

## On Reversal of Temporality of Human Cognition and Dialectical Self

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In terms of temporality of logic, the relation between "before" and "after," is an inverse relation, as is the relation between intension and extension. Reversal of temporality of human cognition is accompanied by corresponding reversal between intension and extension. Such reversal is based on lateral reversal of brain hemisphere locus of time information. A similar inverse relation exists between self as subject and self as object. Extreme objectification of self is associated with brain hemisphere lateral reversal of time information, indicating that subject-object reversal is similar in nature to reversal of temporality of cognition. Dialectical nature of self is based on contradiction between self as subject and self as object. Synthesis arising from such contradiction may be regarded as reality of self.

Seventeenth Century Port Royal Logic made a distinction between *intension* (comprehension) and *extension*. Intension of a general term is the set of attributes which it implies. Extension is the set of things to which it applies (see Kneale and Kneale, 1962, p. 319). Since more attributes apply to a lesser number of things, the relation between intension and extension is an inverse relation. For example, a square has more attributes than a rectangle. Therefore, there are more rectangles than squares. What is known as the *Thesis of Extensionality* proposes that all logic, and all language, is extensional, and that intensional phenomena are surface phenomena (Bealer, 1982; Kneale and Kneale, 1962). Since it is difficult to apply truth-values to future events, the Thesis of Extensionality is resistant to understanding the temporality of human cognition.

In order to conceptualize the temporality of logical reasoning, Brentano's view regarding the relation between intension and extension may be adopted. According to his view, intension may be regarded as being *about* something

and extension as being *from* something (see Bealer, 1982; Reichenbach, 1956, p. 168). If we know more about something, there is less need to obtain information from it. The inverse relation between intension and extension still holds. Intension and extension refer to two kinds of information which are inversely related to each other. Now consider a duration. At the beginning of the duration, no time information can be obtained from the duration, for the simple reason that the duration is in the future, and no time has elapsed yet. The only time information available would be information about, but not time information from, the duration. As time passes, more time information from the duration can be obtained. These two kinds of time information, one being intensional and the other being extensional, may be called, at a given moment in the duration, *prior time information* and *posterior time information*, respectively. Prior time information is maximal at the beginning, and posterior time information is maximal at the end, of the duration. The relation between prior time information and posterior time information is an inverse relation. Another way of stating this temporal aspect of logic, is to say that intension and extension are inversely related to each other with respect to time.

### Schizophrenia

If one were to look for a population of people whose cognition is characterized by delusion and irrational belief, those who are classified as suffering from schizophrenia would be the most obvious population. Consider the following experimental procedure used to study the role of time information in schizophrenic cognition. A tone of variable pitch and duration is followed by tachistoscopic presentation of a single dark dot, and the task is to estimate the duration of the dot. This is a variation of the traditional simple reaction time experiment. The duration of the tone constitutes foreperiod. However, unlike the simple reaction time experiment, prompt motor responding is not a crucial variable and the difficulty of distinguishing motor preparation from attentional expectancy associated with foreperiod is eliminated. When foreperiod duration is variable, duration estimation of the dot is an increasing function of foreperiod duration. The longer the foreperiod, the stronger would be the expectancy of arrival time of the dot, resulting in longer estimation of the dot's duration (Mo and George, 1977). Furthermore, such expectancy is based on posterior time information gained from passage of time, or what may be called a stochastic "aging" process, in the foreperiod. Two different conditions are specified. In the correlated condition, the pitch of the tone is correlated with foreperiod, so that the pitch can function, at the beginning of foreperiod, as prior time information concerning how long the foreperiod is going to last. In the uncorrelated condition, there is no such cor-

relation. The pitch and the foreperiod duration vary independently of each other. Studies have shown that the difference in foreperiod effect between schizophrenics and nonschizophrenics can be observed in the correlated condition, but not in the uncorrelated condition. Specifically, for both schizophrenics and nonschizophrenics, longer foreperiod is associated with longer estimation of the dot's duration. But, when the pitch of the tone is correlated with foreperiod duration, such increasing effect of foreperiod is eliminated for schizophrenics, but not for nonschizophrenics. That is, schizophrenics can be distinguished from nonschizophrenics in terms of prior time information, but not in terms of posterior time information (Mo and Kersey, 1977, 1980; Mo, Kersey, and Lowe, 1977; Mo, Kersey, and Welch, 1978). If prior time information is intensional, then it can be inferred that schizophrenics are intensionally oriented.

It can be speculated that schizophrenic cognition may be characterized by some kind of reversal between intension and extension, that schizophrenics may react intensionally to the situation in which nonschizophrenics react extensionally, and vice versa. In terms of temporality of intension and extension, schizophrenia may be characterized by temporal reversal between prior time information and posterior time information. In order to explore such a possibility, a slightly modified experimental procedure can be used. In a subsequent study (Mo, LeFevre, and Kersey, 1984), the dot was presented, following a tone of variable pitch and duration, either to the left visual field (right brain hemisphere) or to the right visual field (left brain hemisphere). Among nonschizophrenics in the uncorrelated condition, the duration estimation of the dot increased as a function of foreperiod duration. This increasing effect was stronger for the right visual field than for the left visual field. In the correlated condition, the increasing effect was stronger for the left visual field than for the right visual field. The relation between prior time information and posterior time information is an inverse relation with respect to brain hemisphere laterality. Among schizophrenics, such brain hemisphere laterality itself is reversed. In the uncorrelated condition, foreperiod effect is stronger for the right hemisphere. In the correlated condition, foreperiod effect is stronger for the left hemisphere. The inverse relation between prior time information and posterior time information is reversed in terms of brain hemisphere laterality. In this aspect, spatialized time information associated with schizophrenics is a mirror image, an enantiomorph, of time information associated with nonschizophrenics. Spatialization of time reversal manifests itself in lateral reversal of brain hemisphere locus of time information.

### Dialectical Self

As pointed out by Markus and Wurf (1987) in their comprehensive review of the literature regarding study of self, the current tendency among various

self theories is to abandon efforts to describe the "I" aspects of self. However, it should be pointed out also that those theories do not acknowledge inherent contradiction between "I" and "me," or between self as subject and self as object of cognition. If understanding of self is merely regarded as reduction of self to the domain of knowledge, then such understanding is based on objectification of self. If self is totally objectified, then self as subject is eliminated. This is the case of what Deikman (1977) calls "missing center." In the world in which self exists, self exists as subject. For such self, objectification of self constitutes reversal of subject and object. In general, objective inquiry into the nature of subjectivity brings about subject-object reversal. It should be noted that blind pursuit of objectivity as a goal of scientific inquiry in experimental psychology resulted in rather absurd reversal of subject and object. As Reigel (1979) points out, objects of psychological observation are often called "subjects." Whatever the reason, objects are not subjects. There is contradiction between the knower and known.

A good analogy of the relationship between self as subject and self as object is mirror image. When one looks in the mirror, the image of self is reversed laterally, but not longitudinally. The explanation for this "mirror image paradox" may be found in evolution. As Navon (1987) explains, mirror image is basically similar to the image of another animal in head-to-head encounter. Because of the way animals evolved on earth, the encountered animal is reversed laterally. Perhaps the reason for our feeling of strangeness toward our own mirror image, our usual reluctance to objectify ourselves, may have its evolutionary origin in encountering another being face to face. As quoted by Wicklund and Gollwitzer (1987), the tendency to avoid objectification of self was first demonstrated by Wolff (1932). One has a tendency to avoid pictures of one's face, but not one's hands or profile. What appears to be avoidance of self awareness may be the avoidance of front-to-front or face-to-face encounter. And, if subject-object reversal of self is similar to such an encounter, then lateral reversal of self is associated with subject-object reversal of self. The Freudian defense mechanism of projection, which attributes one's own motive to another person, may be but one instance of objectification of self leading to subject-object reversal.

Subject-object reversal of self is associated with lateral reversal of hemispheric locus of time information, and constitutes an instance of mirror image. Evidence in support of this assertion may be found in what is known as *perceptual aberration*, which is grossly distorted perception of one's own body. Perceptual aberration is regarded as a potential indicator of vulnerability to schizophrenia (Chapman, Chapman, and Raulin, 1978; Chapman, Edell, and Chapman, 1980). Perceptual aberration can be viewed as originating from extreme objectification of self. One may infer that subject-object reversal associated with perceptual aberration manifests itself as lateral reversal of brain hemi-

sphere locus of time information. Since such lateral reversal also characterizes schizophrenia, vulnerability to schizophrenia, inherent in perceptual aberration, may be due to such reversal. An experimental study (Mo and Chavez, 1986) was conducted to test this speculation. The *Perceptual Aberration Scale* was administered to a group of nonpsychotic college students who were subsequently ranked according to the scores they obtained. Then each student underwent a duration estimation experiment. A tone of fixed duration was followed by a single dark dot which was presented either to the left or to the right visual field. The tone was presented either to the left or to the right ear. The task was that of estimating the duration of the dot. There was a strong correlation between the ear difference and degree of perceptual aberration. For those who scored high on the *Perceptual Aberration Scale*, the duration estimation of the dot tended to be longer when the tone was presented to the right ear than to the left ear. For those who scored low, the duration estimation of the dot tended to be longer when the tone was presented to the left ear than to the right ear. There was a complete reversal of ear dominance associated with time information between those who scored high and those who scored low on the scale. On the other hand, there was little correlation between the effect of visual field and perceptual aberration. From these findings, one may conclude that extreme objectification of self, as reflected in corresponding degree of perceptual aberration, is associated with lateral reversal of brain hemisphere locus of exectancy. In short, self as object is basically an enantiomorph of self as subject. The fact that such subject-object reversal is associated with corresponding lateral reversal of brain hemisphere locus of time information indicates that the brain hemisphere lateral reversal represents spatialization of temporal reversal. The dialectical nature of self as demonstrated cannot be attributed to psychopathology of cognition for the simple reason that data are obtained from a nonpsychotic population.

### **Irrationality and Abnormality**

I use the term "logical Darwinism" to refer to a doctrine that human nature is essentially rational, and that evolution favors rationality. Dennett (1982), for example, asserts that natural selection favors beliefs which are true and strategies which are rational. Fodor (1981) contends that natural selection guarantees that animals know the element of logic. If we assume that human cognition is rational, then irrationality must be relegated to the domain of abnormality. The notion that irrationality is an indication of thought disorder is a convenient way of rejecting irrationality as a fundamental dimension of cognition.

According to the historical analysis of the notion of "madness" by Rosen (1968), exclusion of irrationality from the realm of reason, or uncoupling of

unreason from reason, seems to have originated in the era of Renaissance. As reflected in the philosophy of Descartes and Pascal, a person is regarded as having the endowed capacity to choose rational reason and to reject irrationality. Inability to reject irrationality, therefore, is a matter of volition. Since irrationality is volitional, it is subject to correction. Rational reason is norm. Irrationality, being merely "abnormal" in the sense of deviation from norm of reason, is excluded from reason. Similarity of such Renaissance view of cognition to logical Darwinism cannot be ignored. The former rejects irrationality by excluding it from reason; the latter rejects irrationality by appealing to natural selection. In neither case irrationality is viewed as an integral part or as a dialectical component of cognition. In order to show how irrationality may be related to rationality, the issue of the nature of delusion may be raised without assuming that rational reason constitutes norm of cognition.

Delusion is a system of rigid ideas and beliefs which resist testing. As such delusion is prior to experience, and is highly intensional. However, the intensionality of delusion is not necessarily an indication of irrationality. To illustrate this assertion, I examine several studies conducted within the context of the theory of Rational Emotive Therapy (Ellis, 1962). According to that theory, "intensionally" oriented people are those whose cognition and affect are influenced by the words they use. "Extensionally" oriented people are more influenced by empirical observations (see Korzybski, 1933). Stated in another way, intensionally oriented people are influenced by words which contain information about something, while extensionally oriented people are influenced by information obtained from observation. It has been shown that intensionally oriented people are more prone to form irrational beliefs, that is, delusions, than are extensional people (Milford and Tobacyk, 1985). Furthermore, the degree of irrationality is inversely related to the level of performance in the tasks of reading and comprehension, but not in the tasks of writing and mathematics (Prola, 1985, 1988). Why? The tasks of reading and comprehension require extraction of information from visual reading materials. The task is extensional. Such extensionality of task is in conflict with intensional orientation. On the other hand, writing requires information about what to write. Since information about something is intensional, the writing task, in contrast to the reading task, is therefore intensional. The implication is that the rationality-irrationality dimension of cognition makes sense only if the world is assumed to be totally extensional, and that human cognition, by nature and by its evolution, is regarded as rational. A similar analysis applies to the task of mathematics, which is generally a problem-solving task. The usual mathematics task, at least for students in the educational institutional, is to produce (write) a correct solution. In this sense, the mathematics task is similar to the writing task, and is intensional.

In schizophrenia, delusion is often accompanied by hallucination. Interpretation of hallucination may lead to delusion even if normal logical reasoning is used to arrive at the interpretation (Maher, 1974). Hallucination is sensory and perceptual, not cognitive. Therefore, hallucination is neither rational nor irrational. Even if what is rational in terms of cognition in the world of hallucination appears irrational to cognition in the world without hallucination, it is not necessary to infer that delusion is due to irrationality inherent in the world of hallucination.

To regard delusion merely as some kind of abnormality is to uphold rationality as the norm of cognition. Such a normative view contributes little to understanding the dialectical nature of cognitive components of delusion.

### Synthesis

The notion of time reversal, except in the realm of physics, assumes the appearance of paranormality or even abnormality. But what is the norm by which the appearance is judged? It is ultimately the ideology associated with the Thesis of Extensionality, the ideology which reduces cognition to the norm of truth and fallacy, with reality being founded on truth. Taking the example of entropical interpretation of time, how can one receive information before it is sent? To receive information which does not exist cannot be judged by the norm of reality founded upon truth. One may say that precognition is neither real nor unreal unless and until it is proven later to be real or unreal. However, as already discussed, prior time information (before) and posterior time information (after) are intensional and extensional, respectively, and can be reversed. Furthermore, such temporal reversal is spatialized in terms of lateral reversal of brain hemisphere locus associated with these two kinds of time information. Extreme objectification of self, as manifest in perceptual aberration, is associated with such reversal. If highly intensional delusion is believed to be true, then it is no longer intensional but becomes extensional. Delusion originates from reversal between intension and extension.

An inverse relation between self as the knower and subject, and self as the known and object, does exist. Reduction of self as subject to self as object is in line with the ideology of the Thesis of Extensionality. Warnings issued by clinicians against "narcissism" imply that the consequence of objectification of self is diminished self as subject. There is contradiction between self as the being and self as the known. Since those who have a high degree of perceptual aberration are regarded as possessing a high degree of vulnerability to schizophrenia, one may infer that those who tend to objectify self are prone to develop delusions. How can a person who is extensionally oriented toward self have intensional delusions? The answer is that subject-object reversal of self is also an indication of reversal between intensionality and extensionality.

To such a person, delusion is extensional. In a world in which temporality of logic is reversed, what is rational becomes irrational, and what is irrational becomes rational. Reversal between intension and extension, as with reversal between subject and object, is due to reversal of temporality of cognition which manifests itself in spatialized lateral reversal of brain hemisphere locus of time information. The world of delusion is a mirror image of the world.

In the dialectical process, contradiction between thesis and antithesis would result in synthesis. The stable state of self awareness is somewhere between self as the subject and self as the object, somewhere between the Zen Buddhist state of rejection of self as the object and the extreme narcissistic state of acceptance of self as object. In this sense, reality of self awareness is a state of synthesis. This view is not in accordance with the Hegelian, or with the Marxist, dialectic which is essentially hierarchical or transcendental. Synthesis of contradiction of self does not originate from reduction of self as subject to self as object, or vice versa. Synthesis of dialectical self originates from resistance against such reduction. We have the tendency to avoid self awareness. For example, as summarized by Wicklund and Gollwitzer (1987), there are tendencies to avoid one's own voice in comparison to other's voices, or to avoid a mirror when feeling of personal inadequacy is salient. Self as subject, or self as being, is often in contradiction to self awareness or self knowledge. On the other hand, we are capable of judging ourselves through objectification of self, even though we may be aversive to doing so. This kind of synthesis is in marked contrast to the extreme case of objectification of self as may be detected in the phenomenon of "pronoun reversal" characterizing autistic children who substitute third person pronoun for first person pronoun in communicating with others (Tramontana and Stimbert, 1970).

It may be noted that the dialectical nature of self is intrinsic to self, and is not derived from contradiction in interpersonal relationship. In a study of preference of photographic facial images (Mita, Dermer, and Knight, 1977), it was found that a person tends to choose the laterally reversed image of himself or herself, while that person's friends or lovers tend to choose the true image. The individual's self image is a mirror image—it is laterally reversed with respect to self as subject—but not to the image of others. When others are observing the person's self, they have no need to objectify their own selves. They are merely observing the observed person's self as subject, not the observed person's self as object. Consequently, the person's image is not reversed to them. Although the reversal between person's self image and person's image by others may appear to indicate some kind of interpersonal contradiction, it is contradiction intrinsic to self which is responsible for such reversal. Appearance of interpersonal contradiction is a reflection of contradiction between self as subject and self as object. Consequently, synthesis of such



apparent contradiction between self and others depends on synthesis of contradiction within dialectical self. Reality of self is synthesis, a state of balance arising from the contradiction between self as subject and self as object, and not a state of imbalance arising from reduction of self as subject to self as object or vice versa.

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