of similar behavior in the animal kingdom, describing a tiger tearing apart the trunk of a tree - the first object that somehow caught its attention after being wounded by a hidden hunter. There is a great deal of research on the psychological mechanism underlying this type of behavior including so-called Mood-Dependent Evaluation and Judgement, that will be discussed in detail hereunder.

**Formulating what is here noted:** pleasantness-acceptability or P of the phenomenon in the center of attention of a subject \((P_{central})\) is determined by PSS at that time \((PSS_t)\)

\[
P_{central,t} = PSS_t
\]

This formula will be referred to as the 'Principle of Synchronicity'. It designates time as a parameter connecting a central phenomenon and synchronous PSS, a perceived and attended object with orientational factors. It expresses the old idea of time as a connecting factor in animal and human reaction. It's quite reasonable to think that the orientation to the phenomenon that one perceives is determined by orientational factors being experienced by this subject.
in the moment. This was experimentally proved with dogs by I. P. Pavlov at the beginning of this century. Anochin (1978) summarized this in speaking about the key role of the parameter of time in the structure of reflexes. Damasio described it in terms of his theory of ‘somatic markers’ (1994).

"When a negative somatic marker is juxtaposed to a particular future outcome the combination functions as an alarm bell. When a positive somatic marker is juxtaposed instead, it becomes a beacon of incentive" (p. 174).

Damasio’s ‘juxtaposition’ of the somatic marker is analogous to the connection of PSS with the synchronous object. In this next section we will define a construct consisting of the phenomenon in the center of attention of a subject and the PSS experienced at that time and the relation of this structure to attitude.

Definition of ‘attitude’, its ‘subject’, and ‘object’

First, let us take a look at some existing definitions of attitude. Here is one given by Encyclopaedia Britannica Online in 2001: “in social psychology, a predisposition to classify objects and events and to react to them with some degree of evaluative consistency.” There are quite a few examples that have a very strong orientational flavor. Fazio(2000) wrote, “... the mere possession of any attitude is useful to the individual in terms of orienting him or her to the object in question” (p. 3). Here are three definitions from the article by Greenwald "On Defining Attitude and Attitude Theory" (p. 362):

[An attitude is] a disposition to react favorably or unfavorably to a class of objects [Sarnoff,1960].

... attitudes [are] enduring systems of positive or negative evaluations, emotional feelings, and pro or con action tendencies with respect to social objects [Krech, Crutchfield, & Ballachey, 1962].

Attitude is the affect for or against a psychological object [Thurston, 1931].

Maio and Olson, editors of the book “Why We Evaluate” (2000) dedicated to the research on attitude function, wrote in the preface: “...it is widely believed that the object appraisal function is the primary function of attitudes”(p. ix). This object appraisal function is motivational by its nature:

First, both (several – A.J.O) theories (of attitude function – A.J.O.) claim that a basic function of attitudes is to simplify knowledge about objects in the environment, consistent with Allport’s (1935) classic description of the attitude construct. That is, attitudes help people to approach things that are good for them and avoid things that are bad for them, without the need to constantly reassess pros and cons. Smith et al. (1956) labeled this motivation the object appraisal function (Ibid., p. viii).

The importance of the orientational or hedonic characteristic of attitude is reflected in the definitions of attitude quoted above. These definitions talk about ‘orienting’ (Fazio), ‘a disposition to react favorably and unfavorably’ (Sarnoff), ‘positive and negative evaluations, emotional feelings, and pro and con action tendencies’ (Krech et al), ‘affect for or against a psychological object’ (Thurston). Attitude is widely held to be an orientational factor in behavior.

- When talking about an attitude we will distinguish between its subject, its object and the attitude itself: The ‘subject’ of an attitude is an entity experiencing the attitude. Primarily, this entity refers to humans, including human infants, but is applicable at least to higher animals, and in the future may apply to ‘affective computers’ (see “Affective Computing”, Picard, 1997), humanoid robots;

- The phenomenon in the center of the subject’s attention will be referred to as the ‘object’ of the attitude;

- An attitude is P-Acceptability of the object of an attitude for its subject or the orientation of the attitude subject toward its object.

Attitude is defined here in a very focused orientational sense versus a possibly broader one. The latter one could include other facets of the reaction of a subject to an object: a full spectrum of emotional and physiological reactions, correspondent verbalization and inferences, etc. My definition is mostly concerned with orientation to the attitude object, its orientational quality of P-Acceptability. It does not try to describe all the facets of attitude, but concentrates on the most important for orientation and choice ‘core’ parts of it. This is similar to the way P-Acceptability of the emotional state (PES) characterizes emotion in a focused, orientational sense. This definition approaches attitude as a part of perception that is responsible for the orientational, intentional or noematic quality.

As a result of this approach, other aspects related to attitude have been grafted upon attitude as elements of orientation that contribute some value in an evolutionary sense. Verbalization or verbalized categorization of attitude as positive or negative, like or dislike, love or hate, etc. are regarded as verbal acts that are secondary, often delayed, not necessarily required for the formation, existence, and functioning of attitude. This leaves room for the existence of intuitive attitudes experienced before and/or without the participation of discursive reasoning as well as for
attitudes in animals and human infants incapable of verbalization. Understanding belief as a verbalized attitude will be discussed later in this chapter.

Attitude and the Principle of Synchronicity

The Principle of Synchronicity was formulated above as follows: Pleasantness-Acceptability or P of the phenomenon in the center of attention of a subject (P_central) is determined by his/her PSS at that time t (PSS_t)

\[ P_{\text{central},t} = \text{PSS}_t \]

Let’s translate the Principle of Synchronicity into a new attitude terminology: attitude (ATTIT_s,x,t) of the subject (s) to the attitude object (x) at the moment (t) is determined by the synchronous PSS

\[ \text{ATTIT}_s,x,t = \text{PSS}_s,t \]

This means that attitude can be positive or negative and its magnitude can be bigger or smaller depending upon the sign and magnitude of the PSS accompanying the object of this attitude

Basic features of an attitude

The following qualities of attitude will be analyzed:

I. Bipolarity
II. Integrativity
III. Universality
IV. Subjectivity
V. Flexibility
VI. Objectivity/Inductivity

I. Bipolarity of an attitude

According to the formula for attitude, \( \text{ATTIT}_s,x,t = \text{PSS}_s,t \), attitude is determined by PSS that is always either positive or negative. (Neutral or zero P-Acceptability can be considered as a disappearingly small positive or negative one). The very basis of the bipolarity of attitude is the bipolar structure of the hedonic continuum. Hedonic drive and attitudes are inseparable. Fazio (2000) wrote, “Accessible attitudes foster approaching objects that have been personally defined as hedonically positive and avoiding those that have been defined as producing negative outcomes” (p. 33).

There are two basic characteristics of attitudes - positive and negative, because of the two polar signs of PSS. It is important to keep in mind that we are talking about the Pleasantness-Acceptability of the State of the Subject (PSS) in which positivity/negativity means positive or negative orientation, acceptance or rejection, approach or avoidance. Bipolarity of attitude in this sense is referred to by Fazio (2000) in many places in his article about attitudes as tools for object appraisal. For example:

It is such categorizations into likes and dislikes – objects that we wish to approach and those that we wish to avoid - that enable individuals to progress easily through daily life. By imposing an evaluative structure on their social world, individuals can more easily cope with the demands of the social environment. Their attitudes provide an indication of which objects to approach and which to avoid, all in the interest of maximizing positive outcomes and minimizing negative outcomes (p. 2). (See also pp. 1, 3, 9, 14, 19, 21, 33 - AJO).

II. Integrative quality of attitude.

Just because a subject has a positive or negative attitude toward an object it does not mean that s/he experiences only attitudes of the same positivity or negativity toward all features of this object. A subject can like or love something as a whole and at the same time dislike or hate some of its features and vice versa. This takes place because of the integrative property of the PSS determining attitude as a whole. An attitude (PSS) summarizes the P and U features of its object. If the totality is positive or negative for a subject then the resulting attitude is similarly positive or negative and is called love/hate, like/dislike and so forth. The integrating or summarizing quality of attitude is considered by contemporary psychology to be one of its fundamental qualities. Fazio (2000) wrote:

The theoretical model that underlies the research my colleges and I have conducted on the functionality of attitudes views attitudes as associations in memory between the attitude object and a given summary evaluation of the object (see Fazio, 1995; Fazio et al., 1982, for a general review) (p. 4).

III. Universality of an attitude

The same subject (s) can experience the same attitude toward totally different phenomena (x and y) because the same PSS can accompany different objects in the center of attention

\[ \text{ATTIT}_{s,x} = \text{PSS}_1 \]
\[ \text{ATTIT}_{s,y} = \text{PSS}_2 \]
This is why one is able to love or hate things so different in nature: a view, smell, taste, person, song, idea, etc. The Principle of Synchronicity explains the mechanism of orientation or formation of attitude toward the audio/visual images created by the remote senses. Remote senses (vision and hearing) do not possess their ‘own’ P-Acceptability, as it was established in Chapter 1, but the formulation of attitude shows that it is not necessary for perceiving the remote senses as P/U, i.e. for orientation or for attitude formation to these sensations. As soon as an audio/visual or any other image becomes the center of attention of an x subject there is one and only one condition necessary for its perception by the subject as P/U or for experiencing +/- orientation or for forming an attitude toward it. This condition is based upon the existence of the simultaneous +/- PSS determining an attitude’s positivity/negativity. Application of this principle will be important later when we look at the process of formation of intuitive judgments to thoughts.

IV. Subjectivity of attitude

The quality of ‘subjectivity’ of attitude as well as what follows in our analysis of ‘flexibility’ of attitude were both described by Spinoza (1674/1955), “Different men may be differently affected by the same object, and the same man may be differently affected at different times by the same object” (p. 163). Different subjects (s1, s2) can experience unlike attitudes (ATTITs1,x ≠ ATTITs2,x) to the same phenomenon (x) because the different PSSs1 ≠ PSSs2 can correspond to the same object of attitude for different people:

ATTITs1,x = PSSs1, and
ATTITs2,x = PSSs2

if PSSs1 ≠ PSSs2 then ATTITs1,x ≠ ATTITs2,x

V. Flexibility of attitude

The same individual (s) at different time can experience unlike attitudes to the same phenomenon (x) because a different PSS can be associated with the same object of attitude at different times (t1 and t2).

ATTITs,x,t1 = PSSs1
ATTITs,x,t2 = PSSs2

if PSSs1 ≠ PSSs2 then ATTITs,x,t1 ≠ ATTITs,x,t2

Will effort can affect the formation of attitude to a certain degree. Basically, this is done by a subject ‘forcing’ or ‘reviving’ one’s own emotional reactions by focusing attention on the positive or negative aspects of the attitude object by force of will or ‘will effort’. This can be done by the retrieval of emotional memories, by activating one’s self-esteem or by reminding oneself how good or bad something really is. This mechanism will be discussed in the chapter titled ‘Will’.

VI. ‘Objectivity’ and ‘inductivity’ of attitude

An attitude of a subject s toward the object x at the moment t (ATTITs,x,t = PSSs,t) summarizes perceived and remembered P-Acceptability of all features of X, positive and negative. When an object x gets in the center of attention of a subject, it brings about a change (Δ) of PSS (ΔPSSs,x,1, or ΔPSSs,x,2). However, a subject always perceives several phenomena and experiences many influences upon PSSs,x at the same time t. Therefore, an attitude object itself only determines a part of the attitude toward x. Two parts of the attitude PSSs,t can be clearly distinguished:

1. ΔPSSs,target,x – the part of attitude determined by the attitude object (x) at the moment(t);
2. ΔPSSs,background,t – this is a ‘background’ part of attitude at the moment (t) formed by all other influences at the attitude PSSt except for the attitude object itself. This part, by its definition, is not associated with PSS changes generated by the current attitude object x, though it can be a function of many (n) different factors itself:

ΔPSSs,background,t =ΔPSSs,background(1),t+ΔPSSs,background(2),t+…+ΔPSSs,background(n),t.

These factors can be independent from the current attitude object, so ΔPSSbackground,t does not have to change as a result of this object’s appearance in the center of attention. Here is the formula that features both ‘object’ and ‘background’ parts of attitude:

ATTITs,x,t = PSSs,t + ΔPSSs,background(t,t)

It is apparent from this formula that the bigger a ‘background’ part of an attitude is compared to its ‘object’ part, the less the object of attitude influences attitude itself and the more fully an attitude is determined by background factors that might have nothing to do with the attitude object. This means that attitude does not necessarily correspond to its object unequivocally, but can be swayed by extraneous influences. It is also obvious from this attitude formula that the influence of background on attitude corresponds to (or is congruent with) the sign and magnitude of the background: positive/negative ΔPSSbackground causes attitude to be more positive/negative and the greater the magnitude of |ΔPSSbackground| the more pronounced this effect. Now let us find a way to characterize the level of correspondence or congruency between attitude and its object more accurately.

Objectivity of attitude
It seems reasonable to consider an attitude to be absolutely or 100% objective toward its object when that object (X) is the only cause of the attitude (PSS) to the object and is 100% determined by its object. Consequently, I can define ‘objectivity’ of an attitude as a ratio of its ‘object’ part (ΔPSS\_object) to the attitude (PSS) as a whole:

\[
\text{ATTIT}_{k,x,t}^\text{objectivity} = \frac{\Delta PSS_{k,\text{object},x,t}}{\text{PSS}_{k,x,t}} = \frac{\Delta PSS_{k,\text{object},x,t}}{\Delta PSS_{k,\text{background},t} + \Delta PSS_{k,\text{background},t}}
\]

It makes sense to use this ratio for characterizing the degree of correspondence between attitude and its object, because the greater the object’s X part of attitude (ΔPSS\_object) is, the higher the objectivity of this attitude goes. According to this equation there are 2 extreme cases:

1. If \( \text{ATTIT}_{k,x,t}^\text{objectivity} = 1 \), 100% we have a perfectly objective attitude.

Objectivity of attitude equals to 1 or 100% if \( \Delta PSS_{k,\text{object},x,t} = \text{PSS}_{k,x,t} \). This can only happen if \( \Delta PSS_{k,\text{background},t} = 0 \), that is to say, if it does not exist:

\[
\text{ATTIT}_{k,x,t}^\text{objectivity} = \frac{\Delta PSS_{k,\text{object},x,t}}{\text{PSS}_{k,x,t}} = \frac{\Delta PSS_{k,\text{object},x,t}}{\Delta PSS_{k,\text{background},t} + \Delta PSS_{k,\text{background},t}}
\]

Only in this case is attitude perfectly correspondent to its object in the above-defined sense.

2. If \( \text{ATTIT}_{k,x,t}^\text{objectivity} = 0 \), we have a totally unobjective attitude.

Objectivity of attitude is equal to 0 if \( \Delta PSS_{k,\text{object},x,t} = 0 \). This can only happen if attitude’s object X doesn’t affect PSS, at all, i.e., \( \Delta PSS_{k,\text{object},x,t} = 0 \).

\[
\text{ATTIT}_{k,x,t} = \text{PSS}_{k,x,t} = \frac{\Delta PSS_{k,\text{object},x,t} + \Delta PSS_{k,\text{background},t}}{\Delta PSS_{k,\text{background},t}} = \frac{0 + \Delta PSS_{k,\text{background},t}}{\Delta PSS_{k,\text{background},t}} = \Delta PSS_{k,\text{background},t}
\]

In this case attitude is 100% determined by the \( \Delta PSS_{k,\text{background},t} \) of the attitude background. The object of an attitude doesn’t influence the attitude at all, it is 100% ‘projected’ on the object. Only an attitude such as this is absolutely ‘unobjective’ in the above-defined sense. A subject comes pretty close to this, in cases well known to everybody as when one ‘punishes’ innocent objects or subjects, breaking dishes, harming furniture, assaulting whomever or whatever comes into the center of attention. Both of the above extreme cases hardly ever take place in reality; these simply represent the upper and lower limits of objectivity for an attitude.

**Inductivity of attitude**

In order to better describe the dynamics of objectivity for an attitude between these limits of objectivity it helps to introduce an additional, separate characteristic for the background of an attitude. This influence of the background on an attitude can be characterized by the ratio of the background part (ΔPSS\_background) to the attitude as a whole. This ratio can be designated as the ‘inductivity’ of attitude.

\[
\text{ATTIT}_{k,x,t}^\text{inductivity} = \frac{\Delta PSS_{k,\text{background},t}}{\text{PSS}_{k,x,t}} = \frac{\Delta PSS_{k,\text{background},t}}{\Delta PSS_{k,\text{object},x,t} + \Delta PSS_{k,\text{background},t}}
\]

It is apparent from this formula that the greater the background part of an attitude (ΔPSS\_background) is, the higher the inductivity of the attitude is and the lower its objectivity. A totally unobjective attitude is completely inductive and the reverse holds true as well.

**Objectivity versus Inductivity**

There are 2 basic qualities of an attitude’s objectivity and inductivity.

1. A sum of objectivity and inductivity of an attitude is always equal to 1 or 100%.

\[
\text{ATTIT}_{k,x,t} = \text{ATTIT}_{k,x,t}^\text{objectivity} + \text{ATTIT}_{k,x,t}^\text{inductivity} = \frac{\Delta PSS_{k,\text{background},t}}{\text{PSS}_{k,x,t}} + \frac{\Delta PSS_{k,\text{object},x,t}}{\text{PSS}_{k,x,t}} = \frac{\Delta PSS_{k,\text{background},t} + \Delta PSS_{k,\text{object},x,t}}{\text{PSS}_{k,x,t}} = \frac{\Delta PSS_{k,\text{background},t} + \text{PSS}_{k,\text{object},x,t}}{\text{PSS}_{k,x,t}} = 1
\]

2. The higher the level of objectivity for an attitude toward its object, the lower its inductivity and vice versa. This simply means that the more the object of an attitude defines its character, the less that is left for other influences.

**Two specific inductivity factors: mood and ‘accessible’ attitude**

There are two well-researched and experimentally proven psychological phenomena that can be explained as specific types of inductivity. These are called ‘mood-congruent perception’ and an ‘accessible attitude bias’. The same phenomenon is also called “emotional congruence” (see “Emotional Congruence in Social Judgment and Perception or Categorization”, DeLancey, 190 - 195). The following analysis will show how our formula for attitude is applied to these cases. Mood as an inductivity factor. Mood-Congruent Perception and Judgment. Speaking about the Mood-Congruent Perception and Judgment, Morris (1999) wrote,

“The possibility that our evaluative reactions to objects, events, other people, and even ourselves might be influenced by moods has attracted enormous attention. At risk of prematurely ‘letting the cat out of the bag,’ I can say that the data here are broadly supportive of mood congruence” (p. 174).

One explanation of it according to Morris is “… that feeling states, including moods, are often consulted directly as means of making an evaluative judgment” (p. 174).

Psychology and psychiatry as well as folk psychology know that mood sways the positivity/negativity of
attitudes in its own direction, ‘coloring’ everything perceived. Though there are ‘disagreements over what moods are’ (Morris, p. 171) it is clear enough that moods belong to what this work refers to as the ‘background’ part of an attitude. There are three reasons for this:

1. Moods certainly carry hedonic tone, possessing the quality of P/U. They can be good or bad, positive or negative, elated or depressed, and these distinctions correspond to that basic division between pleasant and unpleasant (Ruckmick, 1936). Hence, mood characterizes a level of P or ‘hedonic tone’, and therefore has to be a part of PSS which combines all hedonic or P/U components of the state of a subject.

2. More specifically, the P/U of a mood is carried by emotion. This follows the traditional trend toward understanding ‘mood as an attenuated form of emotion’ (Morris, p. 170).

3. Mood is more or less a lasting emotional state. This is a feature of mood upon which most researchers converge. This is important because it means that mood is not object specific – it usually lasts through perception of many objects and in doing so belongs to the ‘background’ part of attitude, rather than to its ‘object’ part.

It is sufficient for this analysis to conclude that mood is an emotional state usually belonging to the attitude background. For that reason mood should affect attitude basically in the same way as any other background factor. Mood is an emotional state and as such affects background PSS because PES is a part of PSS. There are, however, two aspects of ‘normal’ mood that are specific to mood and affect attitude somewhat differently:

1. mood’s typically low hedonic tone;
2. mood’s comparative longevity and uniformity.

Mood’s low hedonic intensity makes it ‘transparent’ or ‘invisible’ to some extent for the mood’s subject. It allows mood to ‘sneak up’ on its subject to some degree unnoticed. Due to mood’s comparative longevity and uniformity it usually lasts through the perception of many objects affecting (‘coloring’) them similarly, in a ‘batch’ mode.

Mood is a part of PES that is a component of the background PSS. Therefore, when \( \Delta \text{PSS}_{s,\text{background}} \) is affected by mood in changing PES, there are at least two parts of \( \Delta \text{PSS}_{s,\text{background}} \) that can be distinguished – a ‘mood’ part \( \Delta \text{PSS}_{s,\text{background}} \), and an ‘other’ part \( \Delta \text{PSS}_{s,\text{background}} \). This means that, in a ‘batch’ mode, a mood will last as long as the mood itself, and mood affects attitudes toward all objects perceived during this time in a similar way, consistent with mood’s sign and magnitude. For example, in the case of ‘mood swings’ of enormous magnitude that are typical for clinical mania and depression, \( \Delta \text{PSS}_{s,\text{background}} \) overrides all other components of PSS, and determines the positivity or negativity (P/U) of attitudes toward everything perceived - toward any object x including a subject her/himself:

- if \( |\Delta \text{PSS}_{s,\text{background}}| >> |\Delta \text{PSS}_{s,\text{object}}| + \Delta \text{PSS}_{s,\text{background}} \) then ATTIT \( _{s,x} = \Delta \text{PSS}_{s,\text{object}} + \Delta \text{PSS}_{s,\text{background}} \) if |\( \Delta \text{PSS}_{s,\text{background}} \) | > 0, will make attitude more positive to a degree proportional to its magnitude \( |\Delta \text{PSS}_{s,\text{background}}| \), i.e., the greater it is the more positive the attitude;

- if \( |\Delta \text{PSS}_{s,\text{background}}| < 0 \), will make attitude more negative to a degree proportional to its magnitude.

This converges with the way Schwarz (2000) describes “mood-congruent evaluations” when he summarized “… a large body of theorising and research documents, …”. He described it as follows, Second, individuals may use their apparent affective response to a target as a basis of judgment, essentially asking themselves: “How do I feel about this?” Because it is difficult to distinguish one’s pre-existing feelings from one’s response to the target at hand, individuals are likely to evaluate about a target more positively when they are in a happy rather than sad mood” (p. 433-434).

The positive/negative effect of a positive/negative mood will last as long as the mood itself, and mood affects attitudes toward all objects perceived during this time in a similar way, consistent with mood’s sign and magnitude. For example, in the case of ‘mood swings’ of enormous magnitude that are typical for clinical mania and depression, \( \Delta \text{PSS}_{s,\text{background}} \) overrides all other components of PSS, and determines the positivity or negativity (P/U) of attitudes toward everything perceived - toward any object x including a subject her/himself:

- if \( |\Delta \text{PSS}_{s,\text{background}}| >> |\Delta \text{PSS}_{s,\text{object}}| + \Delta \text{PSS}_{s,\text{background}} \) then ATTIT \( _{s,x} = \Delta \text{PSS}_{s,\text{object}} + \Delta \text{PSS}_{s,\text{background}} \) if |\( \Delta \text{PSS}_{s,\text{background}} \) | > 0, will make attitude more positive to a degree proportional to its magnitude;

- if \( |\Delta \text{PSS}_{s,\text{background}}| < 0 \), will make attitude more negative to a degree proportional to its magnitude.

The above analysis demonstrates that our formula for attitude correctly describes some main features of Mood-Congruent Perception.

‘Accessible’ attitude as an inductivity factor:
Attitude Congruent Bias, its benefits and costs

In the previous section we divided $\Delta PSS_{\text{object }, t}$ into ‘mood’ and ‘other than mood’ parts in order to analyze the influence of mood on attitude.

$$\Delta \text{ATTIT}_{x,t} = \text{PSS}_{x,t} - \Delta \text{PSS}_{x,\text{object }, x,t} - \Delta \text{PSS}_{x,\text{background }, t}$$

Now let us dissect $\Delta \text{PSS}_{x,\text{object }, x,t}$ and analyze the roles of two of its components in the formation of attitude. There are two parts of the $\Delta \text{PSS}_{x,\text{object }, x}$ that can be distinguished:

1. The ‘new’ or ‘current’ part determined by the immediate perception of the object itself
   
   $$\Delta \text{ATTIT}_{x,t} = \text{PSS}_{x,t} - \Delta \text{PSS}_{x,\text{object }, x,t} - \Delta \text{PSS}_{x,\text{background }, t} = \Delta \text{PSS}_{x,\text{current }, t}$$

2. ‘Old’ or hedonic memory part of PSS ($\Delta \text{PSS}_{x,\text{current }}$) formed by the P-memories of previous experiences associated with the current attitude’s object that are retrieved at the time of perception. Simply speaking, this is a hedonic memory associated with an object of an attitude.

$$\Delta \text{ATTIT}_{x,t} = \text{PSS}_{x,t} - \Delta \text{PSS}_{x,\text{object }, x,t} - \Delta \text{PSS}_{x,\text{background }, t}$$

The following reasons suggest that the latter, hedonic memory or ‘old’ part of the attitude object’s influence on PSS ($\Delta \text{PSS}_{\text{object }, x}$) is much the same as what contemporary attitude psychologists (Olson, et al., 2000) call an ‘accessible attitude’, where ‘accessible’ means from memory:

- They are both involved in the process of orientation.
- They both have a strong hedonic aspect.
- Fazio writes about the hedonic aspect of the accessible attitude throughout his article. For example, “… accessible attitudes alert the individual to the presence of objects that have, for that individual, the potential for hedonic consequences. Recognizing its hedonic significance, the individual is now prepared to either approach or avoid the object, whichever is more appropriate given the valence of the activated attitude” (Ibid. p. 14).

PSS itself represents what Fazio calls ‘hedonic significance’. $\Delta \text{PSS}_{\text{object }, x}$ is the ‘hedonic significance’ of an attitude object in memory, and when it is retrieved/revived by memory it embodies the object’s potential for hedonic consequence.

- They are both involved in the process of orientation.
- Fazio also writes extensively about the orientational aspect of accessible attitudes throughout this article. For example, “… the mere possession of any attitude is useful to the individual in terms of orienting him or her to the object in question” (p. 3, also see pp. 1, 2, 8, 9, 14, 33). This corresponds to the orientational quality of positive/negative acceptability carried by PSS and ‘assigned’ to the object in the process of attitude formation.

The above mentioned reasons show that the meanings of $\Delta \text{PSS}_{\text{object }, x}$ and accessible attitude do converge. This allows us to replace the ‘old’ or memory part for attitude ($\Delta \text{PSS}_{\text{object }, x}$) in the formula for attitude with the ‘accessible attitude’ part ($\Delta \text{ATTIT}_{\text{accessible}}$):

$$\Delta \text{ATTIT}_{x,t} = \text{PSS}_{x,t} - \Delta \text{PSS}_{x,\text{object }, x,t} - \Delta \text{PSS}_{x,\text{background }, t} = \Delta \text{PSS}_{x,\text{current }, t}$$

This formula shows that all 3 components can equally influence attitude toward the object, i.e. P-memories ($\Delta \text{ATTIT}_{\text{accessible}}$) associated with the attitude object can influence attitude in the same way as a background PSS and current interaction with this object.

To simplify analysis at this point we will ignore influence of the background ($\Delta \text{PSS}_{x,\text{background }, t}$) that has already been scrutinized. We will consider it to be equal to zero, so it can be eliminated from the formula. Then,

$$\Delta \text{ATTIT}_{x,t} = \text{PSS}_{x,t} - \Delta \text{PSS}_{x,\text{object }, x,t} =$$

$$= \Delta \text{PSS}_{x,\text{current }} + \Delta \text{ATTIT}_{\text{current }} + \Delta \text{ATTIT}_{\text{accessible }} =$$

$$= \Delta \text{ATTIT}_{\text{new }} + \Delta \text{ATTIT}_{\text{old }}$$
The formula above clearly shows that current or ‘new’ interactions and previous or ‘old’ ones accessible from memory are equal players in the formation of attitude. The last expression highlights ‘new’ and ‘old’ influences affecting attitude. The right side factors of the four last equations above represent the bias of attitude by previous hedonic experiences associated with the attitude object that are stored in memory, while the left side factors represent the current hedonic influence of the object on attitude.

Attitude consistent bias obviously characterizes the status quo or an inert quality of attitude that increases together with the strength of the hedonic memories associated with the attitude object and with accessibility of attitude from memory. This follows from the formula above and converges with those numerous experiments on the attitude bias (see “Why We Evaluate”, 2000). According to Fazio (2000), “Attitudinally biased processing helps maintain the individual’s attitudes and thus maintains a consistent view of objects in social world” (p. 25).

Accessible attitude or hedonic memories are activated automatically and immediately so that an ‘old’ part of an attitude comes to play its role in attitude formation at once. This reaction speed and effortlessness are invaluable when an object has to be evaluated quickly. It is beneficial for the objectivity of an attitude, for the adequacy of the attitude in regard to its object as long as the ‘old’ and ‘new’ parts of attitude carry the same signs, meaning that both must be either positive or negative.

Fazio also points to the ‘costs’ or negative effect of this mechanism in any case where an attitude object has changed since the last encounter with it. This corresponds to the ‘old’ and ‘new’ parts of our formula having different, opposite signs. In this case revived hedonic experiences reduce the adequacy of the formed attitude toward its object because, to some extent the revived hedonic experiences cancel out the actual experience. Using the terminology introduced above in this chapter, this means bringing down the attitude by previous hedonic experiences associated with the attitude object that are stored in memory. This follows from the formula above and converges with those numerous experiments on the attitude bias (see “Why We Evaluate”, 2000). According to Fazio (2000), “Attitudinally biased processing helps maintain the individual’s attitudes and thus maintains a consistent view of objects in social world” (p. 25).

A direction for further analysis of attitude

The above analysis of attitude has been done on the most general level, without consideration of the differences between those numerous types of attitude objects and the diverse factors involved in the formation of attitude. What differences are noted when the central phenomenon or the attitude object is but a thought? What place has intuition in this process? How do emotions, will, discursive reasoning, and intuition interact in the process of the attitude formation? These are many questions that have not been addressed thus far.

Formation of attitude toward a thought. Description of approach

I will attempt to apply the general theory of attitude drafted above to explain orientation toward thoughts – that is acceptance, rejection or indifference toward them. The basic strategy is to extend my general theory of attitude to include thoughts among the specific types of attitude objects in a universal mechanism of orientation, rather than consider them objects of a special mechanism of orientation that applies to thought only.

Let me here state some reasons for this approach: first of all, it is my conviction that it is more than an inclination but a duty for any theorist to expand and detail theory as much as is possible. There are also other, more objective reasons:

1) There's evidence of this orientation toward thoughts;
2) There’s an alleged logic for an evolving mechanism of orientation;
3) There’s a lack of evidence for a special, separate mechanism for orientation toward thoughts.

The fact of orientation to thoughts. Defining ‘right’ and ‘wrong’.

The fact of the matter is that a subject experiences positive, negative or neutral orientation or attitude toward the elements of thought processes like ideas, beliefs, statements or conclusions just as one does toward any other experience - some are accepted, some are rejected and others are ignored. As Aristotle (1993 edition) said, “What affirmation and negation are in the realm of thought, pursuit and avoidance are in the realm of desire” (pp. 147-148).

Evaluation and choice are unavoidable aspects of the process of thinking. Damasio (1994) wrote about the choice aspect of reasoning.

“It is perhaps accurate to say that the purpose of reasoning is deciding and that the essence of deciding is selecting an option, that is, choosing a nonverbal action, a word, a sentence, or some combination
thereof, among the many possible at the moment in connection with a given situation. Reasoning and deciding are interwoven that they are often used interchangeably. Johnson-Laird captured the tight interconnection in the form of saying: "In order to decide, judge; in order to judge, reason; in order to reason, decide (what to reason about)" (pp. 163, 164).

The types of orientation are always the same - positive, negative or indifferent. However, the same orientation to different types of phenomena can be described in different terms. For example, a positive orientation or attitude toward an activity is often characterized by using the specialized term ‘interest’ but it can also be described in more general terms, declaring that interesting activity to be a likable one, something the subject likes, loves or enjoys.

For our purposes, my proposal here is that a positive/negative orientation or attitude toward a thought be called belief/disbelief and that a thought being accepted/rejected be labeled as right/wrong or as a true/false one. The belief/disbelief (or right/wrong, true/false thought or idea) of a subject can be defined as a statement or system of statements that a subject accepts/rejects or, in the terminology of this work, experiences positive/negative orientation or attitude toward it, that is, it possesses +/- acceptability for this subject. Comprehending belief as attitude isn’t something new for modern philosophy. Contemporary philosophy studies beliefs, often calling them ‘propositional attitudes’ and uses them to explain human choice and actions (Donogan, 1987). But as Dennett (1987) points out, ". . . there is no stable and received interpretation of that (propositional attitude - AJO) technical term" (p. 117).

Belief/disbelief as a positive/negative verbalized attitude

I have not been able to see a clear distinction between the common usage of the words ‘attitude’ and ‘belief’. We tend to use the term positive/negative attitude more when speaking of an act of acceptance/rejection that is not openly verbalized, and to use the term belief/disbelief more when speaking about an act of acceptance/rejection that is openly verbalized, that is, speaking of attitudes that are spelled out.

Using these terms as they are defined in this work will be a bit different. From this point of view, belief and attitude are both attitudinal by nature, belief is just a specific type of attitude with a thought as an object; that said, all beliefs are attitudes but not all attitudes are beliefs. In this sense, belief is a verbalized attitude; positive/negative verbalized attitude can be called belief/disbelief. There can be attitudes without verbalization and these attitudes are not beliefs. Animals (and human infants) can only have attitudes but not beliefs. They experience attitudes but they do not have beliefs because they are not capable of verbal expression and rationalization of their attitudes. To the contrary, there can be no belief that is not an attitude. If one truly believes in one’s heart then at times, one doesn’t believe one’s own eyes if it’s emotionally unacceptable.

The alleged logic of an evolving mechanism of orientation.

The ability to think was developed in the later stages of biological evolution. This happened together with formation of a ‘new’ or ‘outer’ brain - the neocortex that is considered to be in charge of thinking. At that time when ancient humans started to develop the ability to think, they already possessed a very old, mature and efficient mechanism of pre-human, animal orientation. It makes sense to believe that this mechanism of orientation was utilized in dealing with any new type of phenomena, rather than that an entirely new different one was developed exclusively for thoughts. Damasio wrote (1994),

“The apparatus of rationality, traditionally presumed to be neocortical, does not seem to work without that of biological regulation, traditionally presumed to be subcortical. Nature appears to have built the apparatus of rationality not just on top of the apparatus of biological regulation, but also from it and with it. The mechanisms for behavior beyond drives and instincts use, I believe, both the upstairs and the downstairs: the neocortex becomes engaged along with the older brain core, and rationality results from their concerted active" (p. 128).

According to Perlovsky (2001),

“The mathematics of instincts and lower emotions is essentially the same as for the “higher” intellectual processes. And the reason is simple: the latter capability evolved on top of the former. Instincts and lower emotions operate with simpler models than thinking, but the basic mechanism is the same” (pp. 368-369).

My suggestion here is that a subject’s orientation or formation of attitude toward thoughts is evidence that makes a case for orientation to thoughts as specific ‘objects’, and thus the same laws as apply to any other phenomena rule this orientation. If this is true then the general principles and features of an attitude that were examined above would be applicable to the orientation to thoughts. These would be applied to thoughts as follows:
a) a thought in the center of attention of a subject is the object of the attitude toward it;
b) an attitude toward a thought in the center of attention of a subject is determined by synchronous PSS;
c) an attitude toward a thought possesses all the general qualities of attitude that have been described here above, i.e. bipolarity, integrativity, etc..

**The object of an attitude toward thought**

The object of an attitude toward a thought is, of course, the thought itself. Thoughts, ideas, believes, statements, judgments, conclusions, etc. usually exist for the perceiving subject in the form of languages, either audio impressions such as speech or internal listening or visual images such as writing or sign language. Such impressions or images are the form and fabric for the existence of thoughts. Therefore, thinking can be viewed as a special kind of processing for those particular types of audio and visual images perceived by a subject through the remote senses. Searle (1983) wrote,

"Since sentences - the sounds that come out of one's mouth or the marks that one makes on paper - are, considered in one way, just objects in the world like any other objects, their capacity to represent is not intrinsic but is derived from the Intentionality of the mind" (p. vii).

**Attitude toward thought**

Orientation to the remote senses and their audio and visual imagery has already been discussed in general in the first chapter. It has been established there that they do not possess their own P-Acceptability like the contact or inner senses and the emotions, and that their P-Acceptability is usually mediated by PES (Pleasantness of Emotional State).

A general logic for the formation of attitude has been formulated in this chapter. Simply stated it says that for an attitude of a subject S to a phenomenon X in the center of the subject’s attention at a given time t (ATTIT<sub>s,x,t</sub>), acceptability-pleasantness of this phenomenon (P<sub>s,x,t</sub>) or orientation to it is determined by PSS at that time t (PSS<sub>t</sub>). So,

\[
\text{ATTIT}_{s,x,t} = \text{P}_{s,x,t} = \text{PSS}_t
\]

Application of this formulaic logic to the formation of attitude toward thoughts means that orientation to a thought in the center of attention of a subject is determined by simultaneous PSS and first of all by the PES (Pleasantness of the Emotional State) component of PSS. I will endeavor to prove that this principle is both necessary and sufficient for an explanation of orientation to or an attitude toward a thought.

**Necessity and sufficiency of the Principle of Synchronicity**

Necessity of orientation or attitude toward a thought in the center of attention of a subject is to be determined by a synchronous PSS and is dictated by the general understanding of what PSS is. At any given moment PSS is an accumulation of all the factors orienting a subject. Everything possible that can currently affect that subject’s orientation to what that subject perceives in the moment belongs to the current PSS by definition. There is simply nothing beyond PSS that can affect a subject’s orientation by itself, such as PSS does. That’s why in the previous chapter I came to the conclusion that any influence on the orientation of the subject has to be carried out through the influence of PSS. The current PSS determines the current orientation. If the object of that current orientation happens to be a thought in the center of attention of a subject, then orientation to this thought must be determined by a synchronous PSS.

The idea here is that orientation toward thought, its acceptance/rejection as right/wrong is guided by the subject’s emotions associated with that thought. At first glance it seems to contradict the common belief that such orientation is a result of logical thinking or discursive reasoning. However, this point of view does not insist on the exclusive function of discursive reasoning in the formation of judgments. It is widely accepted that both the rational and the emotional, mind and feeling, that is, both belief and desire all participate and often compete or struggle in this process for formation of a judgment and the following actions. A number of modern theories of action have been analyzed by Schueler (1995) as belief/desire theories. The role of emotion, at least as a secondary factor in the generation of a judgment can not be ignored. There are however, factors that indicate a primary role as well. Hume (1739/1964) had a very strong opinion about this,

"we speak not strictly and philosophically when we talk of the combat of passion and reason. Reason is, and ought only to be, the slave of the passions, and can never pretend to any other office than to serve and obey them" (Treatise, bk. 2, pt. 3, sec. 3, p. 415, 1964 edition).

The sufficiency of the Principle of Synchronicity in the explanation of this orientation toward thoughts is reinforced by the evidence for the existence of intuition. Let’s step back for a moment and talk about the intuitive versus the rational in general. As stated above, there are various factors involved in the formation of...
an attitude or orientation. The two major players are 'mind' and 'feeling' - rational and emotional elements that are often said to 'struggle' with each other in the process of forming an attitude and its implementation through action.

Depending on the presence/absence and degree of participation of these elements in attitude formation, there seems to be a tendency to label the resulting attitude differently and to lend different attributes to it. An attitude, belief or judgment created with no or minimal participation of the 'mind' or discursive reasoning is often referred to as 'intuitive' attitude, belief or judgment. An attitude, belief or judgment created with considerable involvement of the mind in the form of discursive reasoning is often called a 'rational' attitude, belief or judgment. From this point of view, intuition can be defined as the ability to form an attitude, belief or judgment without discursive reasoning; an intuitive belief or judgment is one formed without discursive reasoning. According to this definition, all the attitudes of animals and human infants, incapable of discursive reasoning that is impossible without language, are intuitive. After years of digesting numerous rulings and casework, the judgment of an expert comes back to this more simple form of immediate judgment without reasoning. After a while, these experts just 'feel' what's the case, whether right or wrong. According to Dreyfus (1986),

"A vast area exists between irrational and rational that might be called arational. The word rational, deriving from the Latin word ratio, meaning to recon or calculate, has come to be equivalent to calculative thought and so carries with it the connotation of "combining component parts to obtain a whole": arational behavior, then, refers to action without conscious analytic decomposition and recombination. Competent performance is rational; proficiency is transitional, experts act arationally" (p. 36).

Understanding the 'arationality' of expertise makes it less surprising that experts are often unable to formulate the 'rules' they follow. Dreyfus (1986) points out that the history of attempting to extract various expert's knowledge goes at least as far back as Socrates, referring to one of the earliest dialogues of Plato, The Euthyphro,

"Throughout the dialogue Socrates persists in interrogating Euthyphro about his rules, but although Euthyphro claims he knows how to tell pious acts from impious ones, he can not state the rules that generate his judgments. Socrates encountered the same problem with craftsmen, poets, and even statesmen. None could articulate the principles on which he acted. Socrates concluded that no one knew anything - including Socrates, who at least knew his own ignorance" (p. 105).

The knowledge engineers of this century have encountered the same difficulties as Socrates in their attempts to extract various expert's knowledge in order to build so called 'expert systems'.

One plausible explanation of the nature and formation of intuitive judgment is that it is guided by the emotional memories of numerous 'rights' and 'wrongs' experienced in similar situations and revived in the current one. The thing to understand here is that judgments about 'right' and 'wrong' are emotional experiences too. This is quite clear in the case of moral judgments about 'right' and 'wrong', or 'good' and 'bad'. The very existence of intuition suggests that a thought can be accepted/rejected and beheld as a belief/disbelief, right/wrong, or truth/falsehood with or without reasoning. This type of attitude, orientation or judgment is labeled 'intuitive' and its psychological agent 'intuition'. A subject experiencing and expressing an intuitive judgment 'simply feels' what's right and wrong, correct or mistaken. These feelings are often specified as an emotionally positive/negative feeling of confidence (certainty) or doubtfulness (uncertainty). Very strong positive feelings of this sort are specially designated as 'insight'. There are numerous descriptions of insight as experienced by heavy users of discursive reasoning such as scientists, as noted, for example, in Nalchadzhpi/Ean (1972).

According to Perlovsky (2001), "There are well-known statements by famous scientists explaining that the first and foremost test of a scientific theory is its beauty" (p. 367).

The mere fact of the existence of intuition shows that the orientation or formation of an attitude toward a thought as being a right/wrong one that is, belief/disbelief does not necessarily require reasoning and in fact can be purely emotional; it need not to involve reasoning at all. People will believe/disbelieve something not because it was logically proved to them, but because they were brought up that way or because a force of authority, parental or otherwise mandated it to them. This is how moral, ethical and religious principles are initially embedded in the minds of people. They do not have to be (and often can not be) logically proved. Brainwashing is a possibility because logical proof is not a requirement for the formation of opinion or its deformation. An emotional association is more than sufficient, as the art and science of advertising proves.

Anthropology has shown us that the same principles can be moral or immoral at the same time in different places (geographically or socially), or in the same
place at different times (historically). A sufficient requirement for the generation of positive/negative attitude is its emotional (I should say - hedonic) charging, the formation of an association with a positive/negative hedonic (usually emotional) factor connected to the attitude object, one way or another. Thinking is in the second stage as an element of attitude formation. Of course, thinking brings an extraordinary associative power and complexity to the process of attitude formation, but it also brings with it vast possibilities for logical mistakes to be made. This converges with the Social Intuitionist Model of moral judgment (Haidt, 2001).

The general qualities of attitude (bipolarity, integrativity, etc.) have been laid out in this chapter. What follows is a brief description of these qualities of an attitude toward a thought or belief.

**Bipolarity of an attitude toward thought or belief**

According to the two polar signs of P-Acceptability and PSS there are two basic polar characters of attitudes to thoughts - positive and negative, they are designated as belief/disbelief, right/wrong or true/false thought, idea, etc.

**Integrative quality of an attitude toward a thought/belief**

There are multiple influences determining acceptance or rejection of a thought by a subject. In “An Essay Concerning Human Understanding” Locke (1690/1993) pointed out various causes of error, only one of which involves discursive reasoning or ‘probability’ in Locke terminology; two of the four named causes of error are “predominant passions or inclinations” and an “authority”. It is evident from the following passage that Locke considered these various factors to act in accord to determine acceptance or rejection of a thought, belief or disbelief, and determining it right or wrong:

12. III. "Predominant passions. Probabilities which cross men’s appetites and prevailing passions run the same fate. Let ever so much probability hang on one side of a covetous man’s reasoning, and money on the other; it is easy to foresee which will outweigh. Earthly minds, like mud walls, resist the strongest batteries: and though, perhaps, sometimes the force of a clear argument may make some impression, yet they nevertheless stand firm, and keep out the enemy, truth, that would captivate or disturb them. Tell a man passionately in love that he is jilted; bring a score of witnesses of the falsehood of his mistress, it is ten to one but three kind words of hers shall invalidate all their testimonies. Quod volumus, facile credimus; what suits our wishes, is forwardly believed, is, I suppose, what every one hath more than once experimented: and though men cannot always openly gainsay or resist the force of manifest probabilities that make against them, yet yield they not to the argument” (Book 4: Chapter 20 Of Wrong Assent, or Error, Edit 6).

**Universality of attitude toward thought or belief**

The same individual (a) can experience the same attitude toward a totally different phenomena (X and Y) because the same PSS can accompany different objects. That’s why one can have believes/disbelieves about anything in the world.

**Subjectivity of attitude toward thought or belief**

Different individuals (a, b, ...) can experience unlike attitudes (ATTIT\textsubscript{a} ≠ ATTIT\textsubscript{b}) to the same phenomenon (x) because different attitude (PSS\textsubscript{a} ≠ PSS\textsubscript{b}) can be associated with the same object of attitude for different people

This is true for any type of an attitude, including attitude toward thought. As Locke (1690/1993) said:

"For there is nothing more common than contrariety of opinions; nothing more obvious than that one man wholly disbelieves what another only doubts of, and a third steadfastly believes and firmly adheres to” (Book IV: Chapter XX, Edit 6).

**Flexibility of attitude toward thought or belief**

It is also true that beliefs of the same subject about the same object change. The same individual (a) at different times can experience unlike attitudes to the same phenomenon (X), because a different attitude can correspond to the same object of an attitude at different times (t1 and t2).

ATTIT\textsubscript{a/t1} = PSS\textsubscript{1},
ATTIT\textsubscript{a/t2} = PSS\textsubscript{2},
if PSS\textsubscript{1} ≠ PSS\textsubscript{2} then ATTIT\textsubscript{a/t1} ≠ ATTIT\textsubscript{a/t2}

**Objectivity and inductivity of attitude toward thought or belief. Additional considerations**

What has been stated above regarding the objectivity and inductivity of attitude toward thought or belief. Additional considerations

There is much more to discuss about the interaction of the rational and the emotional as factors of normative judgment. How is a judgment of right or wrong formed during discursive reasoning? What is the psychological agent of acceptance/rejection or orientation in this case and how does it work?

Two of my previous conclusions are especially helpful in answering these questions. First of these is the PSS Lemma, stating that there are seven immediate orientational factors and that any orientation must be mediated by them. The further conclusion is that only
one of these five factors, namely emotion, can be a regular agent of orientation to the audio and visual images and, therefore, to thoughts. This said, what do emotions have to do with the process of discursive reasoning? Are emotions involved in this process and if so, how? Sloman (1990) wrote,

"If emotional states arise from mechanisms required for coping intelligently in a complex and rapidly changing world, this challenges the common separation of emotion and cognition. This applies equally to human beings, other animals, or intelligent machines to come" (p. 232).

In fact, there are special emotions involved in the process of thinking or generated thereby. These are sometimes called ‘intellectual' emotions. They are intimately connected with the logical qualities of thinking. They influence PSS or the attitudinal character toward a thought about to be or not to be believed. Perlovsky (2001), wrote

"If you pinch your finger, it hurts, and an ability to feel the pain is obviously an a priory faculty, which is necessary for survival to such an extent that it is shared within the entire animal kingdom. This “lower’ origin of feelings separates them from our higher cognitive abilities. And there is a long-standing line of thought that separates and contraposes feelings and thinking, emotions and intellect. But in 1787 in a letter to his friend, Kant wrote that he had discovered a new type of a priory principle, the feelings of pleasure and pain, which he found to be a necessary part of our intellect. Kant came to the conclusion that Judgment is based on the feeling of pleasure caused by the harmony or correspondence between our internal representations-concepts and empirical phenomena" (pp. 366-367).

There is no question that intellectual emotions affect orientation to the thoughts generating them. This is as certain here as is with any emotion in every case. The question is, whether there is another orientational factor besides emotion generated by the process of thinking? Moreover, is there a need for such an inquiry? It may be that the common belief that a judgment is the result of rational thinking or discursive reasoning is basically correct, but it may also be that it is the emotional result of this process that determines judgment.

The viewpoint to consider here is that rational or discursive process affects orientation just as it influences PSS - the same rule applies here as with any other process. How is this accomplished? Primarily by mediation of the intellectual emotions produced by the process of thinking. And what if these intellectual emotions are not just a ‘byproduct’ of the process but are the determining factor? This would explain how mind and emotion, interest and logic, reasoning and feeling can and do compete or ‘combat’ in Hume’s term for acceptance/rejection of a thought by leveling them each with the other, providing us with a common ground and/or denominator. According to Perlovsky (2001),

"Fusion of “lower” level functions (instincts) and "higher” level functions (pure knowledge) is of a basic origin, and therefore persists in our psyche. Often, it is quite difficult to separate “pure” thinking from “lower” emotions" (p. 369).

"Recognition and understanding are not “disinterested” but influenced by instinctual needs. Higher “emotional intellect” is related to high-value concepts that are capable of generating emotional signals, and, like instinct, can affect Judgment" (p. 370).

The suggestion here is that an ability to distinguish logically right from wrong is supported by emotions generated by discursive reasoning. It is not unlike an artist's ability to distinguish between the right/wrong color, or a musician's ability to sense a clear or false note, or the propensity one has for making a moral judgment. According to Hume (1739),

"Thus all probable reasoning is nothing but a species of sensation. 'Tis not solely in poetry and music, we must follow our taste and sentiment, but likewise in philosophy. When I am convinc'd of any principle, 'tis only an idea, which strikes more strongly upon me. When I give the preference to one set of arguments above another, I do nothing but decide from my feeling concerning the superiority of their influence (Treatise, bk. 1, pt. 3, sec. VIII.-OF the Causes of Belief" (1:399)).

So, what is it that guides an artist when s/he chooses a right color for the next brush stroke, or tells the musician that a note just played was right or wrong? What tells one that a deed is morally right or wrong? Is it not, primarily, an approving or disapproving feeling, often referred to as ‘taste'? A similar ‘OK' or ‘NOT OK' feeling variously called ‘common sense', 'intuition' or ‘vibes' appraise the thinker of the absence or presence of a mistake. According to Schönfeld (1995),

"[13] In the last analysis, therefore, Hume's description still seems to apply: value judgments are mere sentiments of approbation and disapprobation arising in our own breasts. Values come from us, and we attach them to the facts”

Poincare (1908) wrote,

"Discovery is discernment, selection" (p. 51).
Thus it is this special aesthetic sensibility that plays the part of the delicate sieve of which I spoke above, and this makes it sufficiently clear why the man who has it not will never be a real discoverer" (p. 60).

“What is it that gives us the feeling of elegance in a solution or a demonstration?” Briefly stated, the sentiment of mathematical elegance is nothing but the satisfaction due to some conformity between the solution we wish to discover and the necessities of our mind….. This aesthetic satisfaction is consequently connected with the economy of thought (pp. 30, 31).

Intuitive, emotional process never stops during discursive reasoning. Let’s take a look through the ‘microscope’ at one logical step. There are multiple possibilities for the further movement of thought in countless conceivable directions. My point here is that when a ‘logical’ one is selected, it is coherent with the previous direction, not contradicting previous steps. The unanswered question remains how this is done, what the selection criteria are? What tells a subject that this step is logical and that one is not? Does the subject apply the rules of formal logic to make a decision? In most cases the answer is no. To say ‘yes’ would be the equivalent of suggesting that as we speak we build our phrases explicitly by using the rules of grammar. This is just not the case. Speech becomes an intuitive process after one masters a language. Similarly, most people do not know the formal rules of logic including those scientists for whom it is the main tool of their trade. They are all guided by intuition and/or common sense. But what exactly is meant by common sense? What kind of sense is it, or, better yet, which is it among the few senses people possess?

A thinking person selects the next ‘logical’ step intuitively, just like an artist selects a color for the next brush stroke or one selects a shirt and tie to go with the jacket. A positive or negative feeling, the ‘aesthetic satisfaction’ or dissatisfaction of Poincare, the feeling of confidence or lack thereof, gives the green or red light. The stream of thoughts is kept in a channel (‘river bed’) of logic formed by the intellectual emotions (feelings) of confidence (certainty) and doubtfulness (uncertainty). Confidence supports movement and direction for the stream of thoughts while doubts slow it down or even stop it in its tracks demanding review of its direction.

The fact of the matter is that the ability to produce intellectual emotions is a very important feature of thinking and the stronger this ability, the sharper the mind. Logical thinking is an emotional process so mind is emotional. This is what Picard wrote about in her book "Affective Computing" (1997),

“This book is a call for a change in computing, a declaration that we have left a key term out of the computer intelligence equation, one which may have been omitted not because it is less important, but because it is so integral and subtle that it rested on our nose the whole time, where we remained unaware of it even when we saw the world through it. Affect is integral to human intelligent functioning, and it succeeds best when it does not draw attention to itself “(p. 250).

So, why is the role of emotion in the process of thinking missed or grossly undermined? The reason maybe that by the nature of this process, emotion is relegated to the periphery of the attention of the thinking subject. Similarly while driving, one is looking at the road and not at the steering wheel that controls the car’s movement. The object of desire, not the desire that drives a subject, claims the center of the subject’s attention. Likewise, a rational process is the center of attention for a thinker, not the intellectual emotions guiding it. Thoughts, not the emotions determining their acceptance or rejection remain in the center of attention. In the case of ‘pure’ intuition the ‘train’ of thought stops and without that ‘noise’ we more easily see the actual picture and the role of emotion as a factor guiding our judgment of right and wrong. Damasio (1994) wrote about this general ‘other side’ of attention, making note of its hiding rather than illuminating power that exists simply because where some are chosen there also are also some rejected, because the spotlight does not exist without a background.

*However, although many important choices involve feelings, a good number of our daily decisions apparently proceed without feelings. That does not mean that the evaluation that normally leads to a body state has not taken place; or that the body state or its vicarious surrogate has not been engaged; or that the regulatory dispositional machinery underlying the process has not been activated. Quite simply, a signal body state or its surrogate may have been activated but not been made the focus of attention. Without attention, neither will be part of consciousness, although either can be part of a covert action on the mechanisms that govern, without willful control, our appetitive (approach) or aversive (withdrawal) attitudes toward the world. While the hidden machinery underneath has been activated, our consciousness will never know it” (pp. 184,185).

A more detailed analysis of the mechanism for the generation of intellectual emotions is not possible at this time, because the key to understand these emotions of logical thinking relies on a third basic
principle (beyond the Hedonistic and Synchronicity principles) that is the subject of an additional part of this "Homo Hedonicus" that can not here be undertaken.

A Comparison Of Elements Of Choice. Desire and Need

Ambiguity in terms “desire”, “want” and their cognates

It’s hard to find a term more important to the explanation of human choice and action than ‘desire’. The question of why one does something is often answered: “Because I want to...”. According to Aristotle (1993 edition),

"Choice is the starting point of action: it is the source of motion but not the end for the sake of which we act, (i.e., the final cause). The starting point of choice, however, is desire and reasoning directed toward some end" (p. 148).

As Stampe (1987) declared, “Desire is the crux of the practical reasoning, and around it we turn” (p. 381).

Nonetheless, it is also true that there is no widely accepted definition of desire. In the 1995 book “Desire. Its role in Practical Reason and the Explanation of Action” Schueler “… focused on contemporary philosophers...” noting that “… the views I am criticizing suffer from a deep ambiguity in terms such as “desire”, “want” and their cognates” (p. 6). This is also true of the terms ‘need’ as well as ‘attitude’, ‘attention’, and ‘will’. It may be even more so of the correlations and connections between them. I must agree with Galperin(1976) that the root of the problem is that these concepts have been attacked separately, rather than systematically approached as aspects of a process of orientation. The level of ambiguity in understanding desire is such that the validity of the notion of desire is questioned or rather denied outright. DeLancey (2002) wrote,

"Since my concern in this book is with basic emotions and other motivational states, I will on several occasions discuss the inappropriateness of the philosopher’s notion of desire; it is hard to overestimate the harm that this notion has done to moral psychology, action theory, and other aspects of philosophy of mind” (p. ix).

… (for example, there are many kinds of motivational states, but no generic one corresponding to the philosophical notion of desire)... (p. ix).

Locke (1690/1824) defined desire as follows, “The uneasiness a man finds in himself upon the absence of anything whose present enjoyment carries the idea of delight with it, is that we call desire” (Book II, Chapter 20, Section 6). Locke defined desire by describing a contrast, lack or difference between internal states of “uneasiness” for the unsatisfied desire and “enjoyment” of its satisfaction, basically between the pain of the former and joy of the latter. In my understanding, Locke’s interpretation of desire is about this lack or gap, but it is, so to say, a ‘hedonic gap’ between the hedonic levels of the state in which the desiring subject is situated and where s/he would like to be. This hedonic gap or hedonic lack is a constant property of experiencing desire:

• it brings a sense of “lacking something” to the subjective experience of desire;
• it can be experienced in the presence as well as the absence of the desire’s object;
• it is independent of the infinite diversity of particular desire objects.

This is as true for the ‘low’ physiological desires as well as for the ‘highest’ psychological desires that would allow us to express our desire for action, power or sex metaphorically as ‘hunger’ or ‘thirst’. We understand quite clearly what being ‘power hungry’, or ‘hungry for you’ means. The hedonic gap is “the consequence of the lack of the object desired” that is sustained until that desire is satisfied.

This hedonic gap concept of desire connects with the fundamental hedonistic principle of PSS maximization in many ways:

• It allows any desire to be considered as an individual manifestation of the general desire to be happy, to maximize PSS;
• It views any object of any desire as a factor of PSS maximization;
• It accommodates a self-regulatory property of desire – a floating hedonic value for objects of desire that become more pleasant with dissatisfaction of desire and less pleasant upon satisfaction;
• It looks at desire satisfaction as a process of closing the hedonic gap that makes a subject happier.

This hedonic concept of desire will be further explored below.

PSS changes and their terminology

In the previous chapter on Attitude I looked at orientation or formation of an attitude toward a singled out phenomenon in the center of the subject’s attention. In the process of perception or imagination the attention of a subject moves amongst numerous phenomena. Consequently, attitudes with different
PSS are formed and this takes place over and over again with each consecutive stop at the center of attention. Let’s look closer look at what takes place when two consecutive evaluations are made and two attitudes are formed one after the other. The two objects of these attitudes or two phenomena following one another in the center of the subject’s attention will need be addressed as ‘first’/‘second’, number (n) and (n-1), ‘previous’/‘next’, ‘new’/‘old’, a ‘beginning’/‘end’.

One of the results of the movement of the center of attention from one phenomenon to another is a change of PSS. This takes place because:

1. The ‘new’ central phenomenon adjusts the PSS and
2. The ‘old’ phenomenon no longer affects the PSS anymore.

Generally speaking, varying degrees or levels of PSS correspond to perception or imagination of different phenomena. Therefore, every movement of the center of attention from one phenomenon to another alters a subject’s PSS, diminishing or enhancing one’s PSS, thus adjusting up or down from the PSS of a former level to the PSS of the present moment. In other words, any change of the attitude’s object or central phenomenon affects the process of maximization of PSS in a positive or negative way. Any new central phenomenon acts as a positive or negative factor of PSS maximization. From the hedonistic point of view that I am exploring here, no other characteristic of any phenomenon can be more important for Homo Hedonicus than this power of PSS maximization. This is because the effort for PSS maximization and thus for happiness, is the essence of Homo Hedonicus. At the very least, it is logical to expect that the characteristic of a phenomenon’s power of PSS maximization must be very significant and would be denoted by significant terms and expressions. It will be shown that the words ‘desire’, ‘want’, ‘wish’ and other such expressions are employed to refer to alterations of PSS as described above and that the desirability of a phenomenon is a characteristic of its current power of PSS maximization.

**Desire and the three types of PSS change**

A ‘new’ phenomenon that makes the center of attention of a subject can change the subject’s PSS in three possible ways:

1) in a positive direction,
2) in a negative direction, or
3) being neutral, makes little or no change in PSS.

These changes can easily be represented graphically. Later, these changes will be illustrated with simplified graphs but first, an elementary mathematics of any change will be briefly discussed.

A change of any variable Y (whether Y is a temperature, pressure, an account balance, or PSS) is represented by the difference (\( \Delta \)) between its values (\( \Delta Y \)) at the end of the change from its beginning

\[
\Delta Y = Y_{end} - Y_{t0}
\]

\( \Delta Y = 0 \) if \( Y_{end} = Y_{t0} \)

**Type 1 of the PSS change**

Appearance in the center of the subject’s attention of the phenomenon number 2 (or X) ‘causes’ or more accurately, is associated with a change of PSS in the positive direction from level 1 to level 2, or from \( PSS_{t0} \) to \( PSS_{t1} \). PSS level 1 \( (PSS_{t0}) \) corresponds to the previous phenomenon 1 that was in the center of attention at the time t1. PSS level 2 \( (PSS_{t1}) \) corresponds to the next phenomenon 2 in the center of attention at the time t2. The following graphs are, of course, very schematic.

**See Illustration 2**

The simple mathematics of this change can be expressed as follows:

\[
\Delta PSS_{t2} = PSS_{t2} - PSS_{t1} > 0 \quad (PSS_{t2} > PSS_{t1})
\]

or more generally,

\[
\Delta PSS_{t} = PSS_{tend} - PSS_{t0} > 0
\]

We know that \( PSS_{t} \) represents PSS experienced when phenomenon X is in the center of attention, and that \( PSS_{tend} \) determines an attitude toward X or P-Acceptability of X, \( P_{t} \). Therefore, this equation can be also written as follows,

\[
\Delta PSS_{t} = P_{tend} - P_{t0} > 0 \quad \text{or more generally,}
\]

\[
\Delta PSS_{tend} = ATTIT_{tend} - ATTIT_{t0} > 0
\]

\( ATTIT_{tend} > ATTIT_{t0} \), meaning that the attitude at the ‘end’ is more positive, than in the beginning.

The positive change of PSS \( (\Delta PSS_{t} > 0) \) experienced by a subject after a phenomenon X gets to the center of attention is usually described by this subject using the expressions ‘I want X’, ‘I (feel) desire (of) X’, and so forth. These expressions are sometimes used reluctantly in cases when the ‘new’ phenomenon X is a factor of PSS maximization \( (\Delta PSS_{t} > 0) \) but it is still unpleasant by itself \( (P_{t0} < 0) \), when

\[
\Delta PSS_{t} > 0
\]

\( P_{t0} < 0 \)

Though X is a factor of PSS maximization in these cases and can be accepted by a subject as the result of choice, it would be choosing the ‘lesser evil’. A subject often describes this as something s/he ‘ought to do’, ‘has to do’, rather than what s/he ‘really wants’ by and of itself. Don Locke (1982) called this "formal desire". These cases could be represented by the same kind of graph as the one above, but points 1 and
2 would be both located in the area of the negative PSS, under the horizontal axis of time T, the area of unhappiness. A preliminary conclusion at this point is that the phenomenon X is usually called desirable if:

1. Perception/imagination of X creates (is associated with) a maximization (rise or positive change) of PSS \( \Delta PSS > 0 \) and
2. An attitude toward X is positive after this PSS change has happened, i.e. X is perceived as being pleasant

\[ \Delta PSS > 0 \quad (1) \]

\[ P_{\text{end}} > 0 \quad (2) \]

Phenomenon X is sometimes called desirable even if the second condition is not satisfied but the first one is considered necessary though not always sufficient. \( \Delta PSS > 0 \) is what is usually referred to as a ‘desire’ of X. The expression ‘desire for X’ characterizes ‘X’ as a factor of PSS rise or PSS maximization. We will return to this later in our discussion of ‘Desire and Attitude’. This case will be remembered as a situation when \( \Delta PSS > 0 \) (desire for X is positive) and \( ATTIT_{\text{end}} < 0 \) (attitude toward X is negative).

Type 2 of the PSS change

The appearance in the center of the subject’s attention of the phenomenon number 2 (or X) ‘causes’ or more accurately is ‘associated with’ a change of PSS in the negative direction from the level 1 to the level 2, or from \( PSS_{\text{hyp}} \) to \( PSS_{\text{end}} \). PSS level 1 (\( PSS_{\text{hyp}} \)) corresponds to the previous phenomenon 1 that was in the center of attention at the time t1. PSS level 2 (\( PSS_{\text{end}} \)) corresponds to the next phenomenon 2 in the center of attention at the time t2.

See Illustration 3

The simple mathematics of this change is the same as in Type #1, except for the negative sign of \( \Delta PSS \):

\[ \Delta PSS = PSS_{\text{end}} - PSS_{\text{hyp}} < 0 \] or, in more general form,

\[ \Delta PSS = P_{\text{end}} - P_{\text{hyp}} < 0 \]

\[ \Delta PSS = ATTIT_{\text{end}} - ATTIT_{\text{hyp}} < 0 \]

\[ ATTIT_{\text{end}} < ATTIT_{\text{hyp}} \] meaning that the ‘end’ attitude is more negative, then the ‘beginning’ attitude.

Type 3 of the PSS change

A perception of the phenomenon X (2 on the graph below) is not associated with change in PSS, that continues to stay at level 1. Tx is the time when X gets to the center of attention of the subject.

See Illustration 4

\[ \Delta PSS = PSS_{\text{end}} - PSS_{\text{hyp}} = 0 \]

When X does not bring about PSS changes in either direction, there is zero or ‘no change’ of PSS associated with X, \( \Delta PSS = 0 \). This is usually spoken of by a subject using the same statements as were used for the negative type of PSS change: ‘I don’t want X’, ‘I’ve no desire for X’. In the latter case this literally connotes an absence of positive change of PSS or mood associated with X, i.e. an absence of desire.

This case, being the least important hedonically is the most important statistically because a great majority of phenomena perceived by a subject does not affect his or her well being or happiness one way or another and does not generate any PSS change. This case will be very important in the following analysis of choice and attention.

Definition of desire

Let’s summarize observations for all three basic cases:

\[ \Delta PSS_{x} = PSS_{\text{end}} - PSS_{\text{hyp}} > 0 \]

\[ \Delta PSS_{x} = PSS_{\text{end}} - PSS_{\text{hyp}} = 0 \]

\[ \Delta PSS_{x} = PSS_{\text{end}} - PSS_{\text{hyp}} < 0 \]

It can also be displayed in the following simple table:

<table>
<thead>
<tr>
<th>( \Delta PSS_{x} )</th>
<th>Positive ( \Delta PSS_{x} )</th>
<th>Desire Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta PSS_{x} &gt; 0 )</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>( \Delta PSS_{x} = 0 )</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>( \Delta PSS_{x} &lt; 0 )</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

The common feature in cases (rows) two and three is a non-positive (zero or negative) change of PSS (\( \Delta PSS_{x} < 0 \)) or, in other words, an absence of positive change for PSS. The fact of the matter is that a subject reports a presence or absence of desire for the perceived phenomenon depending upon the presence or absence of positive change of PSS associated with that phenomenon. The deduction from this observation is that what is usually called ‘desire’ is actually a positive change of PSS. A subject’s desire for X is a positive change of PSS associated with (or ‘caused by’) the appearance of X in the center of the subject’s attention.

DESIRE

From the hedonistic viewpoint it is quite clear why a positive rather than a negative or zero change of PSS is used as the criteria for terms describing PSS alteration. According to hedonism, a subject is looking for just such a positive change - for the maximization or rise of PSS. An expression of ‘X’s desire for Y’ identifies the desire’s object (Y) as a factor of the subject’s (X’s) PSS maximization. An object of desire is a factor of PSS maximization. The use of negative prefixes and suffixes to describe something as ‘UNdesirable’ that a subject ‘does NOT want’ points to the absence of what all subjects are looking for - PSS maximization, that is to say, positive changes of PSS.
and the source of these changes – the objects of desire. For the rest of this work, desire will be treated as an algebraic variable that can be positive (desire or ‘+’ desire), neutral (‘passive non-desire’) or negative (‘active non-desire’)

I want to clarify that those factors in the equation of desire ‘beginning’ and ‘end’ are not referring to the beginning and end of the desire being experienced. PSS\text{beg} and PSS\text{end} indicate the beginning and end of the desire formation. These are the beginning and the end PSS levels of a desire - levels of PSS before the object of desire makes the center of attention of a subject and after. When desire reaches its end level (PSS_{\text{end}}) it does not cease to exist. It has just been finished being created. What comes to end is the initial positive or negative PSS change called ‘desire’ as produced by the introduction of the object of desire into the subject’s center of attention.

The formation of desires is of course, a continuous process. A new desire is formed every time a new object that alters PSS is perceived, so there is an endless sequence of desires. Therefore, it makes sense to delineate the numbering of these desire objects, giving (a current one) a number (n) and the previous one, involved at the formation of this current desire, the number (n-1). Using this generalized notation the formula for desire can be rewritten as

\[ \Delta \text{DES}_n = \Delta \text{PSS}_n = \text{PSS}_n - \text{PSS}_{n-1} = \text{PSS}_{\text{end}} - \text{PSS}_{\text{beg}} = \text{PSS}_2 - \text{PSS}_1 \]

**Strength of Desire**

A desire is often characterized or measured by its strength. While the existence or non-existence of desire depends on the presence or absence of a change in PSS, the strength of desire is a characteristic of the magnitude of this change. The strength of desire is a measure of the influence of an object of desire on the PSS. Both positive and negative desire can be experienced as strong or weak. This means that the strength of desire is a sign-independent characteristic or variable. Therefore, a mathematical sign for the magnitude or an absolute value (| | ) of \( \Delta \text{PSS} \) can be used to express strength of the subject’s desire for X through the PSS change.

**The strength of desire for X = |DES| = |ΔPSS|**

PSS\text{beg} and PSS\text{end} represent the characters of attitude of the subject to two phenomena that made it to the center of attention one after the other. Therefore, the strength of a desire can be defined as a difference between the characters of two consecutive attitudes in time. Another way to describe PSS\text{beg} and PSS\text{end} is to say that they represent P of two phenomena that made it to the center of attention one after another. Thus, desire can be defined by the difference between P-Acceptabilities of the objects of two consecutive attitudes.

**Self - testing the definition of desire**

Theoretically, the best way to test the names given to changes of PSS would be to measure these changes with some kind of device in parallel with a recording of the verbalizations of the subject’s own feelings. Unfortunately, this device has not yet been invented, so one must rely upon introspection to ‘measure’ alterations of PSS. Still, humans are quite capable of using words intuitively in order to characterize their feelings without knowing their exact definitions.

One can easily examine the above stated logic for the use of expressions of desire by observing one’s own or other people’s response to the question: ‘Do you want X?’ It’s notable that a positive answer is given when a perception or imagination of X brings a positive change of PSS - an improvement, or even an arousal in mood and an anticipation of a pleasant experience or an end to an unpleasant one. It is also notable that a negative answer is given when a positive change of PSS is absent, not just including those cases when the change is clearly negative.

A subject’s desires are judged by others in everyday life, prior to, in place of, or even in spite of the subject’s own verbal descriptions of them. This is possible because of external manifestations of desire: changes in the tone of voice or facial expressions and so called ‘body language’. Small children express and communicate their desires very clearly and efficiently so one must rely upon introspection to ‘measure’ changes of PSS would be to measure these changes with some kind of device in parallel with a recording of the subject’s own feelings. Unfortunately, this device has not yet been invented, so one must rely upon introspection to ‘measure’ alterations of PSS. Still, humans are quite capable of using words intuitively in order to characterize their feelings without knowing their exact definitions.

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A subject’s desires are judged by others in everyday life, prior to, in place of, or even in spite of the subject’s own verbal descriptions of them. This is possible because of external manifestations of desire: changes in the tone of voice or facial expressions and so called ‘body language’. Small children express and communicate their desires very clearly and efficiently long before they can speak them. Concurrently, the internal psychological indicator of desire is always evident - a hedonic (PSS) rise or fall.

**Desire and attitude**

The placement of a ‘new’ phenomenon in the center of attention allows a subject to estimate its P-Acceptability and form an attitude toward it. At the same time, movement of the center of attention from an ‘old’ phenomenon to the ‘new’ one allows a subject to evaluate that ‘new’ phenomenon as a factor of PSS maximization or minimization by comparison to the ‘old’ or ‘previous’ one.

An important difference between desire and attitude is that an attitude is an ‘absolute’ characteristic of P-acceptability of its object while desire is a relative or comparative one. An attitude is formed when its object is isolated by the attention of a subject. To the contrary, desire is built by consecutive attitudes, occurring when
the center of their subject's attention moves from one to another. Desire represents a difference between the characters of two consecutive attitudes of a subject, in other words, the difference between the P-Acceptabilities of their objects. Thus, 

\[ \text{DES}_n = \Delta \text{PSS}_n = \text{PSS}_n - \text{PSS}_{n-1} = \text{ATTIT}_n - \text{ATTIT}_{n-1} \]

where \( n \) is a number of the perceived phenomena in the order of their perception.

A good physical analogy is drawn from the correlation between electric potential and voltage: potential characterizes one point of an electric field while voltage is a difference of potentials between two points of an electric field.

The act of isolation of a phenomenon by the center of attention of a subject is one of the most important events in the process of choice making, perhaps the most important one of all. There are two immediate and momentous results of this act - the first is a formation of attitude toward the phenomenon in the center of attention of a subject, and the second one is the creation of desire for it.

Both desire and attitude characterize the P-Acceptability of their object, but they do so differently. Attitude is a measurement of the 'hedonic distance' between the P of its object and the zero point on the scale/axis of P-Acceptability. Attitude describes the position of its object on this scale from a fixed point of reference or 'point of view' - this is the point of zero P-Acceptability that is absolute and is always the same. So an attitude is an 'absolute' characteristic of the P-Acceptability of its object. To the contrary, a point of reference or 'point of view' for desire is floating - it is measured from the P-Acceptability of the object of the preceding attitude, wherever it is present on the P scale. In this sense, desire is an attitude with a floating point of reference or comparative attitude. That is why a subject can simultaneously experience positive attitude and negative desire (or vice versa) to the same object. Any object can be at the same time pleasant to a subject (evoking positive attitude) but undesirable (creating negative desire) and vice versa.

There are four possible combinations of the sign values (positivity/negativity) of desire and attitude toward the same object:

1. \( \text{DES}_x > 0, \text{ATTIT}_x > 0 \)
2. \( \text{DES}_x < 0, \text{ATTIT}_x < 0 \)
3. \( \text{DES}_x < 0, \text{ATTIT}_x > 0 \)
4. \( \text{DES}_x > 0, \text{ATTIT}_x \leq 0 \) (note expanded concept including both negative and neutral attitude)

Let's examine each combination of desire and attitude.

1. \( \text{DES}_x > 0, \text{ATTIT}_x (\text{end}) > 0 \)
In this case both desire and attitude toward the object (x) are positive - a subject wants something that happens to be pleasant. There are two different types of this case - one when P-Acceptability in beginning is negative and another when it is positive. These can easily be represented graphically.

There is nothing painful about the kind of desire that is represented by this last graph - its 'beginning' and 'end' are both in the area of positive P. This validates Edwards (1979) critique of “… the false claim of Schopenhauer’s pessimism that all pleasures result from the satisfaction of painful desire” (p. 95).

2. \( \text{DES}_x < 0, \text{ATTIT}_x < 0 \)
In this case both desire and attitude toward an object (x) are negative: a subject does not want something unpleasant in and of itself.

3. \( \text{DES}_x < 0, \text{ATTIT}_x > 0 \)
In this case an attitude toward the undesirable object x is positive, but the subject does not want that which happens to be pleasant. In this case something better and more pleasant holds the center of attention of a subject before the perception of x, though x is pleasant in and of itself.

4. \( \text{DES}_x > 0, \text{ATTIT}_x (\text{end}) \leq 0 \)
Here we see an attitude toward a desirable object x which is negative (or non-positive, equal to zero); and the subject actually wants something that happens to be unpleasant or neutral in and of itself.
The subject ‘wants’ and chooses something itself unpleasant but feels that with it s/he is better off than without it. This can be a case of choosing the lesser of two evils. There are endless examples of these choices. Mary eats an apple that is good enough for her but that she doesn’t really want (Marks, 1986). A young philosopher accepts an offer to teach at a community college that he doesn’t really like but accepts because it is the best offer he has at the time. Women may submit to sex under a threat (Staude, 1986, pp. 134, 177, 178-179). A terminally ill patient commits suicide, choosing death over suffering. These are cases in which the subject is often hesitant to use the terms ‘desire’ and ‘want’ to describe experiences of positive ΔPSS. Instead, one often says that it was (or will be) done because I ‘had (or have) to’ or ‘ought to’ do it. Otherwise, one might declare ‘I didn’t (or don’t) have a choice’ (implying, a hedonically sound choice) or that those actions were in response to a sense of duty or obligation. Still, even these cases are sometimes self-described as desirable, as something a subject wants, though this is frequently expressed and perceived with a degree of reservation. After all, at times people will say that they ‘want to have surgery’ or even ‘want to die’ or can be said to have a ‘death wish’, and that can be, all said, a literally correct description of how they actually feel.

What is notable about this last case (DESx > 0 or ΔPSSx > 0 and ATTITT(x) (end) ≤ 0), is that it sometimes stops people from describing the PSS maximization (ΔPSS, > 0) that they have experienced or expect to experience in the future as ‘desirable’. The difference for this case is that it is only one of the four possible cases we explored, where the ‘end’ result of human desire is negative while the PSS change experienced by the subject is positive. The object of desire can be said to maximize PSS but doesn’t bring PSS into the area of positive P nor does it make the subject happy or even promise it. An object of such desire is still a factor of PSS maximization, but is not strong enough to bring PSS into the area of positive P, and as such, into the domain of happiness. In my opinion, this is the source of that reluctance to the use of the word ‘desire’ in these particular cases. This ‘hedonic incompleteness’ of desire is reflected in its verbalization.

This gray area in the use of words like ‘desire’ and ‘want’ can be explained to a certain extent as follows: the presence of a positive ΔPSS is a necessary but not always a sufficient condition for a subject to say that s/he experiences desire. A sufficient condition for this situation is the presence of both a positive ΔPSS and a positive attitude toward the object of desire, such as the above mentioned ‘Type I of the PSS change’.

**Need as a periodic desire. Definition of need**

Experiencing a need means feeling the corresponding desire. As Audi (1993) wrote, "Human needs are innate and quickly give rise to desires" (29). S. L. Rubinshteòin has declared that desire is a concrete form of the need’s existence. If a subject experiences a desire for X repetitiously or regularly it is usually said that the subject needs X. This is clearly demonstrated by the needs that emerge and cease to exist with age or during changing conditions, for example, the needs for sex, smoking, or drugs. The origination and disappearance of such needs is acknowledged when the corresponding desire begins or stops being regular or repetitious. Need is a term used for a periodic or cyclical desire. This is true for all kinds of need including any need for, food, sex, activities or drugs. A need is characterized by the strength and frequency of its desire. The expression ‘subject X needs Y’ identifies the object of need Y as an object of repetitive or periodic desire and a recurrent factor of PSS maximization.

**The growth and satisfaction of need and its desire**

Need, being a cyclical process is like a ‘wave’ of desire and can be described as any wave by its frequency or period and its strength or amplitude. All needs have definable features that can be illustrated as recurrent factors in PSS maximization. The satisfaction/dissatisfaction of any need,

a) Affects PSS positively/negatively with a corresponding rise or fall of PSS for the need’s subject; and
b) Increases/decreases P of perceived or imagined objects of this need’s satisfaction for the subject.

These two aspects are easily recognizable in the following description of Russell (1921), "...it seems clear that what, with us, sets a behavior-cycle in motion is some sensation of the sort which we call disagreeable. Take the case of hunger : we have first an uncomfortable feeling inside, producing a disinclination to sit still, a sensitiveness to savory smells, and an attraction towards any food that there may be in our neighborhood" (p. 67).

**One cycle of a need**
Let’s analyze one cycle of a need between the two nearest points in time of its satisfaction. This analysis is done for a simplified situation without regard for any influences on PSS except for a selected need. In this case PSS$_{bg}$ is simply the PSS of a subject who does not perceive or imagine the object(s) of the need’s satisfaction, and PSS$_{uni}$ is the PSS while a subject does it or is attaining satisfaction of that need. In other words, PSS$_{bg}$ represents the background PSS (PSS$_{s,backgr,t}$) for perception or imagination of the object(s) of the need’s satisfaction.

By the point of satisfaction of a specific need, the subject experiencing it no longer has any more desire for the object(s) of this need. When one has satisfied the hunger or thirst, one no longer wants to eat or drink. Objects of a satisfied desire are no longer factors of PSS maximization and at that point the subject becomes indifferent to them, their perception or imagination by a subject does not change her/his PSS. The strength of the satisfied desire now equals zero, which means that the beginning and the end PSS levels of desire are made the same.

$DESIRE_x = \Delta PSS_x = PSS_{end} - PSS_{bg} = 0$

The PSS of the subject before or without perception or imagination of the object of the satisfied desire (PSS$_{bg}$) and while perceiving or imagining it (PSS$_{uni}$) are the same at this point.

There are two distinctly different ‘up’ and ‘down’ phases in the interval between the two nearest points of complete satisfaction of a need where a subject’s desire equals zero. These phases are separated by the point of the beginning of the act of satisfaction of the need. The phases are characterized by opposite directions of change for the desire correspondent to the need.

1. Up-phase of the cycle of a need. The desire corresponding to the need increases (from 0) with passing time because of two simultaneous processes:

A) PSS$_{uni}$, of the desire becomes lower as time proceeds.

Unsatisfied need is a growing negative factor affecting PSS. Dissatisfaction for the specific need lowers PSS$_{beginning}$ or PSS$_{s,backgr,t}$.

B) PSS$_{uni}$ of the desire becomes higher as time proceeds. P of perceived or imagined objects of this need’s satisfaction for the subject gets more and more pleasant.

The simultaneous processes A) and B) increase the gap between the PSS$_{bg}$ and PSS$_{end}$ that amounts to nothing more than the desire for X. This basically means that the object X of the need in question becomes more desirable with passage of time since the occurrence of the last act of this need’s satisfaction. Power of the PSS maximization of the object of the unsatisfied need increases with time for a subject in need.

$DESIRE_x = \Delta PSS_x = PSS_{end} - PSS_{bg} \rightarrow \infty$, where $\infty$ is a symbol for infinity. That, of course, should not be taken literally.

This process, though limited, can reach the point where desire for the object of need becomes so extremely strong that the object becomes a supervalue for a subject or a point of obsession. For example, thirsty people are ready to give anything for a glass of water. Likewise, an abstinent drug addict is willing to do just about anything for a shot of that drug. Any truly needy person can think of nothing else over time but the satisfaction of that particular desire. In the next chapter ‘Attention’ we will see how growing desire increases the probability of a need’s object to get to the center of attention and the time it stays there.

2. Down-phase of a need’s cycle. The down-phase of the cycle of a need represents a mirror image of the up-phase. The corresponding desire decreases with passing time starting from the ‘turning point’ at the beginning of the act of satisfaction of the need.

C) PSS$_{uni}$ of the desire gets higher with time.

The satisfaction of the specific need brings up the PSS of the need’s subject. That is the PSS$_{bg}$ of the desire correspondent to the need.

D) Power of the PSS maximization of the object of need decreases with ongoing satisfaction of a subject in need. Eventually, this process reaches a point where objects of desire do not increase PSS anymore.

The simultaneous processes C) and D) bring PSS$_{bg}$ and PSS$_{end}$ closer and reduce the gap between them so the desire for the need’s object(s) becomes weaker.

$DESIRE = \Delta PSS_x = PSS_{end} - PSS_{bg} \rightarrow 0$

Finally, as a result of the process of PSS$_{bg}$ rising and PSS$_{end}$ lowering they become even again. This illustrates reaching the next point of full satisfaction of the need where PSS$_{end} = PSS_{bg}$, noted as

$DESIRE = \Delta PSS_x = PSS_{end} - PSS_{bg} = 0$. Thus, PSS$_{end} = PSS_{bg}$.

This represents the end of the periodic cycle of growth and satisfaction of the subject’s need and the beginning of the next one.

Surfeit or satiety

If, for whatever reason, a subject continues a need satisfying activity after the need is satisfied, that is to
say, when one eats or drinks after fulfilling the hunger or quenching the thirst, the P of the perceived or imagined objects of this need become reduced for the subject. These objects and the activity itself become factors of the subject’s PSS minimization. The PSS\textsubscript{bgn} continues to rise and PSS\textsubscript{end} will move even lower, beyond the point of full satisfaction of the need, where PSS\textsubscript{end} was equal PSS\textsubscript{bgn}. Hence, PSS\textsubscript{end} becomes lower than PSS\textsubscript{bgn} and the desire becomes negative. Formulaically,

\[
\text{DESIRE}_x = \Delta \text{PSS}_x = \text{PSS}_{\text{end}} - \text{PSS}_{\text{bgn}}, < 0, \text{ because } \text{PSS}_{\text{end}} < \text{PSS}_{\text{bgn}}.
\]

This situation illustrates a subject that reaches utter satisfaction of a specific need. These cases are described as a surfeit or satiety of the subject.

During our discussion of this work, the Director Emeritus of the Boston Colloquium for Philosophy of Science at Boston University, Professor Robert S. Cohen asked me a simple but illuminating question. It is quite obvious that the need in a human being for oxygen is strong and constant, but where is the strong and pressing desire for air that should directly correspond to such a vital need? Isn’t it true that we hardly ever feel it? My answer was that we rarely feel the desire for air precisely because of the demanding power of this need that continuously forces us to satisfy it. Just try to resist it for a minute and you will feel the imposing force of the desire for air this generates. Asthma and emphysema sufferers can tell a story or two about a power of this desire. It is due to the pressing never ending nature of this need that we almost never feel it because we never stop satisfying it, and must always remain in a state of constant satisfaction, as it is truly bad news when we finally stop…

**Alternation of the leading needs and desires**

The analysis of the basic phases and features of the process of satisfaction of a need was described above for a simplified situation, disregarding the PSS influence of other factors except for that one need. In reality, a subject can have multiple needs at different levels of satisfaction at any given moment. As Locke (1690/1824) described,

“We are seldom at ease, and free enough from the solicitation of our natural or adopted desires, but a constant succession of uneasiness out of that stock, which natural wants or acquired habits have heaped up, take the will in their turns: and no sooner is one action dispatched, which by such a determination of the will is set upon, but another uneasiness is ready to set us on work” (p. 248, Book 2, § 45, Edit 12).

It will be established later in the following chapters, that the probability for the objects of desire to be in the center of attention for a subject increases or decreases with the strengthening or weakening of this desire. Corollary to that is an increase or decrease of the probability of the subject’s choice of activity leading to the satisfaction of that desire to be a primary choice among other activities. Satisfaction of desire lessens this desire and therefore, changes the balance of desires in favor of another need. These processes drive an alternation of current activity between the multiple and often competing needs and singular non-periodic, ‘once in a life time’ desires of a subject according to their changing hedonic priority which is their hedonic potential to maximize PSS.

**Desirability and P of the attitude’s object**

Let’s look again at the formulas for an attitude and its ‘objectivity’ as presented in the chapter on ‘Attitude’.

\[
\Delta \text{ATTIT}_{x,t} = \text{PSS}_{x,t} = \Delta \text{PSS}_{x,\text{object } x,t} + \Delta \text{PSS}_{x,\text{background}}
\]

\[
\Delta \text{ATTIT}_{x,t} / \text{object } x,t = \Delta \text{PSS}_{x,\text{object } x,t} / (\Delta \text{PSS}_{x,\text{object } x,t} + \Delta \text{PSS}_{x,\text{background}})
\]

\[
\Delta \text{PSS}_{x,\text{object } x,t} / \text{is an expression for that part of an attitude’s character (ATTIT) determined by the attitude’s object } x \text{ at the moment } t.
\]

\[
\Delta \text{ATTIT}_{x,t} / \text{correspond} = \text{DES} / \text{PSS}_{x} = \text{DES} / P = \text{DES} / \text{ATTIT}_{x}
\]

The correspondence of an attitude toward the object X can be characterized by a ratio of the desirability of X to the P (pleasantness) of X or by the ratio of the desirability of X to the attitude toward X. Both DES\textsuperscript{e} and P\textsuperscript{e} can be either positive or negative in value. If the correspondence of an attitude is to be regarded as a positive variable, these signs could be dropped from consideration and a modified formulation would look as follows:

\[
\Delta \text{ATTIT}_{x,t} / \text{correspond} = |\text{DES}| / \text{PSS}_{x} = |\text{DES}| / P
\]

where |DES\textsubscript{e}| is the power of the desire over its object X.

**Principle or Lemma of Choice**

**Choice’ as an umbrella term**
In this work, attitude - including belief as well as desire, attention and will are considered as aspects of choice. In this context, 'choice' is an umbrella term or name for the process consisting of these many aspects or facets listed above. There is no single, separate process that is, so to speak, the 'choice itself' or the choice 'proper'. One can point to a moment in time when choice as an act of preference is made but it is not an act of a single specialized psychological mechanism. Rather, it is the result of these many aspects working in concert. This consideration has important implications for a general understanding of consciousness itself as being, to a great extent, an apparatus of choice making, because much of what is noticeable in consciousness comes from one or another aspect of the choice making process.

**Choice in terms of the desirability of its competing elements**

Every day a subject faces an infinite universe on the outside and a whole other world on the inside. One invariably perceives these multiple phenomena and comes up with numerous options and many ways of reacting including inaction. The common expression of "having no choice" cannot be taken literally, because it actually implies an absence of a hedonically sound choice. This statement really means that it would be too painful, unpleasant, or deadly for a subject to react including inaction. The common expression of "having no choice" cannot be taken literally, because it actually implies an absence of a hedonically sound choice. This statement really means that it would be too painful, unpleasant, or deadly for a subject to choose otherwise.

To choose something means to give it preference or priority, to concentrate on it. But what happens after a choice is made? Choosing is usually the prelude to action. It is not the end of process as much as the beginning. Choices are made to be acted upon, to be implemented. One chooses a dish from the menu to eat, or a dress to wear, or a book to read, or even a weapon to wield. Choice making is a process of selecting the object of a subject’s action and then pursuing a selective narrowing down of the options for action. This is a necessary, preliminary phase for any action where an object, resources, and course of action are to be determined.

In his seventh Objective Principle of Experimental Hedonism Young (1959) declares, “Affective processes regulate behavior by influencing choice” (p. 123). Objects in the space of consciousness possess different degrees of P or power for PSS maximization. According to the hedonistic doctrine, the actions of a subject are guided by the striving for happiness or PSS maximization. What must such a creature choose to act upon first of all? The logical answer seems to be that Homo Hedonicus must give priority to that element of choice, which most affects PSS maximization.

PSS and PSS maximization, however, can be affected in two opposite ways: elements of choice can both be factors of either PSS maximization or minimization. In other words, either positive or negative factors in PSS maximization. It’s a bit surprising and difficult to understand that these positive and negative signs do not actually affect choice itself. The process of choice making is 'blind' to the signs of these elements of choice as factors for PSS maximization. It doesn’t matter in choice making whether the elements of choice are pleasing or upsetting and desirable or undesirable. Only their 'size' and 'strength', or magnitude as factors for PSS maximization influence their chance to be chosen. A simple model will be used to better illustrate this.

The process of PSS maximization is similar to the task of increasing the level of water in a barrel with a hole in it. Plugging the hole and adding more water are both important ways to get the level of water to rise. If only plugging the hole or adding water can be performed at one time then the situation will require making a choice. Which should be chosen first - to fetch a hose or fix the hole, the choice being between positive or negative determinants of ‘water level maximization’?

It is evident that the optimal choice depends on the comparative volume of water coming in and going out. If two gallons of water are lost every minute through the hole and the hose can add only one gallon during the same period of time, then plugging the hole is the better course of action. On the other hand, if more water can be added through the hose than is lost through the hole in the same time period, then adding water is the more efficient method of maximizing the water level and the right choice is the hose. As this simple example shows, an optimal choice only depends on the comparative magnitude of influences for elements of choice on the process of maximization, regardless of their positive or negative sign value.

Similarly, a subject driven by striving for PSS maximization gives priority to those factors or phenomena that most affect process of PSS maximization. It is not important whether the PSS change created by the elements of choice is positive (maximizing) or negative (minimizing). A subject being an active hedonistic system acts upon the influences of both sign values and tries to eliminate factors of PSS minimization and exploit factors of PSS maximization. This occurs due to the integrating nature of PSS that makes the elimination of factors for PSS minimization equally important with acquisition and exploitation of factors for PSS maximization. The bottom line is that choice making is ruled by factors of
orientation, and the strongest factor, regardless of its positive (acceptance) or negative (rejection) sign, will dominate and dictate the final choice. Choice is aligned with the gradient of the change of PSS. Nonetheless, this sign value plays an important role in determining the type of orientation and action for the chosen element. It determines the positivity or negativity of attitude toward the chosen phenomenon and therefore its acceptance or rejection.

It was proposed in the previous chapter on ‘Desire’ that a change of PSS ($\Delta PSS$) associated with a phenomenon can be called ‘desire’ for that phenomenon. It was also stated that the magnitude of this type of change $|\Delta PSS|$ is referred to as the ‘strength’ of desire $|DES|$. Using these terms the above conclusions can be rephrased as follows:

1. choice is not determined by the positive or negative signs of competing desires;
2. choice making of a subject is determined only by the comparative strength of desires toward the competing elements of choice;
3. the desirability sign of the chosen element or object of choice, however, plays an important role in determining the type (positive or negative) of orientation and action toward it.

Over three centuries ago Locke (1690/1824), asserted that, “The most pressing uneasiness naturally determines the will " (p. 244, Book 2, the heading of the § 40). It should be remembered that for Locke, “Desire is uneasiness” (p. 238, Book 2, the heading of the § 32, Edit 12).

“But we being in this world beset with sundry uneasiness, distracted with different desires, the next inquiry naturally will be, which of them has the precedence in determining the will to the next action? And to that the answer is, that ordinarily, which is the most pressing of those that are judged capable of being then removed” (p. 244, Book 2, § 40).

Basically, it can be assumed that out of n competing choices or n elements of choice with desirabilities $\text{Des}_1, \ldots, \text{Des}_n$, the one to be chosen and to be acted upon first is the element with the largest positive or negative desirability $|\text{DES}|_{\text{max}}$ or $|\Delta PSS|_{\text{max}}$, i.e. with the largest comparative P or acceptability. In other words, choice is guided by the balance of strength for the competing desirabilities.

The principle of choice here stated is not an independent principle. It is deeply rooted in the hedonistic principle that implicitly contains the basis for this choice principle. Within the structure of this theory the choice principle is deduced from the hedonistic principle while taking into consideration some concrete human qualities. That is why, strictly speaking, it should not be called the Principle of Choice but the Lemma of Choice.

**Probability of choice**

Our preliminary discussion of choice thus far has been overly simple. Choice should be discussed more as an ongoing process, and the principle describing it must reflect the unpredictability of the flow of information being processed by a subject. Speaking about "Design constraints for a mind" Sloman (1990) wrote: “Unpredictability of new information and new goals implies a need to be able to interrupt, modify, suspend, or abort ongoing activities, whether external or internal" (p. 232).

It is better to try and formulate a principle of choice in probabilistic terms, because of the unpredictable character of changes in the content of perception. There is a well-known method of following money in order to solve a crime. To analyze choice making one should track attention because choice and then action certainly ‘follow’ thereafter. As James (1927) said, “What holds attention determines action” (448).

Attention is an intricate and inseparable part of any choice:

- Elements of choice are placed in the center of attention during their evaluation;
- The chosen element retains the center of attention after the choice is made subject because it must be attended to in order to be implemented.

This chosen element, however, does not occupy the center of attention all of the time. The attention of a subject constantly moves around scanning the environment, finding new elements of choice or returning to old ones. What is characteristic for attention is the distribution of level or activity of perception of a subject between competing elements of choice. These elements affect the process of PSS maximization to different degrees, and these degrees determine shares of attention those elements receive and their chances of being chosen.

That said, this suggests that the stronger an element of choice is desired or undesired at the time a choice is made, the higher its probability of being chosen. In the first approximation, the probability of choosing an element number n is proportional to the level of its influence on PSS maximization $|\Delta PSS|_n$ or the strength of it desirability $|\text{DES}|_n$.

$$\text{Prob}_n = k|\Delta PSS|_n = k|\text{DES}|_n \quad (1)$$

This means that out of n competing choices or n elements of choice with current desirabilities $\text{Des}_1, \ldots, \text{Des}_n$, the highest probability to be chosen, or to be in
the center of attention, and therefore the best chance to be acted upon belongs to the element with the largest positive or negative desirability i.e. the largest comparative P or |ΔPSS| max, that being the strongest desire |Des| max.

Bracketing or framing

Generally speaking, the number and content of the objects or elements of choice is fluid and constantly changes. It has been suggested that a subject deals with them by limiting, ‘bracketing’, or ‘framing’ the current situation. Orientation as a process features a continual transit from one bracketed situation to another. Attention is evidently the executive of this bracketing (McClamrock, 1995, pp. 183-191), and its mechanism will be discussed below in the next chapter on ‘Attention’.

Let us analyze a limited, simplified or ‘bracketed’ model of the situation when:

1. choice is limited for the time being, i.e. the number of elements of choice remains constant during the process of choosing; and
2. choice is certain or resolute, meaning that one of the competing elements of choice ought to be chosen as a result of this particular choice making session.

This model is close to the numerous real situations of ‘simple’, common choice between a limited number of possibilities, a situation that one experiences many times each day. It is, primarily, a basic choice of acceptance or rejection of a single option, a choice made between engaging into something new or preserving the status quo. This is the type of choice one faces when asked whether you would like to go to the movies or have lunch, etc.

The quality of certainty in choice making means that one of the options at hand must be chosen. This can be restated using the language from the theory of probability as follows: At any given moment the total probability for choice of one of the n choice options/elements is equal to 100% or 1.

\[ \text{Prob}_1 + \text{Prob}_2 + \ldots + \text{Prob}_n = 100\% = 1 \quad (2) \]

Let us combine this formula (2) with formula (1) that was introduced on the previous page:

\[ \text{Prob}_n = k|\Delta\text{PSS}| = k|\text{DES}_n| \quad (1) \]

As a result, the following formula (3) takes place:

\[ k|\text{DES}_1| + k|\text{DES}_2| + \ldots + k|\text{DES}_n| = 100\% = 1 \quad (3) \]

Now, let’s look at how this formula works in some basic cases.

Case 1. Leading desire.

This is the case when a subject experiences a desire of overwhelming strength toward one of the objects of choice (#1):

\[ |\text{DES}_1| >> |\text{DES}_2|, |\text{DES}_3|, \ldots, |\text{DES}_{n-1}| \quad (4) \]

This means that the probability of object #1 to be chosen is much higher than for the other n-1 objects, because if (4) is correct then the following is true as well:

\[ k|\text{DES}_1| >> k|\text{DES}_2|, k|\text{DES}_3|, \ldots, k|\text{DES}_{n-1}| \]

or,

\[ \text{Prob}_1 >> \text{Prob}_2, \text{Prob}_3, \ldots, \text{Prob}_{n-1} \]

The probability of this phenomenon to be chosen by a subject, to enter his/her center of attention, to remain in it, and to be acted upon becomes close to 100% or otherwise close to that full probability equal to 1.

Case 2. Two equal desires.

\[ |\text{DES}_1| = |\text{DES}_2| \]

\[ k|\text{DES}_1| = k|\text{DES}_2| \]

\[ k|\text{DES}_1| + k|\text{DES}_2| = 1 \]

\[ \text{Prob}_1 = \text{Prob}_2 = 1/2 = 50\% \]

This formulation means that elements or objects 1 and 2 of choice have equal chances of being chosen by a subject. A situation of choice between two equally strong desirable options like this was described in the medieval parable of Buridan’s Ass: “the story of an ass that lacked the ability to choose and so starved to death when placed between two equidistant bundles of hay” (Wilson, 1995).

The general theory of choice here described will be applied and illustrated in the following analysis of the processes of attention that will be understood as a process of choosing which phenomena to perceive, and engaging the subject’s will, further understood as the ability of a subject to influence choice making voluntarily.

Attention As a Choice Of Phenomena to Perceive

Steps for the analysis of attention

Psychologist Csikszentmihalyi (1978) observed that, “Many claims were made for the primacy of attention as a crucial psychological process” (p. 337). However, according to Douglas and Peters (1979), “...attention was a neglected topic within psychology for many years” (p. 178), and there was also some measure of “Confusion Caused by Definitions of Attention” (p. 178).

In this work attention is considered to be a form of activity, namely - activity of the perception that is unevenly distributed between phenomena.
At any given moment (t), attention is limited and additive. The total attention (ATTtot) at any moment t is restricted by its upper limit (ATTmax) and the maximum or an upper limit (ATTmax) for the attention of a subject, which is nonsense.

The complexity of attention requires us to proceed with this analysis in a series of consecutive steps, where each successive step addresses more complicated features of attention and provides a closer approximation of its real nature. At first, a simple model of attention toward a single phenomenon will be examined. Then the distribution of attention amongst a number of simultaneously perceived phenomena will be analyzed. After that, the redistribution of attention will be considered. And finally, the nature of the voluntary attention will be evaluated. But first, some basic qualities of attention must be formulated.

**Basic qualities of attention**

There are some important general qualities of attention:

1. Attention has an upper limit;
2. Attention has an additive character;
3. Attention is a non-negative variable.

### 1. Attention has an upper limit

In the words of Csikszentmihalyi (1978), “The main assumption I shall be making is that attention is a form of a psychic energy needed to control the stream of consciousness, and that attention is a limited psychic resource” (p. 337). This means that at any moment (t), there is a maximum or an upper limit (ATTmax) for the attention of a subject.

### 2. Attention has an additive character

At any given moment (t), attention is distributed between a multitude (n) of simultaneously perceived phenomena by a subject. The total volume of attention (ATTtot) is compounded as a sum of the attention paid to each of these phenomena:

\[ ATT_{tot} = ATT_1 + ATT_2 + \ldots + ATT_n \]

### 3. Attention is a non-negative variable

An important consequence of the formula for \( ATT_{tot} \) is that attention is a non-negative variable, greater than or equal to zero. Let’s imagine for a moment that this isn’t so and that there are two polar types of attention, positive and negative. In this imaginary case, these two types might neutralize each other if brought together and the magnitude of the total of the polar variables after their interaction could become less than either factor. Their total would equal the difference between their initial values. This is true for all variables that exist in two polar types – as in electric charge, accounting balances of debit and credit or even positive and negative emotions. It seems better to say that these variables are so called positive and negative when they have two opposing types neutralizing each other and lessening their total impact during interaction.

The formula describing the distribution of same kind (‘positive’) attention between n phenomena perceived in the moment t was given above:

\[ ATT_{tot} = ATT_1 + ATT_2 + \ldots + ATT_n \]

Now, let’s write a formula for the perception of the first number n phenomena and n of the aforementioned ‘negative’ twins, each requiring the same amount of negative attention as the amount of positive attention required by it positive twin:

\[ ATT(-1), ATT(-2), \ldots, ATT(-n) \]

The total attention in this imaginary case when twice the number of the original phenomena with opposing signs are perceived equals zero because the members of each polar pair neutralize each other:

\[ ATT_{tot} = ATT_1 + ATT(-1) + ATT_2 + ATT(-2) + \ldots + ATT_n + ATT(-n) \]

This might mean that no attention at all was utilized and that all attention (ATTmax) is still available. This does not make sense and basically suggests a false idea for the existence of unlimited attention in a subject, which is nonsense.

So, the assumption about the existence of two polar types of attention or the existence of purely ‘negative’ attention is incorrect, and thus we conclude that attention is in fact a non-negative variable. One can pay more or less attention to what’s pleasant or unpleasant or to desirable or undesirable phenomena...
but there’s never ‘negative’ attention. However, the term ‘negative attention’ is used, for example, to describe the attention-seeking behavior of a child acting badly, but this term should not be taken literally. We can see that the ‘negative’ quality actually refers to a description of feelings that ‘negative attention’ seeking behavior can create in those who observe it, rather than to any special ‘negative’ quality of attention itself.

**Attention to a ‘single’ phenomenon**

About the model: The model of a ‘single’ phenomenon that is here reviewed is a sheer abstraction, because in reality a subject always perceives multiple phenomena. This model, however, represents an approximation of a real situation where the subject concentrates mainly on one phenomenon in the center of their attention. This ultimate case can be reached if:

\[
\text{ATT}_{\text{max}} = \text{ATT}_{\text{total}} = \text{ATT}_1 \text{ while } \text{ATT}_2 = \text{ATT}_3 = \ldots = \text{ATT}_{n_1} = 0
\]

The higher the percentage of total attention paid to the phenomenon in the center of attention (ATT\(_1\)), the closer this model comes to reality.

There are some situations when a phenomenon is singled out and scrupulously placed in the center of attention. This occurs in a process of choice making when the elements of choice are appraised by a subject and attitudes toward them are formed one by one, until a ‘new’ phenomenon catches the attention of a subject and is appraised or perhaps an ‘old’ phenomenon is re-appraised. This occurs also when a phenomenon becomes ‘the chosen one’ and is placed in the center of attention, while all competing phenomena are pushed to the periphery of attention or are pushed completely out of it. At this stage of analysis, all but the one ‘central’ phenomenon will be disregarded.

**Application of the hedonistic principle**

Every phenomenon perceived by a subject changes the subject’s PSS. The change (ΔPSS) can be bigger or smaller, positive, negative, or even equal to zero. This ΔPSS is the change imposed by a phenomenon on the current PSS, it determines the level and direction of influence of a phenomenon on the process of PSS maximization. The basic assumption here is that activity of a subject’s perception, (i.e. attention) is distributed between perceived phenomena in accordance with their influence on PSS maximization, i.e. with the ΔPSS they cause. In the first approximation, I posit that the attention of a subject to a perceived phenomenon X (ATTx) is proportional (∝) to the PSS change (ΔPSSx) caused by or associated with X:

\[
\text{ATT}_x \sim \Delta \text{PSS}_x
\]

It was previously discussed that PSS\(_x\) represents a desire for X. Therefore,

\[
\text{ATT}_x \sim \Delta \text{PSS}_x \sim \text{DES}_x
\]

Using the positive coefficient of proportionality ‘k’, then:

\[
\text{ATT}_x = k*\Delta \text{PSS}_x = k \cdot \text{DES}_x \text{ or } \text{ATT}_x = k^*\Delta \text{PSS}_x = k^*\text{DES}_x
\]

This first draft of the formula for attention basically tells us that attention corresponds to desire. The bigger the desire for X the more attention is paid to X by a subject. This makes sense in so many cases which will here be analyzed.

First however, there is a problem to be dealt with. The question is, if attention is considered to be a non-negative variable then, in the case of negative desire, the signs on the left and on the right sides of the formula do not correspond. It was previously established that attention (ATT\(_x\)) on the left side of the formula is always a non-negative variable. Coefficient (k) is positive by definition. Desire (ΔPSS\(_x\)), however, can both be positive or negative. When desire is negative, a positive value remains on the left side of the equation with a negative value on the right.

The first refinement of the above formula (ATT\(_x\) = k*Δ PSS\(_x\) = k*DES\(_x\) = kDES\(_x\)) can be made by emphasizing the independence of attention from the sign of the PSS change (ΔPSS\(_x\)) or from the sign of desire. This depends on the magnitude or an absolute value of the PSS change |ΔPSS\(_x\)| which is the strength of desire. The equation should thus be expressed as follows:

\[
\text{ATT}_x = k |\Delta \text{PSS}_x| = k |\text{DES}_x|
\]

which means that the attention a subject pays to a phenomenon is proportional to the strength of the subject’s desire toward this phenomenon, where:

a) ATT\(_x\) is a subject’s attention toward the phenomenon x;

b) k is some positive coefficient of proportionality; and
c) |DES\(_x\)| is an always non-negative (positive or equal to zero) value for the magnitude of the PSS change associated with the phenomenon X. As previously mentioned, |ΔPSS\(_x\)| or |DES\(_x\)| are expressions for the strength of a desire.

The formula above always returns non-negative values whether ΔPSS\(_x\) > 0 or ΔPSS\(_x\) = 0 because of the magnitude or an absolute value for ΔPSS\(_x\) used in the formula. Therefore, the sign on the left side of the formula always remains non-negative which further
corresponds to the sign on the right side of the equation.

The substance of this matter is that eliminating the sources of PSS minimization is just as important for the hedonic process as acquiring the sources of PSS maximization because of the integrative character of PSS. Adding $100 to an account affects its balance in the same way as canceling a $100 debt. A subject’s concentration on the sources of a positive ΔPSS for their exploitation as well as concentration on the sources of a negative ΔPSS for their elimination are equally important for this process of PSS maximization. Attention paid to X doesn’t depend on the sign of ΔPSS, or a desire for X but only on the magnitude of the PSS change that is the strength of desire for x. In summary, attention is sign-independent or in some sense sign-symmetrical. This reflects one of the main features of choice in general, as was described above.

**Analysis of the formula for attention to a single phenomenon**

\[ ATT_+ = k|ΔPSS_+| = k|DES_+| \]

Let’s analyze this formula to see if it describes different situations correctly

**Case #1.** ΔPSS+ > 0 or DES+, > 0

In this case X is a factor of PSS maximization, meaning that the subject wants X:

IF ΔPSS+, > 0, DES+, > 0 THEN ATT+, > 0

According to the formula ATT+, increases/decreases if the positive desire DES+, increases/decreases. The greater the desire for X by a subject the more attention is paid thereto.

**Case #2.** ΔPSS+, < 0 or DES+, < 0

In this case, X is a factor of PSS minimization and the subject does not want X.

IF ΔPSS+, < 0, DES+, < 0 then ATT+, > 0

The formula ATT+, = k|DES+,| illustrates that the stronger the negative desire for X (the more bothersome or undesirable X is) the more attention is paid to it.

Cases #1 and #2 show that according to the formula a subject pays attention to both desirable and undesirable phenomena. The more desirable or undesirable it is – that is to say, the greater the strength of the (+) or (−) desire for the phenomenon, the more attention will be paid to it.

**Case #3.** ΔPSS+, = 0 or DES+, = 0

If ΔPSS+, = 0, DES+, = 0 then ATT+, = 0

If X is indifferent for a subject (meaning that X doesn’t affect the PSS maximization of a subject, there is no desire for X) then a subject won’t pay any attention to X. No attention at all is paid to indifferent phenomena. Though this case is the least important hedonically, it is the most important statistically. At any given moment, animals, including humans, do not pay attention to the great majority of phenomena accessible to them because they are indifferent to them. This allows them to concentrate on the small percentage of phenomena that are important for their existence and well-being. Zero desire experienced toward indifferent phenomena that require no attention is a powerful filter and eliminator affording great protection for the limited resources of a small creature facing an endless Universe. This is the essence of “…the human talent for ignoring what should be ignored, while staying alert to relevant recalcitrance when it occurs” (Dennett, 1990, p.162).

I would suggest that imitation of this mechanism and the mechanism of hedonic orientation in general is key to the resolution of one of the fundamental problems of Artificial Intelligence, called “the qualification problem” by McCarthy (1968) and described by Dennett (1990) as follows,

“What is needed is a system that genuinely ignores most of what it knows, and operates with a well-chosen portion of its knowledge at any moment. Well chosen, but not chosen by exhaustive consideration. How, though, can you give a system rules for ignoring - or better, since explicit rule-following is not the problem, how can you design a system that reliably ignores what it ought to ignore under a wide variety of different circumstances in a complex action environment?” (p. 161).

The above analysis of the formula for attention shows that this formula gives an accurate basic description of some fundamental features of attention. It correctly illustrates the fact that both positive and negative influences on a subject’s PSS get attention, and that the degree of attention to a phenomenon is proportional to the magnitude of its desirability. It is fair to say that at least in some measure this formula applies.

**Attention to multiple phenomena**

In reality, a subject is always simultaneously perceiving multiple phenomena, because the fact of the matter is that at any given moment the attention of a subject is distributed between a multitude of simultaneously perceived phenomena. Damasio (1994) wrote,

“I propose the following solution: (1) If order is to be created among available .... possibilities, then they
must be ranked. (2) If they are to be ranked, then criteria are needed (values or preferences are equivalent terms) (3) Criteria are provided by somatic markers, which express, at any given time, the cumulative preferences we have both received and acquired. But how do somatic markers function as criteria? One possibility is that when different somatic markers are juxtaposed to different combinations of images, they modify the way the brain handles them, and thus operate as a bias. The bias might allocate attentional enhancement differently to each component, the consequence being the automated assigning of varied degrees of attention to varied contents, which translates into an uneven landscape. The focus of conscious processing could be driven then from component to component, for instance, according to their rank in a progression" (p. 199).

It was established in the beginning of this chapter that the total volume of attention \( \text{ATTtot} \), of a subject perceiving \( n \) phenomena at the moment \( t \) can be described as the sum of attention paid each of them: \( \text{ATTmax} \) >= \( \text{ATTtot} = \text{ATT1} + \text{ATT2} + ... + \text{ATTn} \)

It is has now been established that attention to each of the \( n \) phenomena can be expressed through its desirability: \( \Delta \text{PSS} \), or \( \text{DES}_n \). Now, let’s merge the formula for attention to a single phenomenon with the formula for attention to multiple phenomena by replacing every component \( \text{ATT}_n \) of the right part of the last equation with the expression \( k|\Delta \text{PSS}_1| \) or \( |\text{DES}_n| \)

\( \text{ATTmax} \) >= \( \text{ATTtot} = k|\text{DES}_1| + k|\text{DES}_2| + ... + k|\text{DES}_n| \)

\( \text{ATTmax} \) >= \( \text{ATTtot} = k|\text{DES}_1| + k|\text{DES}_2| + ... + k|\text{DES}_n| \)

The above-presented general formula for attention clearly demonstrates that attention is distributed between these \( n \) phenomena unevenly, in accordance with the magnitude of their desirability. Attention has its periphery and its most focused or ‘brightest’ area which is usually called the ‘center’. We can assign numbers to perceived phenomena in descending order from 1 to \( n \), in accordance with the volume of attention paid by a subject to each of them:

\( \text{ATT1} > \text{ATT2} > ... > \text{ATTn} \)

Thus, the number one (\( \text{ATT1} \)) will always be given to the phenomenon having the most attention or being at the center of attention. According to the latest version of the formula, this indicates the phenomenon with the largest influence on PSS change \( |\Delta \text{PSS}| \) or the one corresponding to the strongest positive or negative levels of desire.

\( \text{ATT1} > \text{ATT2} > ... > \text{ATTn} \), if

\( k|\Delta \text{PSS}_1| > k|\Delta \text{PSS}_2| > ... > k|\Delta \text{PSS}_n| \), or

\( |\text{DES}_1| > |\text{DES}_2| > ... > |\text{DES}_n| \)

**Analysis of the general formula for attention**

Now, we must emphasize the importance of the fact that the general formula for attention includes within itself the formula for attention to a single phenomenon as the first particular case. This case corresponds to the situation when \( n \) equals to 1:

\( \text{ATTmax} \) >= \( \text{ATTtot} = k|\text{DES}_1| \)

If \( n = 1 \) then \( \text{ATTmax} \) >= \( \text{ATTtot} = k|\text{DES}_1| \)

There are five variables included in the general formula for attention:

1. \( \text{ATTmax} \) (greatest attention at the moment \( t \));
2. \( \text{ATTtot} \) (total attention at the moment \( t \));
3. \( \text{DES}_n \) or \( \Delta \text{PSS}_n \) (said desire or change in PSS)
4. \( n \) - number of the simultaneously perceived phenomena
5. \( t \) - time

Let’s find out how this formula works with these adjustments and with different combinations of values for these variables and how the formula’s implications reflect reality. \( \text{ATTtot} \), and \( t \) do not require much analysis. Time \( (t) \) is a universal variable in any process. \( \text{ATTtot} \), simply represents totality of attention at the moment \( t \) or the summation of elements on the right side of the equation. The three other variables - \( \text{ATTmax} \), \( \text{DES}_n \) or \( \Delta \text{PSS}_n \), and \( n \) are worth further investigation. The most important and interesting part of this is the analysis of changes in the only argument in the formula: \( \text{DES}_n \) or \( \Delta \text{PSS}_n \).

In reality, when not simplified for the purpose of gradual analysis, all of the variables included in this formula could change simultaneously. For our purposes, we’ll first take a look at the effect of a change to each of these variables of attention separately, assuming that the others will remain static. Again, for the sake of simplification, \( \text{ATTtot} \) will be considered to be equal to the \( \text{ATTmax} \), unless otherwise stated:

\( \text{ATTmax} = \text{ATTtot} = k|\text{DES}_1| + k|\text{DES}_2| + ... + k|\text{DES}_n| \)

Later we will investigate real conditions, where all variables change simultaneously

**Attention and the change of desirability of one phenomenon**

Case #1. Change of positive desirability of the phenomenon \( x \).
DESx > 0 or ΔPSSx > 0.

If any positive value gets bigger, then its absolute value or magnitude is also enlarged. So, if positive desire (DESx or ΔPSSx) grows, then its magnitude or strength (∥DESx∥ or ∥PSSx∥) also gets bigger. The formula shows that attention towards the phenomenon grows together with the strength of the desire for it or with its desirability

$$\text{ATT}_x = k|\Delta PSS_x| = k|\text{DES}_x|$$

With the additional attention paid to one of the n phenomena, that particular one will move up in the ‘attention hierarchy’ earning an attention ‘promotion’. This phenomenon would change its place in the descending row of the decreasing attention levels corresponding to n different phenomena perceived at the same time t.

$$\text{ATT}_1 > \text{ATT}_2, >...> \text{ATT}_n,$$

Its position will move from right to left in the above formula and its number placement (from 1 to n) will decrease until it becomes the number one phenomenon in the center of attention. The reverse process, an attention ‘demotion’ can be said to occur according to this formula when the strength of desirability for the phenomenon diminishes

Attention ‘promotion’ and ‘demotion’ as prescribed by this formula do take place in reality. A good illustration of a promotion is provided by taking note of a growing desire corresponding to an ongoing unsatisfied need. Such a desire strengthens until it gets into the center of attention of a subject together with those objects and ways of its satisfaction. This situation has been analyzed from a different point of view in the prior discussion of need.

In the course of satisfaction of a need the reverse process takes place. Desire gets weaker, and the attention paid to the objects and actions of satisfaction for this desire decrease, and as such, these objects and acts move out from the center of the subject’s attention to its periphery and finally completely out of range. The center of attention gets overtaken by other phenomena.

Case #2. Change of negative desirability or Undesirability of phenomenon x.

DESx < 0 or ΔPSSx < 0

If any negative value gets more negative, then its absolute value or magnitude is enlarged. So, if negative desire (DESx or ΔPSSx) grows stronger and becomes more negative, then its magnitude or strength (∥DESx∥ or ∥PSSx∥) gets bigger. The formula must show that attention toward the phenomenon grows together with the strength or magnitude of its undesirability.

$$\text{ATT}_x = k|\Delta PSS_x| = k|\text{DES}_x|$$

With the growth of attention paid to one of the n phenomena, that particular one will move up in the ‘attention hierarchy’, getting an attention ‘promotion’. That one phenomenon will change its place in the descending row of the decreasing attention levels corresponding to n different phenomena perceived at the same time t.

$$\text{ATT}_1 > \text{ATT}_2, >...> \text{ATT}_n,$$

Its position will move from right to left in the above formula and its place number (from 1 to n) will continue to decrease until it becomes the number one phenomenon in the center of attention. The reverse process, an attention ‘demotion’ can be said to occur according to the formula, when the strength of desirability for the phenomenon diminishes.

An attention promotion or demotion is supposed to take place according to the formula when the magnitude or strength of undesirability for the phenomenon increases or decreases. A good illustration of these cases is provided by any kind of the increase or lessening of discomfort or unpleasantness, for example hunger pangs or toothache. The more unpleasant and undesirable something becomes for a subject, the more attention is drawn thereto. The less unpleasant and undesirable it becomes due to the action of a painkiller or food intake, the less attention is paid thereto.

Comments about cases #1 and #2

The similarity in changes of attention in the above cases one and two illustrate the independence of attention paid to phenomena from the value sign of the desirability for each phenomenon. It is also interesting that the dissatisfaction of a need can serve as an example for both cases. An object of a need’s satisfaction, as well as corresponding subjective state both get an attention promotion that escalates during the time of their ongoing need dissatisfaction. An object of need (for example, food) rises in the attention hierarchy through an increase in the desirability of this object while the specific subjective state of the dissatisfaction of that need (hunger, thirst, etc.) gets an attention promotion through the decrease in the desirability for that specific state.

In these cases, nature uses both of its major tools of orientation - positive and negative in order to drive a subject to satisfy a need. It pushes a subject away from the subjective state of dissatisfaction of a need and simultaneously pulls toward the object or way of
its satisfaction. It makes the current state of the dissatisfied subject unpleasant and thus undesirable while at the same time, making the objects of satisfaction that much more desirable.

**Hedonic ‘pricing’ and redistribution of attention**

Animals, including humans, are driven by hedonic striving to maximize their PSS. Therefore, a major tool of their orientation, is both by nature and society, hedonic ‘pricing’ through attaching a factor of Pleasantness/Unpleasantness to a phenomenon in order to establish it as positive or negative factor of PSS maximization and determine its desirability. By using variants of reward and punishment, like the carrot and stick scenario, they affix hedonic sticker-prices of what are pleasant or unpleasant and set values on good and bad. Adjustment of this P or hedonic ‘pricing’ is a most significant instrument in the alteration of animal and human orientation and choice.

Let us suppose that a subject perceives the same n phenomena for a given time when $ATT_n = ATT_{\text{max}}$ and remains stable, but attention that is required for one of n phenomena ($ATT_1$) grows.

$$ATT_{\text{max}} = ATT_1 = k|DES_1| + k|DES_2| + \ldots + k|DES_n|.$$  

This formula shows that as one phenomenon (number ‘n’) gathers more attention, then the other (n-1) phenomena will have less attention left to them. If all available attention ($ATT_{\text{max}}$) is not used up ($ATT_{\text{max}} < ATT_{\text{tot}}$) then the total available attention $ATT_n$ must be increased. Now is the time for a subject to become more alert. Conversely, if all available attention ($ATT_{\text{max}}$) is already used up ($ATT_{\text{max}} = ATT_{\text{tot}}$) then the total available attention ($ATT_{\text{tot}}$) must be redistributed.

If the remainder of attention ($ATT_{n-1} = ATT_{\text{tot}} - ATT_n$) is not enough for the rest (n-1) of the evident phenomena, then some will receive no attention at all. Hence, a reduction of the number (n) of the perceived phenomena takes place. At this point, attention becomes more focused or narrowed. If $ATT_n$ grows so great that it requires all of the attention of a subject, then the entire $ATT_{\text{tot}}$ must be spent on $ATT_n$.

$$ATT_{\text{max}} = ATT_{\text{tot}} = ATT_n$$

A good example of this narrowing down of attention is the case where a basic need of a subject has not been satisfied for a long period of time. (A ‘long’ period of time can here be probably defined as any multiple of the regular or average period of time between satisfactions of this need). In this case, objects and images of the subject’s need demand more and more available attention. They gradually push everything out of the center of the subject’s attention to the periphery until they have completely taken over. Eventually the objects and images of the subject’s need become ‘super-values’ for that moment. Think toilet.

**Change of maximal attention ($ATT_{\text{max}}$)**

$ATT_{\text{max}}$, represents the upper limit of attention available in the moment t. If it grows, a subject is able to pay even more attention to the same number n of perceived phenomena or to an increase of their number. Conversely, if $ATT_{\text{max}}$ is diminished, then a subject must pay less attention to the same number (n) of phenomena and, sometimes, has to decrease their number. $ATT_{\text{max}}$ goes down, for example, when a subject gets tired. The formula shows that if the left part of equation ($ATT_{\text{max}}$) becomes smaller, then the right part has to be lessened as well too. It can be reduced by the number (n) of phenomena that are paid attention to, and/or by a decrease of the magnitude of their desirability for the subject.

If $ATT_{\text{max}} \rightarrow 0$ then $ATT_{\text{tot}} \rightarrow 0$ or

$$(k|DES_1| + k|DES_2| + k|DES_n|) \rightarrow 0; \text{ because } n \rightarrow 0 \text{ and/or } |DES_1|, |DES_2|, |DES_n| \rightarrow 0.$$  

This corresponds to what can be observed in reality. For example, with the subject getting more and more fatigued, interest in current activities and their desirability decreases. The same thing happens with one’s ability to be involved in several activities at once. It requires more and more effort to proceed with even one main activity. Nothing excites this very tired subject, not even a favorite activity. One loses interest and desire to do anything. The only desire that remains at this point is to get some rest, to go to sleep and to pay no further attention at all.

**Change of the objects of attention and their number (n)**

Above, I have looked at cases where n was subject to change. N can decrease if the attention of a subject to some of the n phenomena perceived grows, or if the volume of the available attention gets smaller ($ATT_{\text{max}} \rightarrow 0$). N can increase if the attention of a subject to one or more of n perceived phenomena decreases or if the volume of available attention gets bigger. An increase in the number of the perceived phenomena means that some attention is now being paid to ‘new’ phenomenon or phenomena, that were not attended to before.

In reality, a subject constantly perceives new phenomena. An important distinctive quality of new phenomena is the unpredictability of their appearance. In any given moment, new phenomena, important for the maximization of PSS, can appear and make
demands on a subject’s attention. For example, while walking down the street one perceives a numerous objects but pays little attention to them. A subject can see many cars on the street and pay them no attention at all. But the distribution of a subject’s attention changes with the recognition of a friend inside a car, or when it seems that one of these cars is going to hit the subject. However, in may be that an adult deeply concentrated on inner thoughts or a child running after a ball may not pay enough attention to that oncoming car.

The more concentrated a subject is on something, the more difficult it will be for anything else to catch one’s attention. And conversely, if the concentration of attention for a subject is low, then any new phenomena can easily get to the center of attention. For example, a bored child in the classroom is just looking for anything else, something new to switch attention to. Again, the decisive factor in determining a level of attention for a subject to a new phenomenon is not its novelty but the magnitude of its desirability for that particular subject.

**The center of attention**

In order to react to a phenomenon, a subject first has to be able to evaluate it or establish an attitude toward it. The formation of attitude has been analyzed earlier, in the chapter ‘Attitude’. A necessary part of the formation of an attitude is the isolation of a phenomenon to be evaluated by placing it in the center of attention.

It is easy to identify a phenomenon that should be in the center of attention (a ‘central phenomenon’) in the simplified, static situation with a fixed number of phenomena perceived and with a stable hierarchy of their desirabilities. The ‘central phenomenon’ in this case is the one influencing process of PSS maximization the most, the object of the strongest positive or negative desire ∆PSS\textsubscript{max} or |DES\textsubscript{max}|. For the static model, the center of attention can be defined as the part of that space of consciousness of a subject with the highest level of attention occupied by the object of the strongest positive or negative desire, |DES\textsubscript{max}|

In reality, at any moment, a ‘new’ phenomenon may be perceived and concentrated upon, i.e. placed in the center of attention in order to be evaluated, so that it gains access to the center of attention before being estimated. In order for a ‘new’ phenomenon to make it to the center of attention, that phenomenon doesn’t have to possess the largest |DES\textsubscript{max}|. The appearance of new phenomena is a random, unpredictable event. Therefore, an answer to the question ‘Which phenomenon is in the center of attention of a subject at the moment?’ can only be offered in terms of probability. At first approximation, it can be said that the probability (p) and duration (∆t) of a phenomenon (x) being in the center of attention of a subject is directly proportional to the magnitude of their desirability (|DES\textsubscript{max}|) or to their hedonic importance. 

\[ PX_{x,att} = k|DES_x| \]

\[ TX_{x,att} = k|DES_x| \]

PX\textsubscript{x,att} is the probability of the phenomenon X to be present in the center of attention; TX\textsubscript{x,att} is the period of time that phenomenon X is located in the center of attention.

According to the formulas above, the greater the strength of desirability (|DES\textsubscript{i}|) or the hedonic importance of a phenomenon, the higher the probability of it being placed in the center of attention and the longer it will remain there, and vice versa. The majority of phenomena perceived by a subject and at first being ‘new’, will usually have no hedonic importance, and will not alter the PSS of a subject, their ∆PSS or DES being equal to zero. According to the formulas above, the time of their presence in the subject’s center of attention and the probability of them remaining there are close or equal to zero. A subject just glances at them for an instant, if it is a visual object or listens to them for a moment and that is all.

The opposite would be the case for the phenomenon (#1) with an overwhelming hedonic importance, compared to all other (n-1) simultaneously perceived phenomena.

|DES\textsubscript{1}| >> |DES\textsubscript{i}|, |DES\textsubscript{i}|,..., |DES\textsubscript{n-1}|

The probability of such a phenomenon being in the center of attention gets close to the full probability that is equal to 1 or 100%. The duration of phenomenon #1’s presence would be infinite if the hierarchy of desirabilities for perceived phenomena needn’t change sooner or later.

The definition of the center of attention can be now enhanced as follows:

The center of attention is that part of the space of consciousness characterized by the highest level of attention, and the highest probability and duration of ‘residence’ for the phenomenon of greatest hedonic importance (|DES\textsubscript{max}|) for this particular subject.

**About voluntary attention**

By a certain age, normal humans become able, to some extent, to control what is in the center of their attention. This ability is called voluntary attention. It is needed and is exercised, obviously, when the phenomenon that a subject is determined to have in
the center of attention is not centered and has drifted to the periphery. Voluntary attention is considered to be attention driven by will or willed by effort. This mechanism of voluntary attention will be described in the following chapter 'Will'.

**Will as a Voluntary Influence at Choice Making**

**What does will mean?**

The history of philosophy presents a substantial collection of notions on will. Bourke (1964) thought there to be "... eight distinctive views" of these notions "taken by Western thinkers" (p. 8). The point of view on will to be here discussed has much in common with these many meanings, i.e. understandings of will as an "intelligent preference", a "rational appetite", that "dynamic power" and inclusive of a consideration of "freedom as the essential characteristic of will and volition" (Ibid., pp. 9-13). Over three centuries ago Locke (1690/1824) asserted just that, noting: "...the will in truth signifies nothing but a power, or ability, to prefer or choose..." (p. 229, Book 2, § 17, Edit 12).

The basic fact of this matter is that every normal human being, after a certain age, possesses the ability to voluntarily influence one’s own choice to some extent and this ability we refer to as ‘will’. The element of selection that benefits from the will’s influence on choice (i.e. increases the chance of this element being chosen) we’ll refer to as the ‘will’s goal’ or ‘will’s end’. It has been said that will’s goal or end is achieved by ‘will’s effort’. Even when the purpose of the will’s effort is in some sense negative and is directed toward not doing something, this definition of the will’s goal still stands. For example, if one needs not to think about X, it means that one must try thinking of Y and/or Z that exclude X, and thus those factors become the goals of the will effort. So, not attending to X means concentrating on Y and/or Z.

**Choice made with and without a will effort**

Regarding the above mentioned quotation from Locke, it would probably be better to say that will signifies nothing but the power or ability of a subject to influence one’s own preference or choice. The difference is significant because preference or choice does not employ will all at times. A lot of common choices are ‘will-effortless’ and do not involve will. An emotional impulse or desire is quite sufficient by itself to determine choice. Animals and human infants can be said not to possess will, but will have emotional impulses and desires that certainly display preferences and ultimately make choices. As Vilunas (1976) has noted, "Will effort is necessary while one has to act either without an immediate emotional impulse or against it, when, for example, one has to restrain anger, interrupt an exciting activity, or ignore physical pain, etc." (p. 51, trans. A.J.O.). One may want to eat, drink or smoke but possess the will power not to do it.

There is an algorithmically important difference between choice made with and without the involvement of will. Without the will’s participation, elements of choice are (1) first evaluated by a subject and then (2) a choice is made based upon their estimations. This algorithm is reversed in the case when a choice is made with participation of the will; choice is first made (1), by a rational decision, and (2) later is enforced by the will effort that re-estimates and outright adjusts values for the elements of choice in order to support the predetermination of the phase (1) choice. Such an ‘unnatural’ algorithm of choice made by will is the main reason why this type of choice needs the reinforcement of the will effort. Will always fights off other choices that might have otherwise prevailed.

**The Choice Principle and nature of will**

The above noted approach to choice establishes that for a phenomenon to be chosen by a subject in any particular situation it must have the dominant hedonic importance for that subject at the time, i.e. it must be the most important hedonic object - ‘the number one phenomenon’ - the one with the grea magnitude of desirability. The distribution or balance of desirabilities can be formulated as follows:

\[ |\Delta PSS| = |DES_1| > |DES_2| > |DES_3| > ... > |DES_n| > |DES_1| \]

Will is applicable in situations where the above conditions are not satisfied for the phenomenon pre-chosen to be number one, and the above balance has to be created, restored, or sustained by application of the subject's will effort. The essence of this will effort can be defined by a shifting desirability balance in favor of a predetermined phenomenon.

The above noted equation clearly shows that this shift can be implemented by one of these two following ways or by both of them applied together:

1. By raising the hedonic importance of, or magnitude of desirability for the pre-chosen phenomenon or will’s end by stimulating a corresponding hedonic association with it, such as thinking of or imagining an associated reward/punishment or the attendant honor/disgrace;
2. By lowering the hedonic importance or magnitude of...
desirability of those different phenomena competing with a pre-chosen one.

Let's consider a simple case of a choice between just two phenomena A and B with corresponding desires DES_a and DES_b.

Phenomenon A is chosen if |DES_A| > |DES_B|. (1)

Phenomenon A is NOT chosen if |DES_A| < |DES_B| (2)

Now let's consider the case when phenomenon A is NOT chosen in the moment, but the subject has made a conscious decision to choose A over B; it can be said that the subject does not really want A but, for good reason has decided to choose it or do so. To accomplish this s/he has to apply will effort (WE in short) strong enough to shift balance from point (2) to point (1). Mathematically speaking this means that:

|DES_a + WE| > |DES_b| (3)

James (1927) offers a very similar formula to equations (2) and (3) while speaking about a subject conquering and overcoming his/her impulses and temptations in the chapter 'Will' of his Psychology:

"The facts can be most briefly symbolized thus, P standing for propensity, I for ideal impulse, and E for the effort:

I + E > P.

In other words, if E adds itself to I, P immediately offers the least resistance, and motion occurs in spite of it" (p. 444).

It has to be understood that what is stated as will effort WE in equation (3) must be a variable of the same kind as other members of the equation in order to be added to them. The other two elements are desires or changes of PSS, therefore, what is coded as WE must also be a change of PSS (ΔPSS) or desire created by the will effort, desire being a function of will: ΔPSS(WE). As Kant (1785) wrote in the "Introduction to THE METAPHYSICS OF MORALS", "The faculty of desire whose internal ground of determination and, consequently, even whose liking [das Belieben] is found in reason of the subject is called the will" (p. 11).

Accordingly, the equation (3) can be rewritten as follows:

|DES_a + ΔPSS(WE)| > |DES_b|, (3a)
|DES_a + ΔPSS| > |DES_b|, (3b)
|DES_a > |DES_b| - ΔPSS, (3c)

Will effort can also be applied to a competing element of choice in order to reduce its desirability:

Will effort as an effort of attention

There is yet another principle question about will that needs answering: how can a subject voluntarily, by using will effort, change a hedonic value, i.e. the P of an element of choice, an attitude, or desire toward it?

A direct answer to this question was given by William James (1927): "Volitional effort is effort of attention" (p. 450), "Effort of attention is thus the essential phenomenon of the will" (p. 452). But what is it an "effort of attention" does and how is it done?

According to James (1927),

"The strong-willed man, however, is the man who hears the still small voice unflinchingly, and who, when the death-bringing consideration comes, looks at its face, consents to its presence, clings to it, affirms it, and holds it fast, in spite of the host of exciting mental images which rise in revolt against it and would expel it from the mind. Sustained in this way by a resolute effort of attention, the difficult object erelong begins to call its own congeners and associates and ends by changing the disposition of the man’s consciousness
altogether” (p. 452).

The dialectical approach as well as common sense and folk psychology tell us that any phenomenon has its good and bad for a subject, with positive and negative sides. Evaluating a phenomenon involves estimating both these sides and coming up with their total in a way that helps determine an attitude toward it. Hedonic integration facilitating the summation of this total was discussed in detail in an earlier chapter dedicated to attitude.

Limitations of human perception often make a subject look at different sides of each phenomenon one by one, because the human mind cannot observe them all at once. A subject can very often be in the position of the proverbial blind person trying to describe an elephant by touch, without having seen the whole picture. The more the attention that is paid to one side of a phenomenon, the more influence that side of the phenomenon makes on the total impression and attitude formation of a subject. The downside of this situation is that our attitudes are always somewhat off the mark or one-sided to some extent. The upside of this process is that it gives us humans our summary attitudes and some measure of will power.

Just by controlling one’s attention (i.e. by applying voluntary attention) one can concentrate more on the positive or negative side of a phenomenon and ‘turn a blind eye’ to other sides, thus shifting the balance of positivity or negativity of this phenomenon by one’s own volition. Concentrating more on the fullness or emptiness of that 50% measured bottle, one can adjust one’s perception of it to be half full or half-empty. Control of attention or usage of the voluntary attention is the essence of will, as James has asserted, because attention is the will’s executor. A level of mastery of this control determines scope of freedom for a subject’s will. Damasio wrote (1994),

“Willpower draws on the evaluation of a prospect, and that evaluation may not take place if attention is not properly driven to both the immediate trouble and the future payoff, to both the suffering now and the future gratification. Remove the latter and you remove the lift from under your willpower’s wings. Willpower is just another name for the idea of choosing according to long-term outcomes rather than short-term ones” (p. 175).

While discussing P-memory in the beginning of this work, it was stated that P/U memories can be reactivated by remembering or imagining something hedonically/emotionally charged, and this is exactly what will effort accomplishes. A subject can selectively revive the P/U memories associated with the feature X of phenomenon A rather than its feature Y by concentrating attention on X and not Y, that is to say by ‘attending to X’ and ‘turning a blind eye’ to Y. Therefore, X will affect the total PSS that determines the attitude toward A more than Y. In this situation will effort deliberately activates hedonic/emotional memories of a subject by insistently reminding a subject about certain features or consequences of said choice and/or making a subject imagine these consequences. Will directs the attention of a subject toward those features of the elements of choice that change their desirabilities and therefore the balance of these desirabilities in ways advantageous for the will’s goal. Will influences a subject from the inside in the same way other people and/or society changes one from the outside - by reminding a subject about the consequences of these choices, and the rewards and punishments associated therewith. When affected by will, however, they are self-inflicted and self-determined which qualifies it as free. Will’s guidance of attention establishes this attention as being voluntary.

References

Row.


soznanie; o meste psikhicheskogo vo vseobshchei vzaimosvëzi ãiæavleniõi materialñnogo mira. Moskva: izd-vo Akademii nauk SSSR.


Illustrations

Illustration 1

<table>
<thead>
<tr>
<th>A component of the stream of consciousness</th>
<th>vectorial (P/U) component</th>
<th>vector/scalar</th>
<th>Sensor, organ</th>
</tr>
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<tbody>
<tr>
<td>Vision</td>
<td>No</td>
<td>Scalar</td>
<td>Retina, eye</td>
</tr>
<tr>
<td>Audition</td>
<td>No</td>
<td>Scalar</td>
<td>Cochlea, inner ear</td>
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<td>Yes</td>
<td>Vector</td>
<td>Olfactory neurons, nasal mucosa</td>
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<td>Vector</td>
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<td>Yes</td>
<td>Vector</td>
<td>Free ending C fibres, everywhere2</td>
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<td>Yes</td>
<td>Vector</td>
<td>Labyrinth, inner ear; muscle spindles, muscles; Golgi endings, tendons</td>
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<td>Emotional</td>
<td>Yes</td>
<td>Vector</td>
<td>Bodily location - &quot;thoracical&quot; 3</td>
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1. This table is constructed using the table from the Cabanac's “ON THE ORIGIN OF CONSCIOUSNESS, A POSTULATE AND ITS COROLLARY” (p. 20), referring in turn to the J.M. Wolfe “BEYOND THE FIVE SENSES” (1988, p. 49)

2. Being located “everywhere”, algic sensations can be both contact and inner, i.e. produced on the body surface as well as in its interior.

Illustration 2
Illustration 3

Illustration 3

![Graph showing PSS over time with specific points labeled t1, t2, PSS\textsubscript{begn}, and PSS\textsubscript{end}.]
Illustration 4

\[ \Delta PSS_{x} = PSS_{end} - PSS_{bgn} = 0 \]