Prof. Dr. Alfred Toth

"If time returns to itself". On Peirce's semiotic time

1. In her article "Sign and Time" (1995, 2002), Walther noted that for Peirce, "time has no limit, and every portion of time is bounded by two instants", thus, there is nothing "absolutely first and last of time" (CP. 1.498), but one has to concede, "that time is a continuum" (CP. 1.499). As Walther further noticed, for Peirce, the same is true for the sign, "since there is neither a first nor a last sign. Since all signs must be interpreted, there must be always signs that have to be presupposed before a given or introduced sign in order to interpret a new sign. Therefore, signs are thirdness and build a real continuum, i.e., one can neither determine the beginning nor the end of signs. However, if time as well a signs represent 'real continua', then, so Peirce continues, one can ask for the form of time, and 'if time returns into itself, an oval line is an icon (or analytic picture) of it' (CP. 2.275)" (Walther 2002, p. 198).

Except for a first attempt at semiotic time structure (Toth 2008), it has hitherto been impossible to determine sign relations by aid of semiotic representation schemes, although the sign relation had been introduced as a triadic relation over three semiosic relations and thus processes which necessarily have to run down in time. Consequently, Walther restricts mentioning Bense's attempt at mapping the relation of the "sign of itself" to the Möbius band "as an icon of sign-connection. What the 'oval line' for Peirce, there is, for Max Bense, the Möbius band, which represents, at the same time, the cosmological connection. Peirce delivered a picture considering time, Bense brought one considering the sign. However, since both, sign and time, possess, as triadic relations, an identical characteristic, one can postulate for time what is valid for the sign. Therefore, the continuous time, too, is represented by the Möbius band" (Walther 2002, p. 198).

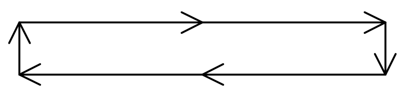
2. The Peircean sign as a triadic relation over firstness (1.), secondness (2.) and thirdness (3.) can be displayed in the following 6 possible semiotic orders:

(.3. > .2. > .1.)	(.1. > .2. > .3.)
(.3. > .1. > .2.)	(.2. > .1. > .3.)
(.1. > .3. > .2.)	(.2. > .3. > .1.)

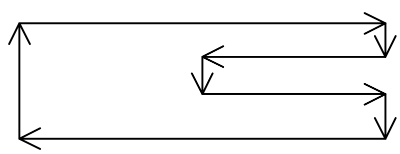
Since the transformation of an object into a meta-object and thus into a sign (Bense 1971, p. 9) needs time, we can associate each triadic value of a sign class or reality thematic in all its transpositions given above with a time-point t_i ($i = 1, 2, 3$). As "unmarked" time structure we will define the order of the sign classes (.3. > .2. > .1.). The "generative" (>) and "degenerative" (<) relations between the triadic values thus become relations of time-order, the sign itself gets a time-structure, and we may thus visualize the time-structures involved in form of semiotic representation schemes (cf. Toth 2008). Thus, we can differentiate between 18 different semiotic time-structures that can be grouped into the following 3 cycles:

1st cycle:

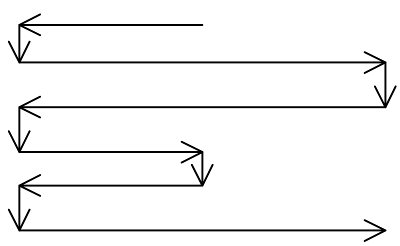
1. (3.1 2.1 1.3) → (1.3 2.1 3.1) → (3.1 2.1 1.3)
   $(t_1 > t_2 > t_3) \rightarrow (t_3 < t_2 < t_1) \rightarrow (t_1 > t_2 > t_3)$, L = 3



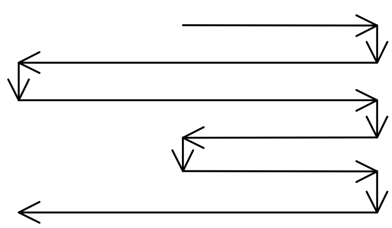
2. (3.1 1.3 2.1) → (2.1 1.3 3.1) → (3.1 1.3 2.1) → ∞
   $(t_1 > t_3 < t_2) \rightarrow (t_2 > t_3 < t_1) \rightarrow (t_1 > t_3 < t_2) \rightarrow \infty$



3. (2.1 3.1 1.3) → (1.3 3.1 2.1) → (2.1 3.1 1.3) → ∞
   $(t_2 < t_1 > t_3) \rightarrow (t_3 < t_1 > t_2) \rightarrow (t_2 < t_1 > t_3) \rightarrow \infty$

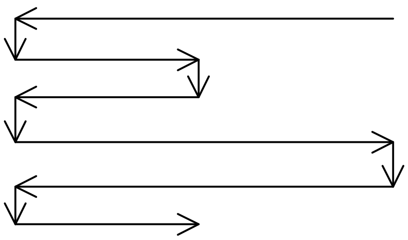


4. (2.1 1.3 3.1) → (3.1 1.3 2.1) → (2.1 1.3 3.1) → ∞
   $(t_2 > t_3 < t_1) \rightarrow (t_1 > t_3 < t_2) \rightarrow (t_2 > t_3 < t_1) \rightarrow \infty$

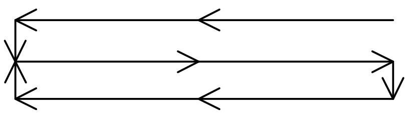


As one sees, nos. 3 and 4 of the 1st cycle stand in a mirror-relation to one another.

5. (1.3 3.1 2.1) $\rightarrow$ (2.1 3.1 1.3) $\rightarrow$ (1.3 3.1 2.1) $\rightarrow \infty$
   $(t_3 < t_1 > t_2) \rightarrow (t_2 < t_1 > t_3) \rightarrow (t_3 < t_1 > t_2) \rightarrow \infty$

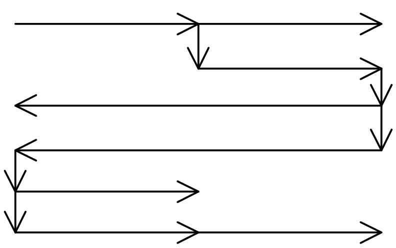


6. (1.3 2.1 3.1) $\rightarrow$ (3.1 2.1 1.3) $\rightarrow$ (1.3 2.1 3.1) $\rightarrow \infty$
   $(t_3 < t_2 < t_1) \rightarrow (t_1 > t_2 > t_3)\ \infty\ (t_3 < t_2 < t_1) \rightarrow \infty$

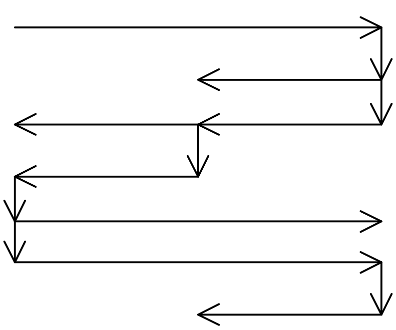


2nd cycle:

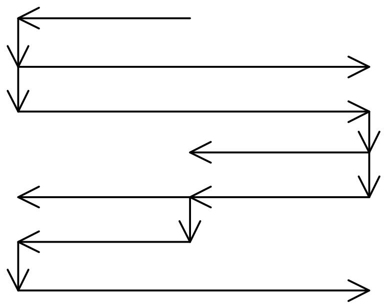
1. (3.1 2.1 1.3) $\rightarrow$ (2.1 1.3 3.1) $\rightarrow$ (1.3 3.1 2.1) $\rightarrow$ (3.1 2.1 1.3)
   $(t_1 > t_2 > t_3) \rightarrow (t_2 > t_3 < t_1) \rightarrow (t_3 < t_1 > t_2)$, $L = 3$



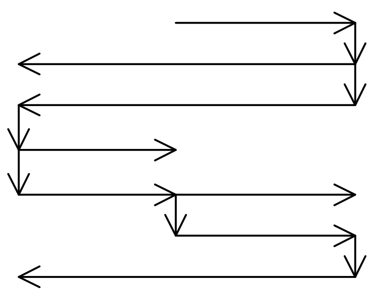
2. (3.1 1.3 2.1) $\rightarrow$ (1.3 2.1 3.1) $\rightarrow$ (2.1 3.1 1.3) $\rightarrow$ (3.1 1.3 2.1) $\rightarrow \infty$
   $(t_1 > t_3 < t_2) \rightarrow (t_3 < t_2 < t_1) \rightarrow (t_2 < t_1 > t_3) \rightarrow (t_1 > t_2 > t_3) \rightarrow \infty$



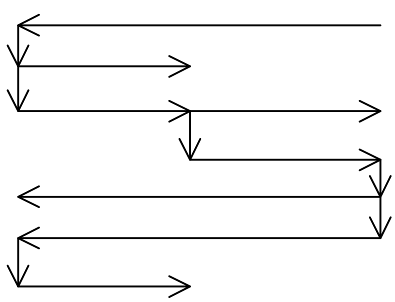
3. $(2.1\ 3.1\ 1.3) \rightarrow (3.1\ 1.3\ 2.1) \rightarrow (1.3\ 2.1\ 3.1) \rightarrow (2.1\ 3.1\ 1.3) \rightarrow \infty$
$(t_2 < t_1 > t_3) \rightarrow (t_1 > t_3 < t_2) \rightarrow (t_3 < t_2 < t_1) \rightarrow (t_2 < t_1 > t_3) \rightarrow \infty$



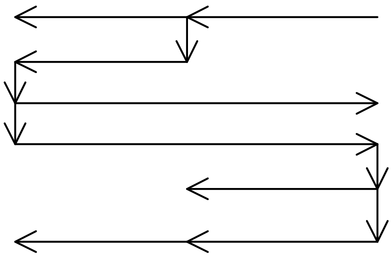
4. $(2.1\ 1.3\ 3.1) \rightarrow (1.3\ 3.1\ 2.1) \rightarrow (3.1\ 2.1\ 1.3) \rightarrow (2.1\ 1.3\ 3.1)$
$(t_2 > t_3 < t_1) \rightarrow (t_3 < t_1 > t_2) \rightarrow (t_1 > t_2 > t_3) \rightarrow (t_2 > t_3 < t_1)$, $L = 4$



5. $(1.3\ 3.1\ 2.1) \rightarrow (3.1\ 2.1\ 1.3) \rightarrow (2.1\ 1.3\ 3.1) \rightarrow (1.3\ 3.1\ 2.1)$
$(t_3 < t_1 > t_2) \rightarrow (t_1 > t_2 > t_3) \rightarrow (t_2 > t_3 < t_1) \rightarrow (t_3 < t_1 > t_2)$, $L = 4$



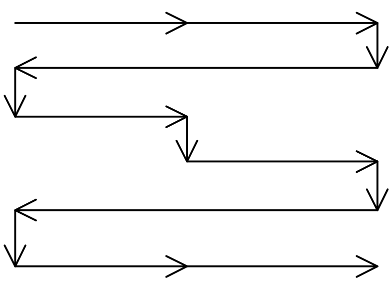
6. (1.3 2.1 3.1) → (2.1 3.1 1.3) → (3.1 1.3 2.1) → (1.3 2.1 3.1) → ∞
   $(t_3 > t_2 > t_1) \rightarrow (t_2 < t_1 < t_3) \rightarrow (t_1 > t_3 > t_2) \rightarrow (t_3 < t_2 < t_1) \rightarrow \infty$



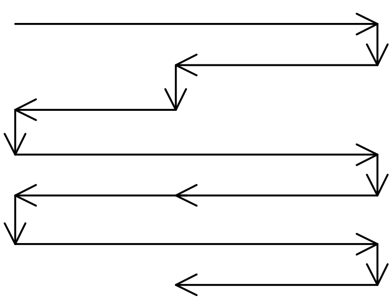
One recognizes easily that nos. 1/6, 2/5 and 3/4 stand in mirror-relations. Therefore, in the 2nd cycle of semiotic time structure, we have three basic structures plus the mirror-function.

3rd Cycle:

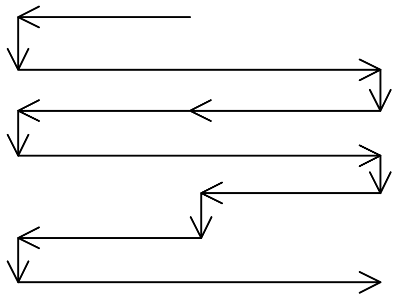
1. (3.1 2.1 1.3) → (1.3 3.1 2.1) → (2.1 1.3 3.1) → (3.1 2.1 1.3)
   $(t_1 > t_2 > t_3) \rightarrow (t_3 < t_1 > t_2) \rightarrow (t_2 < t_3 > t_1) \rightarrow (t_1 > t_2 > t_3)$, L = 4



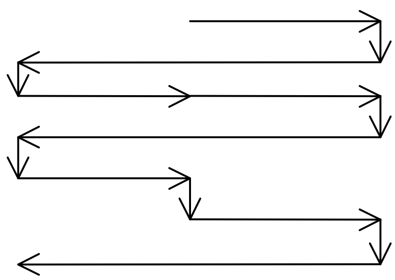
2. (3.1 1.3 2.1) → (2.1 3.1 1.3) → (1.3 2.1 3.1) → (3.1 1.3 2.1) → ∞
   $(t_1 > t_3 < t_2) \rightarrow (t_2 < t_1 > t_3) \rightarrow (t_3 < t_2 < t_1) \rightarrow (t_1 > t_3 < t_2) \rightarrow \infty$



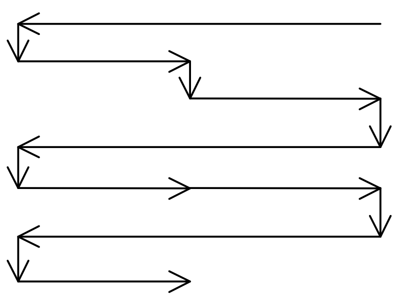
3. (2.1 3.1 1.3) $\rightarrow$ (1.3 2.1 3.1) $\rightarrow$ (3.1 1.3 2.1) $\rightarrow$ (2.1 3.1 1.3) $\rightarrow \infty$
$(t_2 < t_1 > t_3) \rightarrow (t_3 < t_2 < t_1) \rightarrow (t_1 > t_3 < t_2) \rightarrow (t_2 < t_1 > t_3) \rightarrow \infty$



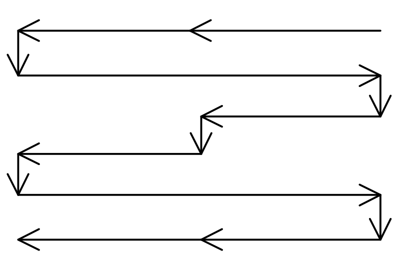
4. (2.1 1.3 3.1) $\rightarrow$ (3.1 2.1 1.3) $\rightarrow$ (1.3 3.1 2.1) $\rightarrow$ (2.1 1.3 3.1)
$(t_2 > t_3 < t_1) \rightarrow (t_1 > t_2 > t_3) \rightarrow (t_3 < t_1 > t_2) \rightarrow (t_2 > t_3 < t_1)$, $L = 4$



5. (1.3 3.1 2.1) $\rightarrow$ (2.1 1.3 3.1) $\rightarrow$ (3.1 2.1 1.3) $\rightarrow$ (1.3 3.1 2.1)
$(t_3 < t_1 > t_2) \rightarrow (t_2 > t_3 < t_1) \rightarrow (t_1 > t_2 > t_3) \rightarrow (t_3 < t_1 > t_2)$, $L = 4$



6. (1.3 2.1 3.1) $\rightarrow$ (3.1 1.3 2.1) $\rightarrow$ (2.1 3.1 1.3) $\rightarrow$ (1.3 2.1 3.1) $\rightarrow \infty$
$(t_3 < t_2 < t_1) \rightarrow (t_1 > t_3 < t_2) \rightarrow (t_2 < t_1 > t_3) \rightarrow (t_3 < t_2 < t_1) \rightarrow \infty$



Like in the 2nd cycle, also in the 3rd cycle the nos. 1/6, 2/5 and 3/4 stand in mirror-relations, and again we have three basic time-structures plus the mirror-function.

In one of his early philosophical works, Paul Mongré alias Felix Hausdorff (1897) criticized Nietzsche's theorem of Eternal Recurrence: "In all these considerations, the possible eternity of space, force, matter does not play a role. We have seen that already in three atoms to which we even had admitted an arbitrarily small space for their movement, the number of atomic groups is infinite. The reason is simply the presupposed continuosness of the variables inside of their boundaries, whereby it does not matter if these boundaries are finite or infinite. The smallest ball has always ∞^3 points, the unlimited straight line has only ∞. Thus, one would have to give up this presupposition of continuosness and consider the space as framework or beehive. In this case, however, there would be only a finite number of states of world, but by aid of these one would not be able to construct a world-line and a continuous flowing, and neither would we have a sensation of time. Therefore, Nietzsche's materialistic proof of the necessity of the Eternal Recurrence is disproved" (Mongré 1897, pp. 353 s.).

However, Mongré-Hausdorff's proof holds only from the standpoint of pure mathematics and physics, but not from mathematical semiotics, i.e. from the viewpoint of a discipline of mathematics in which meaning and sense and thus qualities in addition to pure quantity are involved. As we have seen, there are 3 semiotic time-cycles with totally 18 recurrent time structures, 11 of which are infinite, but 7 of which are finite. Therefore, at least for the 7 finite cases, Nietzsche's theorem of Eternal Recurrence holds, a principle, which is much better called, in German, "Die ewige Wiederkunft des Gleichen", lit. "The eternal return of the Same". Thus, as follows from the original German version, the theorem does not recur to time alone, but to the recurrence of an object in time and thus to an object that may be selected by an interpreter to be transformed into a meta-object and thus into a sign (Bense 1967, p. 9). Hence, Nietzsche's theorem coincides with Peirce's triadic time-structure, but it is not necessary to restrict oneself to the singular case of the dual-identical sign class (3.1 2.2 1.3) and its model, the Möbius band, in order to analyze semiotic time. Since semiotic time is involved in each transformation of an object into a meta-object and thus in the act of thetic introduction, different cycles of transpositions of sign classes also express the idea of semiotic time as time "that returns to itself" and thus to temporal recurrence.

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