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Elements of a surreal theory of the Night

Zwar hat der Idealismus mit dem Gedanken des im ewigen Jetzt vollendeten Logos das metaphysische Bewusstsein des Abendlandes bis an die Höhe des absoluten Todes herangeführt. Bewältigt aber hat er diese Idee nicht, denn er spricht nur von der absoluten Logik der Gedanken Gottes. Von der Möglichkeit einer absoluten Ethik der göttlichen Existenz, d.h. von einer Metaphysik des Willens, weiss er nichts. Und nirgends (ausser in zusammenhanglosen Einfällen Schellings) ist sein Wissen von der Ahnung berührt, dass die durchsichtige Helle des reinen Begriffs, die wie ein sonniges Mittagslicht über dem reellen Leben des konkreten Bewusstseins leuchtet, ihren Ursprung aus der transzentalen Nacht eines Willens, der noch nicht Entscheidung und deshalb noch nicht lebendige, durchleuchtete Wirklichkeit geworden ist, herleitet.

Gotthard Günther (1937, p. 45)

This work is my scientific last will. A.T.



PÁPAI MÁRTON: A POKOL KAPUJA

1. It is a strange fact, that the sign as a scheme of action, like the sign as a scheme of representation, both go back to Aristotle (cf. Trabant 1989, pp. 79 ss.), but do not play any role in Peirce's and Bense's semiotics. However, it is perhaps not by chance, that a definition of the sign as a scheme of action is lacking, although the development of the linguistic theory of action falls into the beginnings of the development of theoretical semiotics. However, it is a fact that the sign, in the framework of semiotics, is primarily not a scheme of action, because in its most general definition action means the "changing of a state of world" (Heinrichs 1980, p. 22). But states of world belong, in the terminology of Bense (1975, p. 65), to the "ontological space" of the pre-thetic objects, but not to the "semiotic space" of the thetic signs. In other words: In Peirce's and Bense's notion of the triadic sign which is based on the monocontextural separation between signs and object and where objects can thus only appear as object-relations, signs cannot change states of world, since they, too, can only be perceived as signs. Therefore, according to theoretical semiotics, signs can change signs, and in order to do such changes, a theory of action is not necessary. Thus, in classical monocontextural semiotics, the theory of the semioses substitutes a theory of action, because signs can never reach their transcendental object and cannot change ontological, but only semiotic states of world.

However, it is a fact, too, which is at least known outside of classical semiotics that signs can have effect out of their semiotic space and inside of the ontological space of the object, events, states, etc. For example, a command can start a war. But also the inverse process, thus the changing of signs by objects, is well-known. E.g., the better knowledge of high-energy physics has several times changes atomic models, which had already been believed as correct. Hence, if someone wants to construct a semiotic theory of action that goes beyond a linguistic theory of action based again on (linguistic) signs and that is powerful enough of letting signs influence reality and vice versa, then it is necessary to abolish the border between sign and reality, i.e to replace moncontextural through polycontextural semiotics.

2. Such a model of a polycontextural semiotics has been displayed by the present author (Toth 2008b) under the name of “Pre-Semiotics”, because the sign model which is the basis,

$$PZR = (3.a \ 2.b \ 1.c \ 0.d)$$

contains the object, which is represented by the artificial or natural sign, as a categorial object (0.d) and thus settles one step before thetic semiosis, in the space between the ontological and the semiotic space.

Now I have already shown in Toth (2008a, pp. 177 ss.) that every triadic sign class has 6 permutations. Consequently, every tetradic sign class has 24 permutations. In Toth (2008c, pp. 220 ss.), I have further shown that each of these 24 permutations can be introduced as semiotic schemes of actions. Since each tetradic sign class has a dual reality thematic, we thus get for 15 pre-semiotic dual systems first $15 \cdot 2 \cdot 24 = 720$ tetradic semiotic schemes of action. Furthermore, in Toth (2008c) it had been shown that a tetradic sign class has exactly the following $4 + 15 + 24 + 24 = 67$ partial relations:

monadic partial relations: (0.), (1.), (2.), (3.).

dyadic partial relations: (0.1), (0.2), (0.3), (1.0), (2.0), (3.0), (1.1),
(1.2), (1.3), (2.1), (2.2), (2.3), (3.1), (3.2),
(3.3).

triadic partial relations: (0., 2., 1.), (0., 1., 2.), (1., 2., 0.), (1., 0., 2), (2.,
1., 0.), (2., 0., 1), (3., 2., 1.), (3., 1., 2.), (2., 3.,
1.), (2., 1., 3.), (1., 3., 2.), (1., 2., 3),
(0., 3., 2.), (0., 2., 3.), (2., 3., 0.), (2., 0., 3.), (3.,
2., 0.), (3., 0., 2.),
(0., 3., 1.), (0., 1., 3.), (1., 3., 0.), (1., 0., 3.), (3.,
1., 0.), (3., 0., 1.).

tetradic partial relations: (3., 2., 1., 0.), (2., 3., 1., 0.), (2., 1., 3., 0.), (1., 2.,
3., 0.), (3., 1., 2., 0.), (1., 3., 2., 0.), (2., 3., 0., 1.),
(3., 2., 0., 1.), (2., 1., 0., 3.), (1., 2., 0., 3.), (3., 1.,
0., 2.), (1., 3., 0., 2.), (2., 0., 3., 1.), (3., 0., 2., 1.),
(2., 0., 1., 3.), (1., 0., 2., 3.), (3., 0., 1., 2.), (1., 0.,

$(3., 2.), (0., 2., 3., 1.), (0., 3., 2., 1.), (0., 1., 2., 3.),$
 $(0., 2., 1., 3.), (0., 3., 1., 2.), (0., 1., 3., 2.).$

We thus get totally $15 \cdot 2 \cdot 67 = 2'010$ semiotic schemes of actions, which are polycontextural already because of the elimination of the discontexturality between sign and object and the embedding of the object qua categorial object into the sign relation.

3. In Toth (2008c), I have also shown that the pre-semiotic tetradic sign relation is complete regarding to epistemological, logical and ontological relation insofar as we have the following correspondences between logical relations and semiotic categories:

subjective subject (sS)	\equiv	Thirdness (interpretant relation, I)
objective object (oO)	\equiv	Secondness (Object relation, O)
subjective object (sO)	\equiv	Firstness (medium relation, M)
objective subject (oS)	\equiv	Zeroness (quality, Q)

Therefore, we can display the above 67 semiotic-numerical partial relations also in the following semiotic-logical form:

Monadic semiotic-logical partial relations:

$(sO), (oS), (oO), (sS).$

Dyadic semiotic-logical partial relations:

$((sO), (oS)); ((sO), (oO)); ((sO), (sS)); ((oS), (sO)); ((oO), (sO)); ((sS), (sO));$
 $((oS), (oS)); ((oS), (oO)); ((oS), (sS)); ((oO), (oS)); ((oO), (oO));$
 $((oO), (sS)); ((sS), (oS)); ((sS), (oO)), ((sS), (sS)).$

Triadic semiotic-logical partial relations:

$((sO), (oO), (oS)); ((sO), (oS)), (oO)); ((oS), (oO), (sO)); ((oS), (sO),$
 $(oO)); ((oO), (oS), (sO)); ((oO), (sO), (oS)); ((sS), (oO), (oS)); ((sS),$
 $(oS), (oO)); ((oO), (sS), (oS)); ((oO), (oS), (sS)); ((oS), (sS), (oO));$
 $((oS), (oO), (sS)); ((sO), (sS), (oO)); ((sO), (oO), (sS)); ((oO), (sS), (sO));$
 $((oO), (sO), (sS)); ((sS), (oO), (sO)); ((sS), (sO), (oO)); ((sO), (sS),$

(oS) ; $((s0), (oS), (sS))$; $((oS), (sS), (s0))$; $((oS), (s0), (sS))$; $((sS), (oS), (s0))$; $((sS), (s0), (oS))$.

A triadic partial relation of a tetradic semiotic relation is a combinatorial selection of the four pre-semiotic categories $(0.)$, $(.1.)$, $(.2.)$, $(.3.)$ or $(s0)$, (oS) , $(o0)$, (sS) , respectively. I.e., we thus can either $(0., .1., .2.)$, $(.1., .2., .3.)$, $(0., .2., .3.)$ or $(0., .1., .3.)$ combine to triads. In doing so, we get the following $2 \cdot 24 = 48$ permutations:

$(0.d\ 2.b\ 1.c) \times (c.1\ b.2\ d.0)$	$\rightarrow ((s0), (o0), (oS)) \times ((s0), (o0), (oS))$
$(0.d\ 1.c\ 2.b) \times (b.2\ c.1\ d.0)$	$\rightarrow ((s0), (oS), (o0)) \times ((o0), (s0), (oS))$
$(1.c\ 2.b\ 0.d) \times (d.0\ b.2\ c.1)$	$\rightarrow ((oS), (o0), (s0)) \times ((oS), (o0), (s0))$
$(1.c\ 0.d\ 2.b) \times (b.2\ d.0\ c.1)$	$\rightarrow ((oS), (s0), (o0)) \times ((o0), (oS), (s0))$
$(2.b\ 1.c\ 0.d) \times (d.0\ c.1\ b.2)$	$\rightarrow ((o0), (oS), (s0)) \times ((oS), (s0), (o0))$
$(2.b\ 0.d\ 1.c) \times (c.1\ d.0\ b.2)$	$\rightarrow ((o0), (s0), (oS)) \times ((s0), (oS), (o0))$
$(3.a\ 2.b\ 1.c) \times (c.1\ b.2\ a.3)$	$\rightarrow ((sS), (o0), (oS)) \times ((s0), (o0), (sS))$
$(3.a\ 1.c\ 2.b) \times (b.2\ c.1\ a.3)$	$\rightarrow ((sS), (oS), (o0)) \times ((o0), (s0), (sS))$
$(2.b\ 3.a\ 1.c) \times (c.1\ a.3\ b.2)$	$\rightarrow ((o0), (sS), (oS)) \times ((s0), (sS), (o0))$
$(2.b\ 1.c\ 3.a) \times (a.3\ c.1\ b.2)$	$\rightarrow ((o0), (oS), (sS)) \times ((sS), (s0), (o0))$
$(1.c\ 3.a\ 2.b) \times (b.2\ a.3\ c.1)$	$\rightarrow ((oS), (sS), (o0)) \times ((o0), (sS), (s0))$
$(1.c\ 2.b\ 3.a) \times (a.3\ b.2\ c.1)$	$\rightarrow ((oS), (o0), (sS)) \times ((sS), (o0), (s0))$
$(0.d\ 3.a\ 2.b) \times (b.2\ a.3\ d.0)$	$\rightarrow ((s0), (sS), (o0)) \times ((o0), (sS), (oS))$
$(0.d\ 2.b\ 3.a) \times (a.3\ b.2\ d.0)$	$\rightarrow ((s0), (o0), (sS)) \times ((sS), (o0), (oS))$
$(2.b\ 3.a\ 0.d) \times (d.0\ a.3\ b.2)$	$\rightarrow ((o0), (sS), (s0)) \times ((oS), (sS), (o0))$
$(2.b\ 0.d\ 3.a) \times (a.3\ d.0\ b.2)$	$\rightarrow (o0), (s0), (sS)) \times ((sS), (oS), (o0))$
$(3.a\ 2.b\ 0.d) \times (d.0\ b.2\ a.3)$	$\rightarrow ((sS), (o0), (s0)) \times ((oS), (o0), (sS))$
$(3.a\ 0.d\ 2.b) \times (b.2\ d.0\ a.3)$	$\rightarrow ((sS), (s0), (o0)) \times ((o0), (oS), (sS))$
$(0.d\ 3.a\ 1.c) \times (c.1\ a.3\ d.0)$	$\rightarrow ((s0), (sS), (oS)) \times ((s0), (sS), (oS))$
$(0.d\ 1.c\ 3.a) \times (a.3\ c.1\ d.0)$	$\rightarrow ((s0), (oS), (sS)) \times ((sS), (s0), (oS))$
$(1.c\ 3.a\ 0.d) \times (d.0\ a.3\ c.1)$	$\rightarrow ((oS), (sS), (s0)) \times ((oS), (sS), (s0))$
$(1.c\ 0.d\ 3.a) \times (a.3\ d.0\ c.1)$	$\rightarrow ((oS), (s0), (sS)) \times ((sS), (oS), (s0))$
$(3.a\ 1.c\ 0.d) \times (d.0\ c.1\ a.3)$	$\rightarrow ((sS), (oS), (s0)) \times ((oS), (s0), (sS))$
$(3.a\ 0.d\ 1.c) \times (c.1\ d.0\ a.3)$	$\rightarrow ((sS), (s0), (oS)) \times ((s0), (oS), (sS))$

Tetradic semiotic-logical partial relations:

$((sS), (o0), (oS), (s0))$; $((o0), (sS), (oS), (s0))$; $((o0), (oS), (sS), (s0))$;
 $((oS), (o0), (sS), (s0))$; $((sS), (oS), (o0), (s0))$; $((oS), (sS), (o0), (s0))$;

$((o0), (sS), (s0), (oS)); ((sS), (o0), (s0), (oS)); ((o0), (oS), (s0), (sS));$
 $((oS), (o0), (s0), (sS)); ((sS), (oS), (s0), (o0)); ((oS), (sS), (s0), (o0));$
 $((o0), (s0), (sS), (oS)); ((sS), (s0), (o0), (oS)); ((o0), (s0), (oS), (sS));$
 $((oS), (s0), (o0), (sS)); ((sS), (s0), (oS), (o0)); ((oS), (s0), (sS), (o0));$
 $((s0), (o0), (sS), (oS)); ((s0), (sS), (o0), (oS)); ((s0), (oS), (o0), (sS));$
 $((s0), (o0), (oS), (sS)); ((s0), (sS), (oS), (o0)); ((s0), (oS), (sS), (o0)).$

Complete listing of the $2 \cdot 24 = 48$ tetradic permutations:

$(3.a\ 2.b\ 1.c\ 0.d) \times (d.0\ c.1\ b.2\ a.3) \rightarrow$
 $((sS), (o0), (oS), (s0)) \times ((oS), (s0), (o0), (sS))$
 $(2.b\ 3.a\ 1.c\ 0.d) \times (d.0\ c.1\ a.3\ b.2) \rightarrow$
 $((o0), (sS), (oS), (s0)) \times ((oS), (s0), (sS), (o0))$
 $(2.b\ 1.c\ 3.a\ 0.d) \times (d.0\ a.3\ c.1\ b.2) \rightarrow$
 $((o0), (oS), (sS), (s0)) \times ((oS), (sS), (s0), (o0))$
 $(1.c\ 2.b\ 3.a\ 0.d) \times (d.0\ a.3\ b.2\ c.1) \rightarrow$
 $((oS), (o0), (sS), (s0)) \times ((oS), (sS), (o0), (s0))$
 $(3.a\ 1.c\ 2.b\ 0.d) \times (d.0\ b.2\ c.1\ a.3) \rightarrow$
 $((sS), (oS), (o0), (s0)) \times ((oS), (o0), (s0), (sS))$
 $(1.c\ 3.a\ 2.b\ 0.d) \times (d.0\ b.2\ a.3\ c.1) \rightarrow$
 $((oS), (sS), (o0), (s0)) \times ((oS), (o0), (sS), (s0))$
 $(2.b\ 3.a\ 0.d\ 1.c) \times (c.1\ d.0\ a.3\ b.2) \rightarrow$
 $((o0), (sS), (s0), (oS)) \times ((s0), (oS), (sS), (o0))$
 $(3.a\ 2.b\ 0.d\ 1.c) \times (c.1\ d.0\ b.2\ a.3) \rightarrow$
 $((sS), (o0), (s0), (oS)) \times ((s0), (oS), (o0), (sS))$
 $(2.b\ 1.c\ 0.d\ 3.a) \times (a.3\ d.0\ c.1\ b.2) \rightarrow$
 $((o0), (oS), (s0), (sS)) \times ((sS), (oS), (s0), (o0))$
 $(1.c\ 2.b\ 0.d\ 3.a) \times (a.3\ d.0\ b.2\ c.1) \rightarrow$
 $((oS), (o0), (s0), (sS)) \times ((sS), (oS), (o0), (s0))$
 $(3.a\ 1.c\ 0.d\ 2.b) \times (b.2\ d.0\ c.1\ a.3)$
 $((sS), (oS), (s0), (o0)) \times ((o0), (oS), (s0), (sS))$
 $(1.c\ 3.a\ 0.d\ 2.b) \times (b.2\ d.0\ a.3\ c.1) \rightarrow$
 $((oS), (sS), (s0), (o0)) \times ((o0), (oS), (sS), (s0))$
 $(2.b\ 0.d\ 3.a\ 1.c) \times (c.1\ a.3\ d.0\ b.2) \rightarrow$
 $((o0), (s0), (sS), (oS)) \times ((s0), (sS), (oS), (o0))$
 $(3.a\ 0.d\ 2.b\ 1.c) \times (c.1\ b.2\ d.0\ a.3) \rightarrow$
 $((sS), (s0), (o0), (oS)) \times ((s0), (o0), (oS), (sS))$
 $(2.b\ 0.d\ 1.c\ 3.a) \times (a.3\ c.1\ d.0\ b.2) \rightarrow$

$$\begin{aligned}
& ((o0), (s0), (oS), (sS)) \times ((sS), (s0), (oS), (o0)) \\
& (1.c\ 0.d\ 2.b\ 3.a) \times (a.3\ b.2\ d.0\ c.1) \rightarrow \\
& ((oS), (s0), (o0), (sS)) \times ((sS), (o0), (oS), (s0)) \\
& (3.a\ 0.d\ 1.c\ 2.b) \times (b.2\ c.1\ d.0\ a.3) \rightarrow \\
& ((sS), (s0), (oS), (o0)) \times ((o0), (s0), (oS), (sS)) \\
& (1.c\ 0.d\ 3.a\ 2.b) \times (b.2\ a.3\ d.0\ c.1) \rightarrow \\
& ((oS), (s0), (sS), (o0)) \times ((o0), (sS), (oS), (s0)) \\
& (0.d\ 2.b\ 3.a\ 1.c) \times (c.1\ a.3\ b.2\ d.0) \rightarrow \\
& ((s0), (o0), (sS), (oS)) \times ((s0), (sS), (o0), (oS)) \\
& (0.d\ 3.a\ 2.b\ 1.c) \times (c.1\ b.2\ a.3\ d.0) \rightarrow \\
& ((s0), (sS), (o0), (oS)) \times ((s0), (o0), (sS), (oS)) \\
& (0.d\ 1.c\ 2.b\ 3.a) \times (a.3\ b.2\ c.1\ d.0) \rightarrow \\
& ((s0), (oS), (o0), (sS)) \times ((sS), (o0), (s0), (oS)) \\
& (0.d\ 2.b\ 1.c\ 3.a) \times (a.3\ c.1\ b.2\ d.0) \rightarrow \\
& ((s0), (o0), (oS), (sS)) \times ((sS), (s0), (o0), (oS)) \\
& (0.d\ 3.a\ 1.c\ 2.b) \times (b.2\ c.1\ a.3\ d.0) \rightarrow \\
& ((s0), (sS), (oS), (o0)) \times ((o0), (s0), (sS), (oS)) \\
& (0.d\ 1.c\ 3.a\ 2.b) \times (b.2\ a.3\ c.1\ d.0) \rightarrow \\
& ((s0), (oS), (sS), (o0)) \times ((o0), (sS), (s0), (oS))
\end{aligned}$$

5. However, as Rudolf Kaehr (2008a, b, c) has shown, a sign relation is not really polycontextural solely by embedding the categorial object into the triadic Peircean sign relation, but the sub-signs constituting the sign relation must be mapped to semiotic contexts. This idea of Kaehr's has, as I have already pointed out before, a splendid impact for the future development of mathematical semiotics. In order to map semiotic contexts as inner environments to the sub-signs of a pre-semiotic tetradic sign relation, we will use the following 4-adic polycontextural semiotic 4×4 matrix:

	0	1	2	3
0	$(0.0)_{3,2,1}$	$(0.1)_{1,3}$	$(0.2)_{1,2}$	$(0.3)_{2,3}$
1	$(1.0)_{3,1}$	$(1.1)_{1,3,4}$	$(1.2)_{1,4}$	$(1.3)_{3,4}$
2	$(2.0)_{2,1}$	$(2.1)_{1,4}$	$(2.2)_{1,2,4}$	$(2.3)_{2,4}$
3	$(3.0)_{3,2}$	$(3.1)_{3,4}$	$(3.2)_{2,4}$	$(3.3)_{2,3,4}$

Since the pre-semiotic sign relation is tetradic, but trichotomic, the four sub-signs to the left of the thick black line can only appear in reality thematics and thus change the order of their contextual numbers from morphistic to hetero-morphistic order. Thus, the above matrix is a “porte-manteau”-matrix of two matrices.

As Günther stated: “Being is the birthplace of Thinking, but Nothing is the homeland of the Will. In the Nothing there is nothing to see as long as we do not decide to enter the Nothing and build there a world according to the laws of negativity. This world God has not yet created, and there is not a world plan for it either, before the Thinking did not describe it in a negative language” (Günther 1937, p. 45). “The transparent clearness of the pure notion, that shines like a sunny midday-light over the real live of the concrete consciousness, has its origin out of the transcendental Night of a Will that has not yet become decision and thus not yet living, translucent reality” (Günther 1980, p. 288). We obtain that the night is the reign of the Will. Since the Will needs a negative language to formulate its vocabulary, the negative languages can only consist of directions of actions. The actions, however, we can formulate precisely on the basis of pre-semiotics. Together with the inner environments, we have a real polycontextural pre-semiotics as a theory of a Theory of the Night.

6. Since the action schemata of the 4 monadic semiotic partial relations

(sO) , (oS) , (oO) , (sS)

as well as of the 15 dyadic semiotic partial relations

$$\begin{array}{llll}
(s0) \leftrightarrow (oS) & (sS) \leftrightarrow (s0) & (o0) \leftrightarrow (o0) \\
(s0) \leftrightarrow (o0) & (oS) \leftrightarrow (oS) & (o0) \leftrightarrow (sS) \\
(s0) \leftrightarrow (sS) & (oS) \leftrightarrow (o0) & (sS) \leftrightarrow (oS) \\
(oS) \leftrightarrow (s0) & (oS) \leftrightarrow (sS) & (sS) \leftrightarrow (o0) \\
(o0) \leftrightarrow (s0) & (o0) \leftrightarrow (oS) & (sS) \leftrightarrow (sS)
\end{array}$$

are trivial, we restrict ourselves here to show up the 24 triadic and the 24 tetradic semiotic partial relations for all 15 pre-semiotic sign classes and their reality thematics together with the semiotic contextures from a 4-contextural 4-adic semiotic matrix.

7. Since surreal numbers (Conway/Guy 1996, pp. 283 ss.) can be defined in several ways, we will agree with the following definitions:

I. Action schemata of the $2 \cdot 24$ triadic semiotic partial relations

1. Pre-semiotic dual system

$$\begin{aligned}
& (\{2| \}.\{0| \}_{\{2| \},\{3| \}} \{1| \}.\{0| \}_{\{0| \},\{3| \}} \{0| \}.\{0| \}_{\{0| \},\{2| \},\{3| \}} \{ | \}) \\
& \{0| \}_{\{0| \},\{2| \}} \times \\
& (\{0| \}.\{ | \}_{\{2| \},\{0| \}} \{0| \}.\{0| \}_{\{3| \},\{2| \},\{0| \}} \{0| \}.\{1| \}_{\{3| \},\{0| \}} \{0| \}) \\
& \{2| \}_{\{3| \},\{2| \}})
\end{aligned}$$

Qualitative action

$$\begin{array}{ll}
(\{1| \}.\{0| \}_{\{0| \},\{3| \}}) & (\{0| \}.\{0| \}_{\{3| \},\{2| \},\{0| \}}) \\
\wedge \gg (\{ | \}.\{0| \}_{\{0| \},\{2| \}}) & \times \quad \wedge \gg (\{0| \}.\{ | \}_{\{2| \},\{0| \}}) \\
(\{0| \}.\{0| \}_{\{0| \},\{2| \},\{3| \}}) & (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\[10mm]
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) & (\{0| \}.\{0| \}_{\{3| \},\{2| \},\{0| \}}) \\
\wedge \gg (\{ | \}.\{0| \}_{\{0| \},\{2| \}}) & \times \quad \wedge \gg (\{0| \}.\{ | \}_{\{2| \},\{0| \}}) \\
(\{0| \}.\{0| \}_{\{0| \},\{2| \},\{3| \}}) & (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\[10mm]
(\{0| \}.\{0| \}_{\{0| \},\{2| \},\{3| \}}) & (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
\wedge \gg (\{ | \}.\{0| \}_{\{0| \},\{2| \}}) & \times \quad \wedge \gg (\{0| \}.\{ | \}_{\{2| \},\{0| \}}) \\
(\{1| \}.\{0| \}_{\{0| \},\{3| \}}) & (\{0| \}.\{0| \}_{\{3| \},\{2| \},\{0| \}})
\end{array}$$

Objectal action

$$\begin{aligned} & (\{0\}. \{0\}_{\{0\}, \{2\}, \{3\}}) \\ & \quad \wedge \gg (\{1\}. \{0\}_{\{0\}, \{3\}}) \times \\ & (\{1\}. \{0\}_{\{0\}, \{2\}}) \end{aligned}$$

$$\begin{aligned} & (\{0\}. \{1\}_{\{2\}, \{0\}}) \\ & \wedge \gg (\{0\}. \{1\}_{\{3\}, \{0\}}) \\ & (\{0\}. \{0\}_{\{3\}, \{2\}, \{0\}}) \end{aligned}$$

$$\begin{aligned} & (\{2\}. \{0\}_{\{2\}, \{3\}}) \\ & \quad \wedge \gg (\{1\}. \{0\}_{\{0\}, \{3\}}) \times \\ & (\{1\}. \{0\}_{\{0\}, \{2\}}) \end{aligned}$$

$$\begin{aligned} & (\{0\}. \{1\}_{\{2\}, \{0\}}) \\ & \wedge \gg (\{0\}. \{1\}_{\{3\}, \{0\}}) \\ & (\{0\}. \{2\}_{\{3\}, \{2\}}) \end{aligned}$$

$$\begin{aligned} & (\{1\}. \{0\}_{\{0\}, \{2\}}) \\ & \quad \wedge \gg (\{1\}. \{0\}_{\{0\}, \{3\}}) \times \\ & (\{0\}. \{0\}_{\{0\}, \{2\}, \{3\}}) \end{aligned}$$

$$\begin{aligned} & (\{0\}. \{0\}_{\{3\}, \{2\}, \{0\}}) \\ & \wedge \gg (\{0\}. \{1\}_{\{3\}, \{0\}}) \\ & (\{0\}. \{1\}_{\{2\}, \{0\}}) \end{aligned}$$

$$\begin{aligned} & (\{2\}. \{0\}_{\{2\}, \{3\}}) \\ & \quad \wedge \gg (\{1\}. \{0\}_{\{0\}, \{3\}}) \times \\ & (\{0\}. \{0\}_{\{0\}, \{2\}, \{3\}}) \end{aligned}$$

$$\begin{aligned} & (\{0\}. \{0\}_{\{3\}, \{2\}, \{0\}}) \\ & \wedge \gg (\{0\}. \{1\}_{\{3\}, \{0\}}) \\ & (\{0\}. \{2\}_{\{3\}, \{2\}}) \end{aligned}$$

$$\begin{aligned} & (\{0\}. \{0\}_{\{0\}, \{2\}, \{3\}}) \\ & \quad \wedge \gg (\{1\}. \{0\}_{\{0\}, \{3\}}) \times \\ & (\{2\}. \{0\}_{\{2\}, \{3\}}) \end{aligned}$$

$$\begin{aligned} & (\{0\}. \{2\}_{\{3\}, \{2\}}) \\ & \wedge \gg (\{0\}. \{1\}_{\{3\}, \{0\}}) \\ & (\{0\}. \{0\}_{\{3\}, \{2\}, \{0\}}) \end{aligned}$$

$$\begin{aligned} & (\{1\}. \{0\}_{\{0\}, \{2\}}) \\ & \quad \wedge \gg (\{1\}. \{0\}_{\{0\}, \{3\}}) \times \\ & (\{2\}. \{0\}_{\{2\}, \{3\}}) \end{aligned}$$

$$\begin{aligned} & (\{0\}. \{2\}_{\{3\}, \{2\}}) \\ & \wedge \gg (\{0\}. \{1\}_{\{3\}, \{0\}}) \\ & (\{0\}. \{1\}_{\{2\}, \{0\}}) \end{aligned}$$

Interpretative action

$$\begin{aligned} & (\{1\}. \{0\}_{\{0\}, \{3\}}) \\ & \quad \wedge \gg (\{2\}. \{0\}_{\{2\}, \{3\}}) \times \\ & (\{1\}. \{0\}_{\{0\}, \{2\}}) \end{aligned}$$

$$\begin{aligned} & (\{0\}. \{1\}_{\{2\}, \{0\}}) \\ & \wedge \gg (\{0\}. \{2\}_{\{3\}, \{2\}}) \\ & (\{0\}. \{1\}_{\{3\}, \{0\}}) \end{aligned}$$

$$\begin{aligned} & (\{0\}. \{0\}_{\{0\}, \{2\}, \{3\}}) \\ & \quad \wedge \gg (\{2\}. \{0\}_{\{2\}, \{3\}}) \times \\ & (\{1\}. \{0\}_{\{0\}, \{2\}}) \end{aligned}$$

$$\begin{aligned} & (\{0\}. \{1\}_{\{2\}, \{0\}}) \\ & \wedge \gg (\{0\}. \{2\}_{\{3\}, \{2\}}) \\ & (\{0\}. \{0\}_{\{3\}, \{2\}, \{0\}}) \end{aligned}$$

$$\begin{array}{ll}
(\{1\}.\{0\}_{\{0\},\{3\}}) & (\{0\}.\{0\}_{\{3\},\{2\},\{0\}}) \\
\lambda \gg (\{2\}.\{0\}_{\{2\},\{3\}}) & \times \quad \lambda \gg (\{0\}.\{2\}_{\{3\},\{2\}}) \\
(\{0\}.\{0\}_{\{0\},\{2\},\{3\}}) & (\{0\}.\{1\}_{\{3\},\{0\}}) \\[10pt]
(\{\}\{0\}_{\{0\},\{2\}}) & (\{0\}.\{0\}_{\{3\},\{2\},\{0\}}) \\
\lambda \gg (\{2\}.\{0\}_{\{2\},\{3\}}) & \times \quad \lambda \gg (\{0\}.\{2\}_{\{3\},\{2\}}) \\
(\{0\}.\{0\}_{\{0\},\{2\},\{3\}}) & (\{0\}.\{\}\{2\}_{\{0\}}) \\[10pt]
(\{0\}.\{0\}_{\{0\},\{2\},\{3\}}) & (\{0\}.\{1\}_{\{3\},\{0\}}) \\
\lambda \gg (\{2\}.\{0\}_{\{2\},\{3\}}) & \times \quad \lambda \gg (\{0\}.\{2\}_{\{3\},\{2\}}) \\
(\{1\}.\{0\}_{\{0\},\{3\}}) & (\{0\}.\{0\}_{\{3\},\{2\},\{0\}}) \\[10pt]
(\{\}\{0\}_{\{0\},\{2\}}) & (\{0\}.\{1\}_{\{3\},\{0\}}) \\
\lambda \gg (\{2\}.\{0\}_{\{2\},\{3\}}) & \times \quad \lambda \gg (\{0\}.\{2\}_{\{3\},\{2\}}) \\
(\{1\}.\{0\}_{\{0\},\{3\}}) & (\{0\}.\{\}\{2\}_{\{0\}})
\end{array}$$

2. Pre-semiotic dual system

$$\begin{array}{l}
(\{2\}.\{0\}_{\{2\},\{3\}}\{1\}.\{0\}_{\{0\},\{3\}}\{0\}.\{0\}_{\{0\},\{2\},\{3\}}\{\}\{1\} \\
\{0\},\{1\}) \times \\
(\{1\}.\{\}\{1\},\{0\})\{0\}.\{0\}_{\{3\},\{2\},\{0\}}\{0\}.\{1\}_{\{3\},\{0\}}\{0\}.\{2\} \\
\{3\},\{2\})
\end{array}$$

Qualitative action

$$\begin{array}{ll}
(\{1\}.\{0\}_{\{0\},\{3\}}) & (\{0\}.\{0\}_{\{3\},\{2\},\{0\}}) \\
\lambda \gg (\{\}\{1\}_{\{0\},\{1\}}) & \times \quad \lambda \gg (\{1\}.\{\}\{1\}_{\{0\}}) \\
(\{0\}.\{0\}_{\{0\},\{2\},\{3\}}) & (\{0\}.\{1\}_{\{3\},\{0\}}) \\[10pt]
(\{2\}.\{0\}_{\{2\},\{3\}}) & (\{0\}.\{0\}_{\{3\},\{2\},\{0\}}) \\
\lambda \gg (\{\}\{1\}_{\{0\},\{1\}}) & \times \quad \lambda \gg (\{1\}.\{\}\{1\}_{\{0\}}) \\
(\{0\}.\{0\}_{\{0\},\{2\},\{3\}}) & (\{0\}.\{2\}_{\{3\},\{2\}}) \\[10pt]
(\{0\}.\{0\}_{\{0\},\{2\},\{3\}}) & (\{0\}.\{1\}_{\{3\},\{0\}}) \\
\lambda \gg (\{\}\{1\}_{\{0\},\{1\}}) & \times \quad \lambda \gg (\{1\}.\{\}\{1\}_{\{0\}}) \\
(\{1\}.\{0\}_{\{0\},\{3\}}) & (\{0\}.\{0\}_{\{3\},\{2\},\{0\}})
\end{array}$$

$$\begin{array}{l}
 (\{2\}.\{0\}.\{2\},\{3\}) \\
 \wedge \gg (\{\}\cdot\{1\}.\{0\},\{1\}) \\
 (\{1\}.\{0\}.\{0\},\{3\})
 \end{array} \times
 \begin{array}{l}
 (\{0\}.\{1\}.\{3\},\{0\}) \\
 \wedge \gg (\{1\}.\{\mid\}.\{1\},\{0\}) \\
 (\{0\}.\{2\}.\{3\},\{2\})
 \end{array}$$

$$\begin{array}{l}
 (\{0\}.\{0\}.\{0\},\{2\},\{3\}) \\
 \wedge \gg (\{\}\cdot\{1\}.\{0\},\{1\}) \\
 (\{2\}.\{0\}.\{2\},\{3\})
 \end{array} \times
 \begin{array}{l}
 (\{0\}.\{2\}.\{3\},\{2\}) \\
 \wedge \gg (\{1\}.\{\mid\}.\{1\},\{0\}) \\
 (\{0\}.\{0\}.\{3\},\{2\},\{0\})
 \end{array}$$

$$\begin{array}{l}
 (\{1\}.\{0\}.\{0\},\{3\}) \\
 \wedge \gg (\{\}\cdot\{1\}.\{0\},\{1\}) \\
 (\{2\}.\{0\}.\{2\},\{3\})
 \end{array} \times
 \begin{array}{l}
 (\{0\}.\{2\}.\{3\},\{2\}) \\
 \wedge \gg (\{1\}.\{\mid\}.\{1\},\{0\}) \\
 (\{0\}.\{1\}.\{3\},\{0\})
 \end{array}$$

Medial action

$$\begin{array}{l}
 (\{1\}.\{0\}.\{0\},\{3\}) \\
 \wedge \gg (\{0\}.\{0\}.\{0\},\{2\},\{3\}) \\
 (\{\}\cdot\{1\}.\{0\},\{1\})
 \end{array} \times
 \begin{array}{l}
 (\{1\}.\{\mid\}.\{1\},\{0\}) \\
 \wedge \gg (\{0\}.\{0\}.\{3\},\{2\},\{0\}) \\
 (\{0\}.\{1\}.\{3\},\{0\})
 \end{array}$$

$$\begin{array}{l}
 (\{2\}.\{0\}.\{2\},\{3\}) \\
 \wedge \gg (\{0\}.\{0\}.\{0\},\{2\},\{3\}) \\
 (\{\}\cdot\{1\}.\{0\},\{1\})
 \end{array} \times
 \begin{array}{l}
 (\{1\}.\{\mid\}.\{1\},\{0\}) \\
 \wedge \gg (\{0\}.\{0\}.\{3\},\{2\},\{0\}) \\
 (\{0\}.\{2\}.\{3\},\{2\})
 \end{array}$$

$$\begin{array}{l}
 (\{\}\cdot\{1\}.\{0\},\{1\}) \\
 \wedge \gg (\{0\}.\{0\}.\{0\},\{2\},\{3\}) \\
 (\{1\}.\{0\}.\{0\},\{3\})
 \end{array} \times
 \begin{array}{l}
 (\{0\}.\{1\}.\{3\},\{0\}) \\
 \wedge \gg (\{0\}.\{0\}.\{3\},\{2\},\{0\}) \\
 (\{1\}.\{\mid\}.\{1\},\{0\})
 \end{array}$$

$$\begin{array}{l}
 (\{2\}.\{0\}.\{2\},\{3\}) \\
 \wedge \gg (\{0\}.\{0\}.\{0\},\{2\},\{3\}) \\
 (\{1\}.\{0\}.\{0\},\{3\})
 \end{array} \times
 \begin{array}{l}
 (\{0\}.\{1\}.\{3\},\{0\}) \\
 \wedge \gg (\{0\}.\{0\}.\{3\},\{2\},\{0\}) \\
 (\{0\}.\{2\}.\{3\},\{2\})
 \end{array}$$

$$\begin{array}{l}
 (\{\}\cdot\{1\}.\{0\},\{1\}) \\
 \wedge \gg (\{0\}.\{0\}.\{0\},\{2\},\{3\}) \\
 (\{2\}.\{0\}.\{2\},\{3\})
 \end{array} \times
 \begin{array}{l}
 (\{0\}.\{2\}.\{3\},\{2\}) \\
 \wedge \gg (\{0\}.\{0\}.\{3\},\{2\},\{0\}) \\
 (\{1\}.\{\mid\}.\{1\},\{0\})
 \end{array}$$

$$\begin{array}{l}
 (\{1\}.\{0\}.\{0\},\{3\}) \\
 \wedge \gg (\{0\}.\{0\}.\{0\},\{2\},\{3\}) \\
 (\{2\}.\{0\}.\{2\},\{3\})
 \end{array} \times
 \begin{array}{l}
 (\{0\}.\{2\}.\{3\},\{2\}) \\
 \wedge \gg (\{0\}.\{0\}.\{3\},\{2\},\{0\}) \\
 (\{0\}.\{1\}.\{3\},\{0\})
 \end{array}$$

Objectal action

$(\{0 \}. \{0 \}_{\{0 \}, \{2 \}, \{3 \}})$	$(\{1 \}. \{ \}_{\{1 \}, \{0 \}})$
$\wedge \gg (\{1 \}. \{0 \}_{\{0 \}, \{3 \}}) \times$	$\wedge \gg (\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{ \}. \{1 \}_{\{0 \}, \{1 \}})$	$(\{0 \}. \{0 \}_{\{3 \}, \{2 \}, \{0 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$	$(\{1 \}. \{ \}_{\{1 \}, \{0 \}})$
$\wedge \gg (\{1 \}. \{0 \}_{\{0 \}, \{3 \}}) \times$	$\wedge \gg (\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{ \}. \{1 \}_{\{0 \}, \{1 \}})$	$(\{0 \}. \{0 \}_{\{3 \}, \{2 \}, \{0 \}})$
$\wedge \gg (\{1 \}. \{0 \}_{\{0 \}, \{3 \}}) \times$	$\wedge \gg (\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{0 \}. \{0 \}_{\{0 \}, \{2 \}, \{3 \}})$	$(\{1 \}. \{2 \}_{\{3 \}, \{2 \}})$
$\wedge \gg (\{1 \}. \{0 \}_{\{0 \}, \{3 \}}) \times$	$\wedge \gg (\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$	$(\{0 \}. \{0 \}_{\{3 \}, \{2 \}, \{0 \}})$
$(\{ \}. \{1 \}_{\{0 \}, \{1 \}})$	$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$\wedge \gg (\{1 \}. \{0 \}_{\{0 \}, \{3 \}}) \times$	$\wedge \gg (\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$	$(\{1 \}. \{ \}_{\{1 \}, \{0 \}})$

Interpretative action

$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$	$(\{1 \}. \{ \}_{\{1 \}, \{0 \}})$
$\wedge \gg (\{2 \}. \{0 \}_{\{2 \}, \{3 \}}) \times$	$\wedge \gg (\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{ \}. \{1 \}_{\{0 \}, \{1 \}})$	$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{0 \}. \{0 \}_{\{0 \}, \{2 \}, \{3 \}})$	$(\{0 \}. \{0 \}_{\{3 \}, \{2 \}, \{0 \}})$
$\wedge \gg (\{2 \}. \{0 \}_{\{2 \}, \{3 \}}) \times$	$\wedge \gg (\{2 \}. \{0 \}_{\{3 \}, \{2 \}})$
$(\{ \}. \{1 \}_{\{0 \}, \{1 \}})$	$(\{ \}. \{1 \}_{\{0 \}, \{1 \}})$

$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$	\times	$(\{0 \}. \{0 \}_{\{3 \}, \{2 \}, \{0 \}})$
$\wedge \gg (\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$		$\wedge \gg (\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{0 \}. \{0 \}_{\{0 \}, \{2 \}, \{3 \}})$		$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{ \}. \{1 \}_{\{0 \}, \{1 \}})$	\times	$(\{0 \}. \{0 \}_{\{3 \}, \{2 \}, \{0 \}})$
$\wedge \gg (\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$		$\wedge \gg (\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{0 \}. \{0 \}_{\{0 \}, \{2 \}, \{3 \}})$	\times	$(\{0 \}. \{0 \}_{\{3 \}, \{2 \}, \{0 \}})$
$(\{ \}. \{1 \}_{\{0 \}, \{1 \}})$	\times	$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$\wedge \gg (\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$		$\wedge \gg (\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$		$(\{1 \}. \{ \}_{\{1 \}, \{0 \}})$

3. Pre-semiotic dual system

$$\begin{aligned}
 & (\{2 | \}. \{0 | \}_{\{2 | \}, \{3 | \}} \{1 | \}. \{0 | \}_{\{0 | \}, \{3 | \}} \{0 | \}. \{0 | \}_{\{0 | \}, \{2 | \}, \{3 | \}} \{ | \}. \\
 & \{2 | \}_{\{1 | \}, \{2 | \}} \times \\
 & (\{2 | \}. \{ | \}_{\{2 | \}, \{1 | \}} \{0 | \}. \{0 | \}_{\{3 | \}, \{2 | \}, \{0 | \}} \{0 | \}. \{1 | \}_{\{3 | \}, \{0 | \}} \{0 | \}. \\
 & \{2 | \}_{\{3 | \}, \{2 | \}})
 \end{aligned}$$

Qualitative Action

$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$	\times	$(\{0 \}. \{0 \}_{\{3 \}, \{2 \}, \{0 \}})$
$\wedge \gg (\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$\wedge \gg (\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$(\{0 \}. \{0 \}_{\{0 \}, \{2 \}, \{3 \}})$		$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$	\times	$(\{0 \}. \{0 \}_{\{3 \}, \{2 \}, \{0 \}})$
$\wedge \gg (\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$\wedge \gg (\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$(\{0 \}. \{0 \}_{\{0 \}, \{2 \}, \{3 \}})$	\times	$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{0 \}. \{0 \}_{\{0 \}, \{2 \}, \{3 \}})$	\times	$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$\wedge \gg (\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$\wedge \gg (\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$		$(\{0 \}. \{0 \}_{\{3 \}, \{2 \}, \{0 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$	\times	$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$\wedge \gg (\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$\wedge \gg (\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$		$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$

```
({0 | }.{0 | }_{\{0 | \},\{2 | \},\{3 | \}}) 
  \gg ({1 | }.{2 | }_{\{1 | \},\{2 | \}})      \times
(\{2 | \}.{0 | }_{\{2 | \},\{3 | \}})
```

```
({0 | }, {2 | }{3 | }, {2 | })
Λ ≫ ({2 | }, { | }{2 | }, {1 | })
({0 | }, {0 | }{3 | }, {2 | }, {0 | })
```

$$\begin{aligned} & (\{1\}, \{0\}, \{3\}) \\ \wedge \gg & (\{1\}, \{2\}, \{1\}, \{2\}) \quad \times \\ & (\{2\}, \{0\}, \{2\}, \{3\}) \end{aligned}$$

```
({0 | }, {2 | }{3 | }, {2 | })
  \gg ({2 | }. {1 | }{2 | }, {1 | })
({0 | }, {1 | }{3 | }, {0 | })
```

Medial action

```
({1 | }.{0 | }{0 | },{3 | })
\gg ({0 | }.{0 | }{0 | },{2 | },{3 | })    ×
({ | }.{2 | }{1 | },{2 | })
```

```
({2 | }.{ | }{2 | }{1 | })
λ ≫ ({0 | }.{0 | }{3 | }{2 | }{0 | })
({0 | }:{1 | }{3 | }{0 | })
```

```
({2 | }.{0 | }_{2 | },{3 | })
  ↳ >> ({0 | }.{0 | }_{0 | },{2 | },{3 | })      ×
({ | }.{2 | }_{1 | },{2 | })
```

```

({2 | }.{ | }_{\{2 | \},\{1 | \}}) 
λ ≫ ({0 | }.{0 | }_{\{3 | \},\{2 | \},\{0 | \}}) 
({0 | }.{2 | }_{\{3 | \},\{2 | \}}) 

```

```

({ | }).{2 | }{1 | },{2 | })
Λ ≫ ({0 | }).{0 | }{0 | },{2 | },{3 | }) ×
({1 | }).{0 | }{0 | },{3 | })

```

```

({0 | }.{1 | }{3 | },{0 | })
λ ≫ ({0 | }.{0 | }{3 | },{2 | },{0 | })
({2 | }.{ | }{2 | },{1 | })

```

$(\{2 \mid \}.\{0 \mid \}_{\{2 \mid \},\{3 \mid \}})$
 $\wedge \gg (\{0 \mid \}.\{0 \mid \}_{\{0 \mid \},\{2 \mid \},\{3 \mid \}}) \quad \times$
 $(\{1 \mid \}.\{0 \mid \}_{\{0 \mid \},\{3 \mid \}})$

```

({0 | }.{1 | }{3 | },{0 | })
λ ≫ ({0 | }.{0 | }{3 | },{2 | },{0 | })
({0 | }.{2 | }{3 | },{2 | })

```

```
({ | }.{2 | }{1 | }{2 | })
  ↳ >> ({0 | }.{0 | }{0 | }{2 | }{3 | })      ×
({2 | }.{0 | }{2 | }{3 | })
```

```

({0 | }.{2 | }{3 | }{2 | })
λ ≫ ({0 | }.{0 | }{3 | }{2 | }{0 | })
({2 | }.{ | }{2 | }{1 | })

```

$(\{1\}, \{0\}, \{0\}, \{3\})$
 $\wedge \gg (\{0\}, \{0\}, \{0\}, \{2\}, \{3\}) \quad \times$
 $(\{2\}, \{0\}, \{2\}, \{3\})$

```

({0 | }.{2 | }{3 | },{2 | })
λ ≫ ({0 | }.{0 | }{3 | },{2 | },{0 | })
({0 | }.{1 | }{3 | },{0 | })

```

Objectal action

```

({0 | }.{0 | }{0 | },{2 | },{3 | })
Λ ≫ ({1 | }.{0 | }{0 | },{3 | }) ×
({ | }.{2 | }{1 | },{2 | })

```

```
({2 | }.{ | }{2 | },{1 | })
Λ ≫ ({0 | }.{1 | }{3 | },{0 | })
({0 | },{0 | }{3 | },{2 | },{0 | })
```

$$\begin{array}{l}
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \\
\lambda \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times \\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) \\
\\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) \\
\lambda \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times \\
(\{0| \}.\{0| \}_{\{0| \},\{2| \},\{3| \}}) \\
\\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \\
\lambda \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times \\
(\{0| \}.\{0| \}_{\{0| \},\{2| \},\{3| \}}) \\
\\
(\{0| \}.\{0| \}_{\{0| \},\{2| \},\{3| \}}) \\
\lambda \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \\
\\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) \\
\lambda \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \\
\\
(\{0| \}.\{2| \}_{\{1| \},\{2| \}}) \\
\lambda \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times \\
(\{2| \}.\{1| \}_{\{2| \},\{1| \}}) \\
\\
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\lambda \gg (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
(\{0| \}.\{0| \}_{\{3| \},\{2| \},\{0| \}}) \\
\\
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\lambda \gg (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
(\{2| \}.\{1| \}_{\{2| \},\{1| \}})
\end{array}$$

Interpretative action

$$\begin{array}{l}
(\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) \\
\\
(\{0| \}.\{0| \}_{\{0| \},\{2| \},\{3| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) \\
\\
(\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{0| \}.\{0| \}_{\{0| \},\{2| \},\{3| \}}) \\
\\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{0| \}.\{0| \}_{\{0| \},\{2| \},\{3| \}})
\end{array}$$

$$\begin{array}{l}
(\{2| \}.\{1| \}_{\{2| \},\{1| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
\\
(\{2| \}.\{1| \}_{\{2| \},\{1| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{0| \}.\{0| \}_{\{3| \},\{2| \},\{0| \}}) \\
\\
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\lambda \gg (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
(\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
\\
(\{0| \}.\{0| \}_{\{3| \},\{2| \},\{0| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{0| \}.\{1| \}_{\{3| \},\{0| \}})
\end{array}$$

$$\begin{array}{l}
(\{0\}.\{0\}_{\{0\},\{2\},\{3\}}) \\
\quad \wedge \gg (\{2\}.\{0\}_{\{2\},\{3\}}) \quad \times \\
(\{1\}.\{0\}_{\{0\},\{3\}}) \\
\\
(\{| \}.\{2\}_{\{1\},\{2\}}) \\
\quad \wedge \gg (\{2\}.\{0\}_{\{2\},\{3\}}) \quad \times \\
(\{1\}.\{0\}_{\{0\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{0\}.\{1\}_{\{3\},\{0\}}) \\
\quad \wedge \gg (\{0\}.\{2\}_{\{3\},\{2\}}) \\
(\{0\}.\{0\}_{\{3\},\{2\},\{0\}}) \\
\\
(\{0\}.\{1\}_{\{3\},\{0\}}) \\
\quad \wedge \gg (\{0\}.\{2\}_{\{3\},\{2\}}) \\
(\{2\}.\{| \}_{\{2\},\{1\}})
\end{array}$$

4. Pre-semiotic dual system

$$\begin{array}{l}
(\{2\}.\{0\}_{\{2\},\{3\}}) \{1\}.\{0\}_{\{0\},\{3\}} \{0\}.\{1\}_{\{0\},\{3\}} \{| \}. \\
\{1\}_{\{0\},\{1\}} \times \\
(\{1\}.\{| \}_{\{1\},\{0\}}) \{1\}.\{0\}_{\{3\},\{0\}} \{0\}.\{1\}_{\{3\},\{0\}} \{0\} \\
\{2\}_{\{3\},\{2\}})
\end{array}$$

Qualitative action

$$\begin{array}{l}
(\{1\}.\{0\}_{\{0\},\{3\}}) \\
\quad \wedge \gg (\{| \}.\{1\}_{\{0\},\{1\}}) \quad \times \\
(\{0\}.\{1\}_{\{0\},\{3\}}) \\
\\
(\{2\}.\{0\}_{\{2\},\{3\}}) \\
\quad \wedge \gg (\{| \}.\{1\}_{\{0\},\{1\}}) \quad \times \\
(\{0\}.\{1\}_{\{0\},\{3\}}) \\
\\
(\{0\}.\{1\}_{\{0\},\{3\}}) \\
\quad \wedge \gg (\{| \}.\{1\}_{\{0\},\{1\}}) \quad \times \\
(\{1\}.\{0\}_{\{0\},\{3\}}) \\
\\
(\{2\}.\{0\}_{\{2\},\{3\}}) \\
\quad \wedge \gg (\{| \}.\{1\}_{\{0\},\{1\}}) \quad \times \\
(\{1\}.\{0\}_{\{0\},\{3\}}) \\
\\
(\{0\}.\{1\}_{\{0\},\{3\}}) \\
\quad \wedge \gg (\{| \}.\{1\}_{\{0\},\{1\}}) \quad \times \\
(\{2\}.\{0\}_{\{2\},\{3\}}) \\
\\
(\{1\}.\{0\}_{\{0\},\{3\}}) \\
\quad \wedge \gg (\{| \}.\{1\}_{\{0\},\{1\}}) \quad \times \\
(\{2\}.\{0\}_{\{2\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{1\}.\{0\}_{\{3\},\{0\}}) \\
\quad \wedge \gg (\{1\}.\{| \}_{\{1\},\{0\}}) \\
(\{0\}.\{1\}_{\{3\},\{0\}}) \\
\\
(\{1\}.\{0\}_{\{3\},\{0\}}) \\
\quad \wedge \gg (\{1\}.\{| \}_{\{1\},\{0\}}) \\
(\{0\}.\{2\}_{\{3\},\{2\}}) \\
\\
(\{0\}.\{1\}_{\{3\},\{0\}}) \\
\quad \wedge \gg (\{1\}.\{| \}_{\{1\},\{0\}}) \\
(\{1\}.\{0\}_{\{3\},\{0\}}) \\
\\
(\{0\}.\{1\}_{\{3\},\{0\}}) \\
\quad \wedge \gg (\{1\}.\{| \}_{\{1\},\{0\}}) \\
(\{0\}.\{2\}_{\{3\},\{2\}}) \\
\\
(\{0\}.\{2\}_{\{3\},\{2\}}) \\
\quad \wedge \gg (\{1\}.\{| \}_{\{1\},\{0\}}) \\
(\{1\}.\{0\}_{\{3\},\{0\}})
\end{array}$$

Medial action

$$\begin{aligned} &(\{1\}.\{0\}_{\{0\},\{3\}}) \\ &\quad \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \times \\ &(\{1\}.\{1\}_{\{0\},\{1\}}) \end{aligned}$$

$$\begin{aligned} &(\{2\}.\{0\}_{\{2\},\{3\}}) \\ &\quad \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \times \\ &(\{1\}.\{1\}_{\{0\},\{1\}}) \end{aligned}$$

$$\begin{aligned} &(\{1\}.\{1\}_{\{0\},\{1\}}) \\ &\quad \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \times \\ &(\{1\}.\{0\}_{\{0\},\{3\}}) \end{aligned}$$

$$\begin{aligned} &(\{2\}.\{0\}_{\{2\},\{3\}}) \\ &\quad \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \times \\ &(\{1\}.\{0\}_{\{0\},\{3\}}) \end{aligned}$$

$$\begin{aligned} &(\{1\}.\{1\}_{\{0\},\{1\}}) \\ &\quad \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \times \\ &(\{2\}.\{0\}_{\{2\},\{3\}}) \end{aligned}$$

$$\begin{aligned} &(\{1\}.\{0\}_{\{0\},\{3\}}) \\ &\quad \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \times \\ &(\{2\}.\{0\}_{\{2\},\{3\}}) \end{aligned}$$

$$\begin{aligned} &(\{1\}.\{1\}_{\{1\},\{0\}}) \\ &\quad \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\ &(\{0\}.\{1\}_{\{3\},\{0\}}) \end{aligned}$$

$$\begin{aligned} &(\{1\}.\{1\}_{\{1\},\{0\}}) \\ &\quad \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\ &(\{0\}.\{2\}_{\{3\},\{2\}}) \end{aligned}$$

$$\begin{aligned} &(\{0\}.\{1\}_{\{3\},\{0\}}) \\ &\quad \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\ &(\{1\}.\{1\}_{\{1\},\{0\}}) \end{aligned}$$

$$\begin{aligned} &(\{0\}.\{1\}_{\{3\},\{0\}}) \\ &\quad \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\ &(\{0\}.\{2\}_{\{3\},\{2\}}) \end{aligned}$$

$$\begin{aligned} &(\{0\}.\{2\}_{\{3\},\{2\}}) \\ &\quad \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\ &(\{1\}.\{1\}_{\{1\},\{0\}}) \end{aligned}$$

$$\begin{aligned} &(\{0\}.\{2\}_{\{3\},\{2\}}) \\ &\quad \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\ &(\{0\}.\{1\}_{\{3\},\{0\}}) \end{aligned}$$

Objectal action

$$\begin{aligned} &(\{0\}.\{1\}_{\{0\},\{3\}}) \\ &\quad \wedge \gg (\{1\}.\{0\}_{\{0\},\{3\}}) \times \\ &(\{1\}.\{1\}_{\{0\},\{1\}}) \end{aligned}$$

$$\begin{aligned} &(\{2\}.\{0\}_{\{2\},\{3\}}) \\ &\quad \wedge \gg (\{1\}.\{0\}_{\{0\},\{3\}}) \times \\ &(\{1\}.\{1\}_{\{0\},\{1\}}) \end{aligned}$$

$$\begin{aligned} &(\{1\}.\{1\}_{\{0\},\{1\}}) \\ &\quad \wedge \gg (\{1\}.\{0\}_{\{0\},\{3\}}) \times \\ &(\{0\}.\{1\}_{\{0\},\{3\}}) \end{aligned}$$

$$\begin{aligned} &(\{1\}.\{1\}_{\{1\},\{0\}}) \\ &\quad \wedge \gg (\{0\}.\{1\}_{\{3\},\{0\}}) \\ &(\{1\}.\{0\}_{\{3\},\{0\}}) \end{aligned}$$

$$\begin{aligned} &(\{1\}.\{1\}_{\{1\},\{0\}}) \\ &\quad \wedge \gg (\{0\}.\{1\}_{\{3\},\{0\}}) \\ &(\{0\}.\{2\}_{\{3\},\{2\}}) \end{aligned}$$

$$\begin{aligned} &(\{1\}.\{0\}_{\{3\},\{0\}}) \\ &\quad \wedge \gg (\{0\}.\{1\}_{\{3\},\{0\}}) \\ &(\{1\}.\{1\}_{\{1\},\{0\}}) \end{aligned}$$

$$\begin{array}{l}
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \\
\lambda \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times \\
(\{0| \}.\{1| \}_{\{0| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{1| \}.\{0| \}_{\{3| \},\{0| \}}) \\
\lambda \gg (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
(\{0| \}.\{2| \}_{\{3| \},\{2| \}})
\end{array}$$

$$\begin{array}{l}
(\{0| \}.\{1| \}_{\{0| \},\{3| \}}) \\
\lambda \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\lambda \gg (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
(\{1| \}.\{0| \}_{\{3| \},\{0| \}})
\end{array}$$

$$\begin{array}{l}
(\{| \}.\{1| \}_{\{0| \},\{1| \}}) \\
\lambda \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\lambda \gg (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
(\{1| \}.\{| \}_{\{1| \},\{0| \}})
\end{array}$$

Interpretative action

$$\begin{array}{l}
(\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{| \}.\{1| \}_{\{0| \},\{1| \}})
\end{array}
\qquad
\begin{array}{l}
(\{1| \}.\{| \}_{\{1| \},\{0| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{0| \}.\{1| \}_{\{3| \},\{0| \}})
\end{array}$$

$$\begin{array}{l}
(\{0| \}.\{1| \}_{\{0| \},\{3| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{| \}.\{1| \}_{\{0| \},\{1| \}})
\end{array}
\qquad
\begin{array}{l}
(\{1| \}.\{| \}_{\{1| \},\{0| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{1| \}.\{0| \}_{\{3| \},\{0| \}})
\end{array}$$

$$\begin{array}{l}
(\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{0| \}.\{1| \}_{\{0| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{1| \}.\{0| \}_{\{3| \},\{0| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{0| \}.\{1| \}_{\{3| \},\{0| \}})
\end{array}$$

$$\begin{array}{l}
(\{| \}.\{1| \}_{\{0| \},\{1| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{0| \}.\{1| \}_{\{0| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{1| \}.\{0| \}_{\{3| \},\{0| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{1| \}.\{| \}_{\{1| \},\{0| \}})
\end{array}$$

$$\begin{array}{l}
(\{0| \}.\{1| \}_{\{0| \},\{3| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{1| \}.\{0| \}_{\{0| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{1| \}.\{0| \}_{\{3| \},\{0| \}})
\end{array}$$

$$\begin{array}{l}
(\{| \}.\{1| \}_{\{0| \},\{1| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{1| \}.\{0| \}_{\{0| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{1| \}.\{| \}_{\{1| \},\{0| \}})
\end{array}$$

5. Pre-Semiotic dual system

$$\begin{aligned}
 & (\{2\}.\{0\}_{\{2\},\{3\}}\{1\}.\{0\}_{\{0\},\{3\}}\{0\}.\{1\}_{\{0\},\{3\}}\{|}) \\
 & \{2\}_{\{1\},\{2\}} \times \\
 & (\{2\}.|\}_{\{2\},\{1\}}\{1\}.\{0\}_{\{3\},\{0\}}\{0\}.\{1\}_{\{3\},\{0\}}\{0\} \\
 & \{2\}_{\{3\},\{2\}})
 \end{aligned}$$

Qualitative action

$$\begin{array}{lll}
 (\{1\}.\{0\}_{\{0\},\{3\}}) & & (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 \lambda \gg (\{|\}.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.\{|\}_{\{2\},\{1\}}) \\
 (\{0\}.\{1\}_{\{0\},\{3\}}) & & (\{0\}.\{1\}_{\{3\},\{0\}}) \\
 \\
 (\{2\}.\{0\}_{\{2\},\{3\}}) & & (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 \lambda \gg (\{|\}.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.\{|\}_{\{2\},\{1\}}) \\
 (\{0\}.\{1\}_{\{0\},\{3\}}) & & (\{0\}.\{2\}_{\{3\},\{2\}}) \\
 \\
 (\{0\}.\{1\}_{\{0\},\{3\}}) & & (\{0\}.\{1\}_{\{3\},\{0\}}) \\
 \lambda \gg (\{|\}.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.\{|\}_{\{2\},\{1\}}) \\
 (\{1\}.\{0\}_{\{0\},\{3\}}) & & (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 \\
 (\{2\}.\{0\}_{\{2\},\{3\}}) & & (\{0\}.\{1\}_{\{3\},\{0\}}) \\
 \lambda \gg (\{|\}.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.\{|\}_{\{2\},\{1\}}) \\
 (\{1\}.\{0\}_{\{0\},\{3\}}) & & (\{0\}.\{2\}_{\{3\},\{2\}}) \\
 \\
 (\{0\}.\{1\}_{\{0\},\{3\}}) & & (\{0\}.\{2\}_{\{3\},\{2\}}) \\
 \lambda \gg (\{|\}.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.\{|\}_{\{2\},\{1\}}) \\
 (\{2\}.\{0\}_{\{2\},\{3\}}) & & (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 \\
 (\{1\}.\{0\}_{\{0\},\{3\}}) & & (\{0\}.\{2\}_{\{3\},\{2\}}) \\
 \lambda \gg (\{|\}.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.\{|\}_{\{2\},\{1\}}) \\
 (\{2\}.\{0\}_{\{2\},\{3\}}) & & (\{0\}.\{1\}_{\{3\},\{0\}})
 \end{array}$$

Medial action

$$\begin{aligned}
 & (\{1\}.\{0\}_{\{0\},\{3\}}) \\
 & \lambda \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \quad \times \quad (\{2\}.\{|\}_{\{2\},\{1\}}) \\
 & (\{|\}.\{2\}_{\{1\},\{2\}})
 \end{aligned}$$

$(\{2 \}.\{0 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$\wedge \gg (\{0 \}.\{1 \}_{\{0 \},\{3 \}}) \times$	$\wedge \gg (\{1 \}.\{0 \}_{\{3 \},\{0 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{0 \}.\{1 \}_{\{3 \},\{0 \}})$
$\wedge \gg (\{0 \}.\{1 \}_{\{0 \},\{3 \}}) \times$	$\wedge \gg (\{1 \}.\{0 \}_{\{3 \},\{0 \}})$
$(\{1 \}.\{0 \}_{\{0 \},\{3 \}})$	$(\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{2 \}.\{0 \}_{\{2 \},\{3 \}})$	$(\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$\wedge \gg (\{0 \}.\{1 \}_{\{0 \},\{3 \}}) \times$	$\wedge \gg (\{1 \}.\{0 \}_{\{3 \},\{0 \}})$
$(\{2 \}.\{0 \}_{\{2 \},\{3 \}})$	$(\{0 \}.\{1 \}_{\{3 \},\{0 \}})$

Objectal action

$(\{0 \}.\{1 \}_{\{0 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$\wedge \gg (\{1 \}.\{0 \}_{\{0 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{1 \}_{\{3 \},\{0 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{1 \}.\{0 \}_{\{3 \},\{0 \}})$
$(\{2 \}.\{0 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$\wedge \gg (\{1 \}.\{0 \}_{\{0 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{1 \}_{\{3 \},\{0 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{1 \}.\{0 \}_{\{3 \},\{0 \}})$	$(\{1 \}.\{0 \}_{\{3 \},\{0 \}})$
$\wedge \gg (\{0 \}.\{1 \}_{\{3 \},\{0 \}}) \times$	$\wedge \gg (\{0 \}.\{1 \}_{\{3 \},\{0 \}})$
$(\{2 \}.\{0 \}_{\{2 \},\{3 \}})$	$(\{1 \}.\{0 \}_{\{3 \},\{0 \}})$
$\wedge \gg (\{1 \}.\{0 \}_{\{0 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{1 \}_{\{3 \},\{0 \}})$
$(\{0 \}.\{1 \}_{\{0 \},\{3 \}})$	$(\{0 \}.\{2 \}_{\{3 \},\{2 \}})$

$$\begin{array}{ll}
(\{0| \}.\{1| \}_{\{0| \},\{3| \}}) & (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\wedge \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times & \wedge \gg (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) & (\{1| \}.\{0| \}_{\{3| \},\{0| \}}) \\
\\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) & (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\wedge \gg (\{1| \}.\{0| \}_{\{0| \},\{3| \}}) \times & \wedge \gg (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) & (\{2| \}.\{1| \}_{\{2| \},\{1| \}})
\end{array}$$

Interpretative action

$$\begin{array}{ll}
(\{1| \}.\{0| \}_{\{0| \},\{3| \}}) & (\{2| \}.\{1| \}_{\{2| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times & \wedge \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) & (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
\\
(\{0| \}.\{1| \}_{\{0| \},\{3| \}}) & (\{2| \}.\{1| \}_{\{2| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times & \wedge \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) & (\{1| \}.\{0| \}_{\{3| \},\{0| \}}) \\
\\
(\{1| \}.\{0| \}_{\{0| \},\{3| \}}) & (\{1| \}.\{0| \}_{\{3| \},\{0| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times & \wedge \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{0| \}.\{1| \}_{\{0| \},\{3| \}}) & (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
\\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) & (\{1| \}.\{0| \}_{\{3| \},\{0| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times & \wedge \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{0| \}.\{1| \}_{\{0| \},\{3| \}}) & (\{2| \}.\{1| \}_{\{2| \},\{1| \}}) \\
\\
(\{0| \}.\{1| \}_{\{0| \},\{3| \}}) & (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times & \wedge \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{1| \}.\{0| \}_{\{0| \},\{3| \}}) & (\{1| \}.\{0| \}_{\{3| \},\{0| \}}) \\
\\
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) & (\{0| \}.\{1| \}_{\{3| \},\{0| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times & \wedge \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{1| \}.\{0| \}_{\{0| \},\{3| \}}) & (\{2| \}.\{1| \}_{\{2| \},\{1| \}})
\end{array}$$

6. Pre-semiotic dual system

$$\begin{array}{l}
(\{2| \}.\{0| \}_{\{2| \},\{3| \}} \{1| \}.\{0| \}_{\{0| \},\{3| \}} \{0| \}.\{2| \}_{\{2| \},\{3| \}} \{1| \}. \\
\{2| \}_{\{1| \},\{2| \}} \times \\
(\{2| \}.\{1| \}_{\{2| \},\{1| \}} \{2| \}.\{0| \}_{\{3| \},\{2| \}} \{0| \}.\{1| \}_{\{3| \},\{0| \}} \{0| \}. \\
\{2| \}_{\{3| \},\{2| \}})
\end{array}$$

Qualitative action

$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$	\times	$(\{2 \}. \{0 \}_{\{3 \}, \{2 \}})$
$\wedge \gg (\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$\wedge \gg (\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$(\{0 \}. \{2 \}_{\{2 \}, \{3 \}})$		$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$	\times	$(\{2 \}. \{0 \}_{\{3 \}, \{2 \}})$
$\wedge \gg (\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$\wedge \gg (\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$(\{0 \}. \{2 \}_{\{2 \}, \{3 \}})$		$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$\wedge \gg (\{ \}. \{2 \}_{\{1 \}, \{2 \}})$	\times	$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$		$\wedge \gg (\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$\wedge \gg (\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$		$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$	\times	$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$\wedge \gg (\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$\wedge \gg (\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$		$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$

Medial action

$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$	\times	$(\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$\wedge \gg (\{0 \}. \{2 \}_{\{2 \}, \{3 \}})$		$\wedge \gg (\{2 \}. \{0 \}_{\{3 \}, \{2 \}})$
$(\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$	\times	$(\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$\wedge \gg (\{0 \}. \{2 \}_{\{2 \}, \{3 \}})$		$\wedge \gg (\{2 \}. \{0 \}_{\{3 \}, \{2 \}})$
$(\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$\wedge \gg (\{0 \}. \{2 \}_{\{2 \}, \{3 \}})$	\times	$(\{0 \}. \{1 \}_{\{3 \}, \{0 \}})$
$(\{1 \}. \{0 \}_{\{0 \}, \{3 \}})$		$\wedge \gg (\{2 \}. \{0 \}_{\{3 \}, \{2 \}})$

$$(\{2\} \cdot \{0\} \cdot \{2\} \cdot \{3\}) \\ \wedge \gg (\{0\} \cdot \{2\} \cdot \{2\} \cdot \{3\}) \quad \times \\ (\{1\} \cdot \{0\} \cdot \{0\} \cdot \{3\})$$

```
({0 | }, {1 | }{3 | },{0 | })
Λ ≫ ({2 | }, {0 | }{3 | },{2 | })
({0 | }, {2 | }{3 | },{2 | })
```

$(\{\cdot\}, \{2\}, \{1, 2\})$
 $\wedge \gg(\{0\}, \{2\}, \{2, 3\}) \quad \times$
 $(\{2\}, \{0\}, \{2, 3\})$

```
({0 | }, {2 | }_{3 | }_{2 | })
\gg ({2 | }, {0 | }_{3 | }_{2 | })
({2 | }, { | }_{2 | }_{1 | })
```

$$\begin{aligned} & (\{1\}, \{0\}, \{0\}, \{3\}) \\ \text{and } & (\{0\}, \{2\}, \{2\}, \{3\}) \quad \times \\ & (\{2\}, \{0\}, \{2\}, \{3\}) \end{aligned}$$

```
({0 | }, {2 | }{3 | }{2 | })
  ↳ >> ({2 | }, {0 | }{3 | }{2 | })
({0 | }, {1 | }{3 | },{0 | })
```

Objectal action

$$\begin{aligned} & (\{0\}, \{2\}, \{3\}) \\ \wedge & \gg (\{1\}, \{0\}, \{3\}) \quad \times \\ & (\{\}, \{2\}, \{1\}, \{2\}) \end{aligned}$$

```
({2 | }, {1 | }{2 | }{1 | })
Λ ≫ ({0 | }, {1 | }{3 | }{0 | })
({2 | }, {0 | }{3 | }{2 | })
```

$$(\{2\}, \{0\}, \{2\}, \{3\}) \\ \wedge \gg (\{1\}, \{0\}, \{0\}, \{3\}) \quad \times \\ (\{\}, \{2\}, \{1\}, \{2\})$$

```
({2 | }, {1 | }{2 | }, {1 | })
Λ ≫ ({0 | }, {1 | }{3 | }, {0 | })
({0 | }, {2 | }{3 | }{2 | })
```

$(\{\{ \mid \}\}, \{2 \mid \} \{1 \mid \}, \{2 \mid \})$
 $\wedge \gg (\{1 \mid \}, \{0 \mid \} \{0 \mid \}, \{3 \mid \}) \quad \times$
 $(\{0 \mid \}, \{2 \mid \} \{2 \mid \}, \{3 \mid \})$

```
({2 | }.{0 | }{3 | }{2 | })
\gg ({0 | }.{1 | }{3 | }{0 | })
({2 | },{1 | }{2 | }{1 | })
```

$$\begin{aligned} & (\{2\}, \{0\}, \{2\}, \{3\}) \\ \wedge & \gg (\{1\}, \{0\}, \{0\}, \{3\}) \quad \times \\ & (\{0\}, \{2\}, \{2\}, \{3\}) \end{aligned}$$

```
({2 | }, {0 | }{3 | }, {2 | })
Λ ≫ ({0 | }, {1 | }{3 | }, {0 | })
({0 | }, {2 | }{3 | }, {2 | })
```

$$(\{0\}, \{2\}, \{3\}) \\ \wedge \gg (\{1\}, \{0\}, \{3\}) \quad \times \\ (\{2\}, \{0\}, \{3\})$$

```
({0 | }, {2 | }{3 | },{2 | })
Λ ≫ ({0 | }, {1 | }{3 | },{0 | })
({2 | }, {0 | }{3 | },{2 | })
```

$$\begin{aligned} & (\{\mid\}, \{2\mid\}_{\{1\mid\}, \{2\mid\}}) \\ & \wedge \gg (\{1\mid\}, \{0\mid\}_{\{0\mid\}, \{3\mid\}}) \quad \times \\ & (\{2\mid\}, \{0\mid\}_{\{2\mid\}, \{3\mid\}}) \end{aligned}$$

```
({0 | }.{2 | }{3 | }.{2 | })
\gg ({0 | }.{1 | }{3 | }.{0 | })
({2 | }.{ | }{2 | }.{1 | })
```

Interpretative action

$(\{1 \}.\{0 \}_{\{0 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{0 \}.\{1 \}_{\{3 \},\{0 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{0 \}.\{1 \}_{\{3 \},\{0 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{0 \}.\{1 \}_{\{3 \},\{0 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{1 \}.\{0 \}_{\{0 \},\{3 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{0 \}.\{1 \}_{\{3 \},\{0 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{1 \}.\{0 \}_{\{0 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$

7. Pre-semiotic dual system

$(\{2 | \}.\{0 | \}_{\{2 | \},\{3 | \}} \{1 | \}.\{1 | \}_{\{0 | \},\{1 | \},\{3 | \}} \{0 | \}.\{1 | \}_{\{0 | \},\{3 | \}} \{ | \}.$
 $\{1 | \}_{\{0 | \},\{1 | \}} \times$
 $(\{1 | \}.\{ | \}_{\{1 | \},\{0 | \}} \{1 | \}.\{0 | \}_{\{3 | \},\{0 | \}} \{1 | \}.\{1 | \}_{\{3 | \},\{1 | \},\{0 | \}} \{0 | \}.$
 $\{2 | \}_{\{3 | \},\{2 | \}})$

Qualitative action

$(\{1 \}.\{1 \}_{\{0 \},\{1 \},\{3 \}})$	$(\{1 \}.\{0 \}_{\{3 \},\{0 \}})$
$\wedge \gg (\{ \}.\{1 \}_{\{0 \},\{1 \}}) \times$	$\wedge \gg (\{1 \}.\{ \}_{\{1 \},\{0 \}})$
$(\{0 \}.\{1 \}_{\{0 \},\{3 \}})$	$(\{1 \}.\{1 \}_{\{3 \},\{1 \},\{0 \}})$

$(\{2 \}.\{0 \}_{\{2 \}, \{3 \}})$	\times	$(\{1 \}.\{0 \}_{\{3 \}, \{0 \}})$
$\wedge \gg (\{ \}.\{1 \}_{\{0 \}, \{1 \}})$		$\wedge \gg (\{1 \}.\{ \}_{\{1 \}, \{0 \}})$
$(\{0 \}.\{1 \}_{\{0 \}, \{3 \}})$		$(\{0 \}.\{2 \}_{\{3 \}, \{2 \}})$
$(\{0 \}.\{1 \}_{\{0 \}, \{3 \}})$	\times	$(\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$\wedge \gg (\{ \}.\{1 \}_{\{0 \}, \{1 \}})$		$\wedge \gg (\{1 \}.\{ \}_{\{1 \}, \{0 \}})$
$(\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}})$		$(\{1 \}.\{0 \}_{\{3 \}, \{0 \}})$
$(\{2 \}.\{0 \}_{\{2 \}, \{3 \}})$	\times	$(\{0 \}.\{2 \}_{\{3 \}, \{2 \}})$
$\wedge \gg (\{ \}.\{1 \}_{\{0 \}, \{1 \}})$		$\wedge \gg (\{1 \}.\{ \}_{\{1 \}, \{0 \}})$
$(\{2 \}.\{0 \}_{\{2 \}, \{3 \}})$		$(\{1 \}.\{0 \}_{\{3 \}, \{0 \}})$
$(\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}})$	\times	$(\{0 \}.\{2 \}_{\{3 \}, \{2 \}})$
$\wedge \gg (\{ \}.\{1 \}_{\{0 \}, \{1 \}})$		$\wedge \gg (\{1 \}.\{ \}_{\{1 \}, \{0 \}})$
$(\{2 \}.\{0 \}_{\{2 \}, \{3 \}})$		$(\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$

Medial action

$(\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}})$	\times	$(\{1 \}.\{ \}_{\{1 \}, \{0 \}})$
$\wedge \gg (\{0 \}.\{1 \}_{\{0 \}, \{3 \}})$		$\wedge \gg (\{1 \}.\{0 \}_{\{3 \}, \{0 \}})$
$(\{ \}.\{1 \}_{\{0 \}, \{1 \}})$		$(\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{2 \}.\{0 \}_{\{2 \}, \{3 \}})$	\times	$(\{1 \}.\{ \}_{\{1 \}, \{0 \}})$
$\wedge \gg (\{0 \}.\{1 \}_{\{0 \}, \{3 \}})$		$\wedge \gg (\{1 \}.\{0 \}_{\{3 \}, \{0 \}})$
$(\{ \}.\{1 \}_{\{0 \}, \{1 \}})$		$(\{1 \}.\{ \}_{\{1 \}, \{0 \}})$
$(\{2 \}.\{0 \}_{\{2 \}, \{3 \}})$	\times	$(\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$\wedge \gg (\{0 \}.\{1 \}_{\{0 \}, \{3 \}})$		$\wedge \gg (\{1 \}.\{0 \}_{\{3 \}, \{0 \}})$
$(\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}})$		$(\{0 \}.\{2 \}_{\{3 \}, \{2 \}})$

$$(\{ \mid \}.\{1 \mid \}_{\{0 \mid \}}\{1 \mid \}) \\ \wedge \gg (\{0 \mid \}.\{1 \mid \}_{\{0 \mid \}}\{3 \mid \}) \quad \times \\ (\{2 \mid \}.\{0 \mid \}_{\{2 \mid \}}\{3 \mid \})$$

```
({0 | }, {2 | }{3 | }{2 | })
Λ ≫ ({1 | }, {0 | }{3 | }{0 | })
({1 | }, { | }{1 | }{0 | })
```

$(\{1\}, \{1\}, \{0\}, \{1\}, \{3\})$
 $\wedge \gg (\{0\}, \{1\}, \{0\}, \{3\}) \quad \times$
 $(\{2\}, \{0\}, \{2\}, \{3\})$

```
({0 | }, {2 | }{3 | },{2 | })
Λ ≫ ({1 | }, {0 | }{3 | },{0 | })
({1 | },{1 | }{3 | },{1 | },{0 | })
```

Objectal action

$(\{0\}, \{1\})_{\{0\}, \{3\}} \wedge \gg(\{1\}, \{1\})_{\{0\}, \{1\}, \{3\}}) \times (\{\}, \{1\})_{\{0\}, \{1\}}$

$$\begin{aligned} & (\{1\mid\}\cdot\{\mid\}_{\{1\mid\},\{0\mid\}}) \\ \lambda \gg & (\{1\mid\}\cdot\{1\mid\}_{\{3\mid\},\{1\mid\},\{0\mid\}}) \\ & (\{1\mid\}\cdot\{0\mid\}_{\{3\mid\},\{0\mid\}}) \end{aligned}$$

$(\{2 | \}.\{0 | \}_{\{2 | \},\{3 | \}})$
 $\wedge \gg (\{1 | \}.\{1 | \}_{\{0 | \},\{1 | \},\{3 | \}}) \quad \times$
 $(\{ | \}.\{1 | \}_{\{0 | \},\{1 | \}})$

```

({1 | }.{ | }{1 | },{0 | })
λ ≫ ({1 | }.{1 | }{3 | },{1 | },{0 | })
({0 | }.{2 | }{3 | },{2 | })

```

$(\{\mid\}).\{1\mid\}_{\{0\mid\},\{1\mid\}})$
 $\wedge \gg (\{1\mid\},\{1\mid\}_{\{0\mid\},\{1\mid\},\{3\mid\}}) \quad \times$
 $(\{0\mid\},\{1\mid\}_{\{0\mid\},\{3\mid\}})$

```
({1 | }.{0 | }{3 | }{0 | })
λ ≫ ({1 | }.{1 | }{3 | }{1 | }{0 | })
({1 | }.{ | }{1 | }{0 | })
```

$(\{2 \mid \}.\{0 \mid \}_{\{2 \mid \},\{3 \mid \}})$
 $\wedge \gg (\{1 \mid \}.\{1 \mid \}_{\{0 \mid \},\{1 \mid \},\{3 \mid \}}) \quad \times$
 $(\{0 \mid \}.\{1 \mid \}_{\{0 \mid \},\{3 \mid \}})$

```

({1 | }.{0 | }{3 | }{0 | })
λ ≫ ({1 | }.{1 | }{3 | }{1 | }{0 | })
({0 | }.{2 | }{3 | }{2 | })

```

$(\{0\}, \{1\}, \{3\})$
 $\wedge \gg (\{1\}, \{1\}, \{1\}, \{3\})$ \times
 $(\{2\}, \{0\}, \{2\}, \{3\})$

```

({0 | }.{2 | }{3 | }{2 | })
λ ≫ ({1 | }.{1 | }{3 | }{1 | }{0 | })
({1 | }.{0 | }{3 | }{0 | })

```

$(\{\mid\}).\{1\mid\}_{\{0\mid\},\{1\mid\}})$
 $\wedge \gg (\{1\mid\},\{1\mid\}_{\{0\mid\},\{1\mid\},\{3\mid\}}) \quad \times$
 $(\{2\mid\},\{0\mid\}_{\{2\mid\},\{3\mid\}})$

```
({0 | }.{2 | }{3 | },{2 | })
λ ≫ ({1 | }.{1 | }{3 | },{1 | },{0 | })
({1 | },{1 | }{1 | },{0 | })
```

Interpretative action

$$(\{1\} \cdot \{1\} \cdot \{0\} \cdot \{1\} \cdot \{3\}) \\ \wedge \gg (\{2\} \cdot \{0\} \cdot \{2\} \cdot \{3\}) \quad \times \\ (\{\} \cdot \{1\} \cdot \{0\} \cdot \{1\})$$

```
({1 | }, { | }{1 | },{0 | })
Λ ≫ ({0 | }, {2 | }{3 | },{2 | })
({1 | },{1 | }{3 | },{1 | },{0 | })
```

$$\begin{array}{ll}
(\{0\} \cdot \{1\}_{\{0\},\{3\}}) & (\{1\} \cdot \{1\}_{\{1\},\{0\}}) \\
\wedge \gg (\{2\} \cdot \{0\}_{\{2\},\{3\}}) \times & \wedge \gg (\{0\} \cdot \{2\}_{\{3\},\{2\}}) \\
(\{1\} \cdot \{1\}_{\{0\},\{1\}}) & (\{1\} \cdot \{0\}_{\{3\},\{0\}}) \\[10pt]
(\{1\} \cdot \{1\}_{\{0\},\{1\},\{3\}}) & (\{1\} \cdot \{0\}_{\{3\},\{0\}}) \\
\wedge \gg (\{2\} \cdot \{0\}_{\{2\},\{3\}}) \times & \wedge \gg (\{0\} \cdot \{2\}_{\{3\},\{2\}}) \\
(\{0\} \cdot \{1\}_{\{0\},\{3\}}) & (\{1\} \cdot \{1\}_{\{3\},\{1\},\{0\}}) \\[10pt]
(\{1\} \cdot \{1\}_{\{0\},\{1\}}) & (\{1\} \cdot \{0\}_{\{3\},\{0\}}) \\
\wedge \gg (\{2\} \cdot \{0\}_{\{2\},\{3\}}) \times & \wedge \gg (\{0\} \cdot \{2\}_{\{3\},\{2\}}) \\
(\{0\} \cdot \{1\}_{\{0\},\{3\}}) & (\{1\} \cdot \{1\}_{\{1\},\{0\}}) \\[10pt]
(\{0\} \cdot \{1\}_{\{0\},\{3\}}) & (\{1\} \cdot \{1\}_{\{3\},\{1\},\{0\}}) \\
\wedge \gg (\{2\} \cdot \{0\}_{\{2\},\{3\}}) \times & \wedge \gg (\{0\} \cdot \{2\}_{\{3\},\{2\}}) \\
(\{1\} \cdot \{1\}_{\{0\},\{1\},\{3\}}) & (\{1\} \cdot \{0\}_{\{3\},\{0\}}) \\[10pt]
(\{1\} \cdot \{1\}_{\{0\},\{1\}}) & (\{1\} \cdot \{1\}_{\{3\},\{1\},\{0\}}) \\
\wedge \gg (\{2\} \cdot \{0\}_{\{2\},\{3\}}) \times & \wedge \gg (\{0\} \cdot \{2\}_{\{3\},\{2\}}) \\
(\{1\} \cdot \{1\}_{\{0\},\{1\},\{3\}}) & (\{1\} \cdot \{1\}_{\{1\},\{0\}})
\end{array}$$

8. Pre-semiotic dual system

$$\begin{aligned}
& (\{2\} \cdot \{0\}_{\{2\},\{3\}} \{1\} \cdot \{1\}_{\{0\},\{1\},\{3\}} \{0\} \cdot \{1\}_{\{0\},\{3\}} \{1\} \cdot \\
& \{2\}_{\{1\},\{2\}}) \times \\
& (\{2\} \cdot \{1\}_{\{2\},\{1\}} \{1\} \cdot \{0\}_{\{3\},\{0\}} \{1\} \cdot \{1\}_{\{3\},\{1\},\{0\}} \{0\} \cdot \\
& \{2\}_{\{3\},\{2\}})
\end{aligned}$$

Qualitative action

$$\begin{array}{ll}
(\{1\} \cdot \{1\}_{\{0\},\{1\},\{3\}}) & (\{1\} \cdot \{0\}_{\{3\},\{0\}}) \\
\wedge \gg (\{1\} \cdot \{2\}_{\{1\},\{2\}}) \times & \wedge \gg (\{2\} \cdot \{1\}_{\{2\},\{1\}}) \\
(\{0\} \cdot \{1\}_{\{0\},\{3\}}) & (\{1\} \cdot \{1\}_{\{3\},\{1\},\{0\}}) \\[10pt]
(\{2\} \cdot \{0\}_{\{2\},\{3\}}) & (\{1\} \cdot \{0\}_{\{3\},\{0\}}) \\
\wedge \gg (\{1\} \cdot \{2\}_{\{1\},\{2\}}) \times & \wedge \gg (\{2\} \cdot \{1\}_{\{2\},\{1\}}) \\
(\{0\} \cdot \{1\}_{\{0\},\{3\}}) & (\{0\} \cdot \{2\}_{\{3\},\{2\}})
\end{array}$$

$$\begin{array}{l}
 (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 \wedge \gg (\{\}\{2\}_{\{1\},\{2\}}) \\
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}})
 \end{array}
 \times
 \begin{array}{l}
 (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
 \wedge \gg (\{2\}.\{\}\}_{\{2\},\{1\}}) \\
 (\{1\}.\{0\}_{\{3\},\{0\}})
 \end{array}$$

$$\begin{array}{l}
 (\{2\}.\{0\}_{\{2\},\{3\}}) \\
 \wedge \gg (\{\}\{2\}_{\{1\},\{2\}}) \\
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}})
 \end{array}
 \times
 \begin{array}{l}
 (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
 \wedge \gg (\{2\}.\{\}\}_{\{2\},\{1\}}) \\
 (\{0\}.\{2\}_{\{3\},\{2\}})
 \end{array}$$

$$\begin{array}{l}
 (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 \wedge \gg (\{\}\{2\}_{\{1\},\{2\}}) \\
 (\{2\}.\{0\}_{\{2\},\{3\}})
 \end{array}
 \times
 \begin{array}{l}
 (\{0\}.\{2\}_{\{3\},\{2\}}) \\
 \wedge \gg (\{2\}.\{\}\}_{\{2\},\{1\}}) \\
 (\{1\}.\{0\}_{\{3\},\{0\}})
 \end{array}$$

$$\begin{array}{l}
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
 \wedge \gg (\{\}\{2\}_{\{1\},\{2\}}) \\
 (\{2\}.\{0\}_{\{2\},\{3\}})
 \end{array}
 \times
 \begin{array}{l}
 (\{0\}.\{2\}_{\{3\},\{2\}}) \\
 \wedge \gg (\{2\}.\{\}\}_{\{2\},\{1\}}) \\
 (\{1\}.\{1\}_{\{3\},\{1\},\{0\}})
 \end{array}$$

Medial action

$$\begin{array}{l}
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
 \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 (\{\}\{2\}_{\{1\},\{2\}})
 \end{array}
 \times
 \begin{array}{l}
 (\{2\}.\{\}\}_{\{2\},\{1\}}) \\
 \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 (\{1\}.\{1\}_{\{3\},\{1\},\{0\}})
 \end{array}$$

$$\begin{array}{l}
 (\{2\}.\{0\}_{\{2\},\{3\}}) \\
 \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 (\{\}\{2\}_{\{1\},\{2\}})
 \end{array}
 \times
 \begin{array}{l}
 (\{2\}.\{\}\}_{\{2\},\{1\}}) \\
 \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 (\{0\}.\{2\}_{\{3\},\{2\}})
 \end{array}$$

$$\begin{array}{l}
 (\{\}\{2\}_{\{1\},\{2\}}) \\
 \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}})
 \end{array}
 \times
 \begin{array}{l}
 (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
 \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 (\{2\}.\{\}\}_{\{2\},\{1\}})
 \end{array}$$

$$\begin{array}{l}
 (\{2\}.\{0\}_{\{2\},\{3\}}) \\
 \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}})
 \end{array}
 \times
 \begin{array}{l}
 (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
 \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 (\{0\}.\{2\}_{\{3\},\{2\}})
 \end{array}$$

$$\begin{array}{l}
 (\{\}\{2\}_{\{1\},\{2\}}) \\
 \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 (\{2\}.\{0\}_{\{2\},\{3\}})
 \end{array}
 \times
 \begin{array}{l}
 (\{0\}.\{2\}_{\{3\},\{2\}}) \\
 \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 (\{2\}.\{\}\}_{\{2\},\{1\}})
 \end{array}$$

$$(\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \\ \wedge \gg (\{0\}, \{1\}, \{0\}, \{3\}) \quad \times \\ (\{2\}, \{0\}, \{2\}, \{3\})$$

```
({0 | }, {2 | }{3 | },{2 | })
Λ ≫ ({1 | }, {0 | }{3 | },{0 | })
({1 | },{1 | }{3 | },{1 | },{0 | })
```

Objectal action

$(\{0\}, \{1\}, \{3\})$
 $\wedge \gg (\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \quad \times$
 $(\{1\}, \{2\}, \{1\}, \{2\})$

```

({2 | }.{ | }{2 | },{1 | })
λ ≫ ({1 | }.{1 | }{3 | },{1 | },{0 | })
({1 | }.{0 | }{3 | },{0 | })

```

$(\{2\}, \{0\}, \{2\}, \{3\})$
 $\wedge \gg (\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \quad \times$
 $(\{\}, \{2\}, \{1\}, \{2\})$

```

({2 | }.{ | }_{\{2 | \}}_{\{1 | \}})
λ ≫ ({1 | }.{1 | }_{\{3 | \}}_{\{1 | \}}_{\{0 | \}})
({0 | }.{2 | }_{\{3 | \}}_{\{2 | \}})

```

```
({ | }.{2 | }{1 | }{2 | })  

  \gg ({1 | }.{1 | }{0 | }{1 | }{3 | })    ×  

({0 | }.{1 | }{0 | }{3 | })
```

```
({1 | }.{0 | }{3 | },{0 | })
λ ≫ ({1 | }.{1 | }{3 | },{1 | },{0 | })
({2 | }.{| }{2 | },{1 | })
```

```
({2 | }.{0 | }{2 | },{3 | })
  ↳ >> ({1 | }.{1 | }{0 | },{1 | },{3 | })    ×
({0 | }.{1 | }{0 | },{3 | })
```

```

({1 | }.{0 | }{3 | }{0 | })
λ ≫ ({1 | }.{1 | }{3 | }{1 | }{0 | })
({0 | }.{2 | }{3 | }{2 | })

```

$(\{0 \mid \}.\{1 \mid \}_{\{0 \mid \},\{3 \mid \}})$
 $\quad \wedge \gg (\{1 \mid \}.\{1 \mid \}_{\{0 \mid \},\{1 \mid \},\{3 \mid \}}) \quad \times$
 $(\{2 \mid \}.\{0 \mid \}_{\{2 \mid \},\{3 \mid \}})$

```

({0 | }.{2 | }{3 | },{2 | })
λ ≫ ({1 | }.{1 | }{3 | },{1 | },{0 | })
({1 | }.{0 | }{3 | },{0 | })

```

```

({|}.{2|}{1|}{2|})
\gg ({1|}.{1|}{0|}{1|}{3|})    ×
({2|}.{0|}{2|}{3|})

```

```

({0 | }.{2 | }{3 | }{2 | })
λ ≫ ({1 | }.{1 | }{3 | }{1 | }{0 | })
({2 | }.{ | }{2 | }{1 | })

```

Interpretative action

$$(\{1\} \cdot \{1\} \cdot \{0\} \cdot \{1\} \cdot \{3\}) \\ \cdot \gg (\{2\} \cdot \{0\} \cdot \{2\} \cdot \{3\}) \quad \times \\ (\{\} \cdot \{2\} \cdot \{1\} \cdot \{2\})$$

```
({2 | }.{ | }{2 | },{1 | })
Λ ≫ ({0 | }.{2 | }{3 | },{2 | })
({1 | }.{1 | }{3 | },{1 | },{0 | })
```

$$(\{0\}, \{1\}, \{0\}, \{3\}) \\ \wedge \gg (\{2\}, \{0\}, \{2\}, \{3\}) \quad \times \\ (\{\}, \{2\}, \{1\}, \{2\})$$

```
({2 | }, { | }{2 | }, {1 | })
Λ ≫ ({0 | }, {2 | }{3 | }, {2 | })
({1 | }, {0 | }{3 | }{0 | })
```

$(\{1 \}.\{1 \}_{\{0 \},\{1 \},\{3 \}})$	$(\{1 \}.\{0 \}_{\{3 \},\{0 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{0 \}.\{1 \}_{\{0 \},\{3 \}})$	$(\{1 \}.\{1 \}_{\{3 \},\{1 \},\{0 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{1 \}.\{0 \}_{\{3 \},\{0 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{0 \}.\{1 \}_{\{0 \},\{1 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{1 \}.\{1 \}_{\{3 \},\{1 \},\{0 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{1 \}.\{1 \}_{\{0 \},\{1 \},\{3 \}})$	$(\{1 \}.\{0 \}_{\{3 \},\{0 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{1 \}.\{1 \}_{\{3 \},\{1 \},\{0 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{1 \}.\{1 \}_{\{0 \},\{1 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$

9. Pre-semiotic dual system

$$\begin{aligned}
 & (\{2 | \}.\{0 | \}_{\{2 | \},\{3 | \}} \{1 | \}.\{1 | \}_{\{0 | \},\{1 | \},\{3 | \}} \{0 | \}.\{2 | \}_{\{3 | \},\{2 | \}} \{ | \}. \\
 & \{2 | \}_{\{1 | \},\{2 | \}} \times \\
 & (\{2 | \}.\{ | \}_{\{2 | \},\{1 | \}} \{2 | \}.\{0 | \}_{\{3 | \},\{2 | \}} \{1 | \}.\{1 | \}_{\{3 | \},\{1 | \},\{0 | \}} \{0 | \}. \\
 & \{2 | \}_{\{3 | \},\{2 | \}})
 \end{aligned}$$

Qualitative action

$(\{1 \}.\{1 \}_{\{0 \},\{1 \},\{3 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$\wedge \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}}) \times$	$\wedge \gg (\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{1 \}.\{1 \}_{\{3 \},\{1 \},\{0 \}})$
$(\{2 \}.\{0 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$\wedge \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}}) \times$	$\wedge \gg (\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{1 \}.\{1 \}_{\{3 \},\{1 \},\{0 \}})$
$\wedge \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}}) \times$	$\wedge \gg (\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{1 \}.\{1 \}_{\{0 \},\{1 \},\{3 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$

$$\begin{array}{c}
 (\{2\}.\{0\}.\{2\},\{3\}) \\
 \wedge \gg (\{\}\cdot\{2\}.\{1\},\{2\}) \\
 (\{1\}.\{1\}.\{0\},\{1\},\{3\})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{1\}.\{3\},\{1\},\{0\}) \\
 \wedge \gg (\{2\}.\{\}\cdot\{2\},\{1\}) \\
 (\{0\}.\{2\}.\{3\},\{2\})
 \end{array}$$

$$\begin{array}{c}
 (\{0\}.\{2\}.\{2\},\{3\}) \\
 \wedge \gg (\{\}\cdot\{2\}.\{1\},\{2\}) \\
 (\{2\}.\{0\}.\{2\},\{3\})
 \end{array}
 \times
 \begin{array}{c}
 (\{0\}.\{2\}.\{3\},\{2\}) \\
 \wedge \gg (\{2\}.\{\}\cdot\{2\},\{1\}) \\
 (\{2\}.\{0\}.\{3\},\{2\})
 \end{array}$$

$$\begin{array}{c}
 (\{1\}.\{1\}.\{0\},\{1\},\{3\}) \\
 \wedge \gg (\{\}\cdot\{2\}.\{1\},\{2\}) \\
 (\{2\}.\{0\}.\{2\},\{3\})
 \end{array}
 \times
 \begin{array}{c}
 (\{0\}.\{2\}.\{3\},\{2\}) \\
 \wedge \gg (\{2\}.\{\}\cdot\{2\},\{1\}) \\
 (\{1\}.\{1\}.\{3\},\{1\},\{0\})
 \end{array}$$

Medial action

$$\begin{array}{c}
 (\{1\}.\{1\}.\{0\},\{1\},\{3\}) \\
 \wedge \gg (\{0\}.\{2\}.\{2\},\{3\}) \\
 (\{\}\cdot\{2\}.\{1\},\{2\})
 \end{array}
 \times
 \begin{array}{c}
 (\{2\}.\{\}\cdot\{2\},\{1\}) \\
 \wedge \gg (\{2\}.\{0\}.\{3\},\{2\}) \\
 (\{1\}.\{1\}.\{3\},\{1\},\{0\})
 \end{array}$$

$$\begin{array}{c}
 (\{2\}.\{0\}.\{2\},\{3\}) \\
 \wedge \gg (\{0\}.\{2\}.\{2\},\{3\}) \\
 (\{\}\cdot\{2\}.\{1\},\{2\})
 \end{array}
 \times
 \begin{array}{c}
 (\{2\}.\{\}\cdot\{2\},\{1\}) \\
 \wedge \gg (\{2\}.\{0\}.\{3\},\{2\}) \\
 (\{0\}.\{2\}.\{3\},\{2\})
 \end{array}$$

$$\begin{array}{c}
 (\{\}\cdot\{2\}.\{1\},\{2\}) \\
 \wedge \gg (\{0\}.\{2\}.\{2\},\{3\}) \\
 (\{1\}.\{1\}.\{0\},\{1\},\{3\})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{1\}.\{3\},\{1\},\{0\}) \\
 \wedge \gg (\{2\}.\{0\}.\{3\},\{2\}) \\
 (\{2\}.\{\}\cdot\{2\},\{1\})
 \end{array}$$

$$\begin{array}{c}
 (\{2\}.\{0\}.\{2\},\{3\}) \\
 \wedge \gg (\{0\}.\{2\}.\{2\},\{3\}) \\
 (\{1\}.\{1\}.\{0\},\{1\},\{3\})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{1\}.\{3\},\{1\},\{0\}) \\
 \wedge \gg (\{2\}.\{0\}.\{3\},\{2\}) \\
 (\{0\}.\{2\}.\{3\},\{2\})
 \end{array}$$

$$\begin{array}{c}
 (\{\}\cdot\{2\}.\{1\},\{2\}) \\
 \wedge \gg (\{0\}.\{2\}.\{2\},\{3\}) \\
 (\{2\}.\{0\}.\{2\},\{3\})
 \end{array}
 \times
 \begin{array}{c}
 (\{0\}.\{2\}.\{3\},\{2\}) \\
 \wedge \gg (\{2\}.\{0\}.\{3\},\{2\}) \\
 (\{2\}.\{\}\cdot\{2\},\{1\})
 \end{array}$$

$$\begin{array}{c}
 (\{1\}.\{1\}.\{0\},\{1\},\{3\}) \\
 \wedge \gg (\{0\}.\{2\}.\{2\},\{3\}) \\
 (\{2\}.\{0\}.\{2\},\{3\})
 \end{array}
 \times
 \begin{array}{c}
 (\{0\}.\{2\}.\{3\},\{2\}) \\
 \wedge \gg (\{2\}.\{0\}.\{3\},\{2\}) \\
 (\{1\}.\{1\}.\{3\},\{1\},\{0\})
 \end{array}$$

Objectal action

$(\{0 \}. \{2 \}_{\{2 \}, \{3 \}})$	\times	$(\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$\lambda \gg (\{1 \}. \{1 \}_{\{0 \}, \{1 \}, \{3 \}})$		$\lambda \gg (\{1 \}. \{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$(\{2 \}. \{0 \}_{\{3 \}, \{2 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$	\times	$(\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$\lambda \gg (\{1 \}. \{1 \}_{\{0 \}, \{1 \}, \{3 \}})$		$\lambda \gg (\{1 \}. \{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$	\times	$(\{2 \}. \{0 \}_{\{3 \}, \{2 \}})$
$\lambda \gg (\{1 \}. \{1 \}_{\{0 \}, \{1 \}, \{3 \}})$		$\lambda \gg (\{1 \}. \{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{0 \}. \{2 \}_{\{2 \}, \{3 \}})$		$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{ \}. \{2 \}_{\{1 \}, \{2 \}})$	\times	$(\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$\lambda \gg (\{1 \}. \{1 \}_{\{0 \}, \{1 \}, \{3 \}})$		$\lambda \gg (\{1 \}. \{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$		$(\{2 \}. \{ \}_{\{2 \}, \{1 \}})$

Interpretative action

$(\{1 \}. \{1 \}_{\{0 \}, \{1 \}, \{3 \}})$	\times	$(\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$\lambda \gg (\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$		$\lambda \gg (\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$(\{1 \}. \{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{0 \}. \{2 \}_{\{2 \}, \{3 \}})$	\times	$(\{2 \}. \{ \}_{\{2 \}, \{1 \}})$
$\lambda \gg (\{2 \}. \{0 \}_{\{2 \}, \{3 \}})$		$\lambda \gg (\{0 \}. \{2 \}_{\{3 \}, \{2 \}})$
$(\{ \}. \{2 \}_{\{1 \}, \{2 \}})$		$(\{2 \}. \{0 \}_{\{3 \}, \{2 \}})$

$(\{1 \}.\{1 \}_{\{0 \},\{1 \},\{3 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{1 \}.\{1 \}_{\{3 \},\{1 \},\{0 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{1 \}.\{1 \}_{\{0 \},\{1 \},\{3 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{1 \}.\{1 \}_{\{0 \},\{1 \},\{0 \}})$	$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{1 \}.\{1 \}_{\{3 \},\{1 \},\{0 \}})$
$\wedge \gg (\{2 \}.\{0 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{1 \}.\{1 \}_{\{0 \},\{1 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$

10. Pre-semiotic dual system

$$\begin{aligned}
 & (\{2 | \}.\{0 | \}_{\{2 | \},\{3 | \}} \{1 | \}.\{2 | \}_{\{1 | \},\{3 | \}} \{0 | \}.\{2 | \}_{\{2 | \},\{3 | \}} \{ | \}. \\
 & \{2 | \}_{\{1 | \},\{2 | \}} \times \\
 & (\{2 | \}.\{ | \}_{\{2 | \},\{1 | \}} \{2 | \}.\{0 | \}_{\{3 | \},\{2 | \}} \{2 | \}.\{1 | \}_{\{3 | \},\{1 | \}} \{0 | \}. \\
 & \{2 | \}_{\{3 | \},\{2 | \}})
 \end{aligned}$$

Qualitative action

$(\{1 \}.\{2 \}_{\{1 \},\{3 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$\wedge \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}}) \times$	$\wedge \gg (\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{1 \}_{\{3 \},\{1 \}})$
$(\{2 \}.\{0 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$\wedge \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}}) \times$	$\wedge \gg (\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{0 \}.\{2 \}_{\{3 \},\{2 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{1 \}_{\{3 \},\{1 \}})$
$\wedge \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}}) \times$	$\wedge \gg (\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{1 \}.\{2 \}_{\{1 \},\{3 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{2 \}.\{0 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{1 \}_{\{3 \},\{1 \}})$
$\wedge \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}}) \times$	$\wedge \gg (\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{1 \}.\{2 \}_{\{1 \},\{3 \}})$	$(\{0 \}.\{2 \}_{\{3 \},\{2 \}})$

$$\begin{array}{l}
(\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \\
\wedge \gg (\{|\}.\{2| \}_{\{1| \},\{2| \}}) \quad \times \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\wedge \gg (\{2| \}.\{|\} _{\{2| \},\{1| \}}) \\
(\{2| \}.\{0| \}_{\{3| \},\{2| \}})
\end{array}$$

$$\begin{array}{l}
(\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \\
\wedge \gg (\{|\}.\{2| \}_{\{1| \},\{2| \}}) \quad \times \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\wedge \gg (\{2| \}.\{|\} _{\{2| \},\{1| \}}) \\
(\{2| \}.\{1| \}_{\{3| \},\{1| \}})
\end{array}$$

Medial action

$$\begin{array}{l}
(\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{|\}.\{2| \}_{\{1| \},\{2| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{|\} _{\{2| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{1| \}_{\{3| \},\{1| \}})
\end{array}$$

$$\begin{array}{l}
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{|\}.\{2| \}_{\{1| \},\{2| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{|\} _{\{2| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
(\{0| \}.\{2| \}_{\{3| \},\{2| \}})
\end{array}$$

$$\begin{array}{l}
(\{|\}.\{2| \}_{\{1| \},\{2| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{1| \}.\{2| \}_{\{1| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{|\} _{\{2| \},\{1| \}})
\end{array}$$

$$\begin{array}{l}
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{1| \}.\{2| \}_{\{1| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
(\{0| \}.\{2| \}_{\{3| \},\{2| \}})
\end{array}$$

$$\begin{array}{l}
(\{|\}.\{2| \}_{\{1| \},\{2| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{|\} _{\{2| \},\{1| \}})
\end{array}$$

$$\begin{array}{l}
(\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{1| \}_{\{3| \},\{1| \}})
\end{array}$$

Objectal action

$$\begin{array}{l}
(\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \\
\wedge \gg (\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \quad \times \\
(\{|\}.\{2| \}_{\{1| \},\{2| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{|\} _{\{2| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
(\{2| \}.\{0| \}_{\{3| \},\{2| \}})
\end{array}$$

$$\begin{array}{l}
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \\
\lambda \gg (\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \times \\
(\{| \}.\{2| \}_{\{1| \},\{2| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{| \}_{\{2| \},\{1| \}}) \\
\lambda \gg (\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
(\{0| \}.\{2| \}_{\{3| \},\{2| \}})
\end{array}$$

$$\begin{array}{l}
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) \\
\lambda \gg (\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \times \\
(\{0| \}.\{2| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
\lambda \gg (\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
(\{2| \}.\{| \}_{\{2| \},\{1| \}})
\end{array}$$

$$\begin{array}{l}
(\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \\
\lambda \gg (\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \times \\
(\{0| \}.\{2| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\lambda \gg (\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
(\{2| \}.\{0| \}_{\{3| \},\{2| \}})
\end{array}$$

$$\begin{array}{l}
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) \\
\lambda \gg (\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \times \\
(\{2| \}.\{0| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
\lambda \gg (\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
(\{2| \}.\{| \}_{\{2| \},\{1| \}})
\end{array}$$

Interpretative action

$$\begin{array}{l}
(\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{| \}.\{2| \}_{\{1| \},\{2| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{| \}_{\{2| \},\{1| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{1| \}_{\{3| \},\{1| \}})
\end{array}$$

$$\begin{array}{l}
(\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{| \}.\{2| \}_{\{1| \},\{2| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{| \}_{\{2| \},\{1| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{0| \}_{\{3| \},\{2| \}})
\end{array}$$

$$\begin{array}{l}
(\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{0| \}.\{2| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{1| \}_{\{3| \},\{1| \}})
\end{array}$$

$$\begin{array}{l}
(\{| \}.\{2| \}_{\{1| \},\{2| \}}) \\
\lambda \gg (\{2| \}.\{0| \}_{\{2| \},\{3| \}}) \times \\
(\{0| \}.\{2| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
\lambda \gg (\{0| \}.\{2| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{| \}_{\{2| \},\{1| \}})
\end{array}$$

$$\begin{array}{l}
(\{0\}.\{2\})_{\{2\},\{3\}} \\
\wedge \gg (\{2\}.(0\})_{\{2\},\{3\}} \times \\
(\{1\}.\{2\})_{\{1\},\{3\}}
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{1\})_{\{3\},\{1\}} \\
\wedge \gg (\{0\}.(2\})_{\{3\},\{2\}} \\
(\{2\}.(0\})_{\{3\},\{2\}})
\end{array}$$

$$\begin{array}{l}
(\{1\}.\{2\})_{\{1\},\{2\}} \\
\wedge \gg (\{2\}.(0\})_{\{2\},\{3\}} \times \\
(\{1\}.\{2\})_{\{1\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{1\})_{\{3\},\{1\}} \\
\wedge \gg (\{0\}.(2\})_{\{3\},\{2\}} \\
(\{2\}.(1\})_{\{2\},\{1\}})
\end{array}$$

11. Pre-semiotic dual system

$$\begin{array}{l}
(\{2\}.\{1\})_{\{1\},\{3\}} \{1\}.\{1\}_{\{0\},\{1\},\{3\}} \{0\}.\{1\}_{\{0\},\{3\}} \{1\} \\
\{1\}_{\{0\},\{1\}} \times \\
(\{1\}.\{1\})_{\{0\},\{1\}} \{1\}.\{0\}_{\{3\},\{0\}} \{1\}.\{1\}_{\{3\},\{1\},\{0\}} \{1\} \\
\{2\}_{\{3\},\{1\}}
\end{array}$$

Qualitative action

$$\begin{array}{l}
(\{1\}.\{1\})_{\{0\},\{1\},\{3\}} \\
\wedge \gg (\{1\}.\{1\})_{\{0\},\{1\}} \times \\
(\{0\}.\{1\})_{\{0\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{1\}.\{0\})_{\{3\},\{0\}} \\
\wedge \gg (\{1\}.\{1\})_{\{1\},\{0\}} \\
(\{1\}.\{1\})_{\{3\},\{1\},\{0\}})
\end{array}$$

$$\begin{array}{l}
(\{2\}.\{1\})_{\{1\},\{3\}} \\
\wedge \gg (\{1\}.\{1\})_{\{0\},\{1\}} \times \\
(\{0\}.\{1\})_{\{0\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{1\}.\{0\})_{\{3\},\{0\}} \\
\wedge \gg (\{1\}.\{1\})_{\{1\},\{0\}} \\
(\{1\}.\{2\})_{\{3\},\{1\}})
\end{array}$$

$$\begin{array}{l}
(\{0\}.\{1\})_{\{0\},\{3\}} \\
\wedge \gg (\{1\}.\{1\})_{\{0\},\{1\}} \times \\
(\{1\}.\{1\})_{\{0\},\{1\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{1\}.\{1\})_{\{3\},\{1\},\{0\}} \\
\wedge \gg (\{1\}.\{1\})_{\{1\},\{0\}} \\
(\{1\}.\{0\})_{\{3\},\{0\}})
\end{array}$$

$$\begin{array}{l}
(\{2\}.\{1\})_{\{1\},\{3\}} \\
\wedge \gg (\{1\}.\{1\})_{\{0\},\{1\}} \times \\
(\{1\}.\{1\})_{\{0\},\{1\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{1\}.\{1\})_{\{3\},\{1\},\{0\}} \\
\wedge \gg (\{1\}.\{1\})_{\{1\},\{0\}} \\
(\{1\}.\{2\})_{\{3\},\{1\}})
\end{array}$$

$$\begin{array}{l}
(\{0\}.\{1\})_{\{0\},\{3\}} \\
\wedge \gg (\{1\}.\{1\})_{\{0\},\{1\}} \times \\
(\{2\}.\{1\})_{\{1\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{1\}.\{2\})_{\{3\},\{1\}} \\
\wedge \gg (\{1\}.\{1\})_{\{1\},\{0\}} \\
(\{1\}.\{0\})_{\{3\},\{0\}})
\end{array}$$

$$\begin{array}{c}
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
 \wedge \gg (\{\}\cdot\{1\}_{\{0\},\{1\}}) \\
 (\{2\}.\{1\}_{\{1\},\{3\}})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{2\}_{\{3\},\{1\}}) \\
 \wedge \gg (\{1\}.\{\}_{\{1\},\{0\}}) \\
 (\{1\}.\{1\}_{\{3\},\{1\},\{0\}})
 \end{array}$$

Medial action

$$\begin{array}{c}
 (\{2\}.\{1\}_{\{1\},\{3\}}) \\
 \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 (\{\}\cdot\{1\}_{\{0\},\{1\}})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{1\}_{\{1\},\{0\}}) \\
 \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 (\{1\}.\{2\}_{\{3\},\{1\}})
 \end{array}$$

$$\begin{array}{c}
 (\{\}\cdot\{1\}_{\{0\},\{1\}}) \\
 \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
 \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 (\{1\}.\{\}_{\{1\},\{0\}})
 \end{array}$$

$$\begin{array}{c}
 (\{2\}.\{1\}_{\{1\},\{3\}}) \\
 \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
 \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 (\{1\}.\{2\}_{\{3\},\{1\}})
 \end{array}$$

$$\begin{array}{c}
 (\{\}\cdot\{1\}_{\{0\},\{1\}}) \\
 \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 (\{2\}.\{1\}_{\{1\},\{3\}})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{2\}_{\{3\},\{1\}}) \\
 \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 (\{1\}.\{\}_{\{1\},\{0\}})
 \end{array}$$

$$\begin{array}{c}
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
 \wedge \gg (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 (\{2\}.\{1\}_{\{1\},\{3\}})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{2\}_{\{3\},\{1\}}) \\
 \wedge \gg (\{1\}.\{0\}_{\{3\},\{0\}}) \\
 (\{1\}.\{1\}_{\{3\},\{1\},\{0\}})
 \end{array}$$

Objectual action

$$\begin{array}{c}
 (\{0\}.\{1\}_{\{0\},\{3\}}) \\
 \wedge \gg (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
 (\{\}\cdot\{1\}_{\{0\},\{1\}})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{\}_{\{1\},\{0\}}) \\
 \wedge \gg (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
 (\{1\}.\{0\}_{\{3\},\{0\}})
 \end{array}$$

$$\begin{array}{c}
 (\{2\}.\{1\}_{\{1\},\{3\}}) \\
 \wedge \gg (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
 (\{\}\cdot\{1\}_{\{0\},\{1\}})
 \end{array}
 \times
 \begin{array}{c}
 (\{1\}.\{\}_{\{1\},\{0\}}) \\
 \wedge \gg (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
 (\{1\}.\{2\}_{\{3\},\{1\}})
 \end{array}$$

$\{ \{ \mid \} \cdot \{ 1 \mid \} \{ 0 \mid \} \{ 1 \mid \} \}$	\times	$(\{ 1 \mid \} \cdot \{ 0 \mid \} \{ 0 \mid \} \{ 3 \mid \})$
$\wedge \gg (\{ 1 \mid \} \cdot \{ 1 \mid \} \{ 0 \mid \} \{ 1 \mid \} \{ 3 \mid \})$		$\wedge \gg (\{ 1 \mid \} \cdot \{ 1 \mid \} \{ 3 \mid \} \{ 1 \mid \} \{ 0 \mid \})$
$(\{ 0 \mid \} \cdot \{ 1 \mid \} \{ 0 \mid \} \{ 3 \mid \})$		$(\{ 1 \mid \} \cdot \{ \mid \} \{ 1 \mid \} \{ 0 \mid \})$
$(\{ 2 \mid \} \cdot \{ 1 \mid \} \{ 1 \mid \} \{ 3 \mid \})$	\times	$(\{ 1 \mid \} \cdot \{ 0 \mid \} \{ 3 \mid \} \{ 0 \mid \})$
$\wedge \gg (\{ 1 \mid \} \cdot \{ 1 \mid \} \{ 0 \mid \} \{ 1 \mid \} \{ 3 \mid \})$		$\wedge \gg (\{ 1 \mid \} \cdot \{ 1 \mid \} \{ 3 \mid \} \{ 1 \mid \} \{ 0 \mid \})$
$(\{ 0 \mid \} \cdot \{ 1 \mid \} \{ 0 \mid \} \{ 3 \mid \})$		$(\{ 1 \mid \} \cdot \{ 2 \mid \} \{ 3 \mid \} \{ 1 \mid \})$
$(\{ 0 \mid \} \cdot \{ 1 \mid \} \{ 0 \mid \} \{ 3 \mid \})$	\times	$\wedge \gg (\{ 1 \mid \} \cdot \{ 1 \mid \} \{ 3 \mid \} \{ 1 \mid \} \{ 0 \mid \})$
$\wedge \gg (\{ 1 \mid \} \cdot \{ 1 \mid \} \{ 0 \mid \} \{ 1 \mid \} \{ 3 \mid \})$		$(\{ 1 \mid \} \cdot \{ 0 \mid \} \{ 3 \mid \} \{ 0 \mid \})$
$(\{ 2 \mid \} \cdot \{ 1 \mid \} \{ 1 \mid \} \{ 3 \mid \})$		
$(\{ \mid \} \cdot \{ 1 \mid \} \{ 0 \mid \} \{ 1 \mid \})$	\times	$(\{ 1 \mid \} \cdot \{ 2 \mid \} \{ 3 \mid \} \{ 1 \mid \})$
$\wedge \gg (\{ 1 \mid \} \cdot \{ 1 \mid \} \{ 0 \mid \} \{ 1 \mid \} \{ 3 \mid \})$		$\wedge \gg (\{ 1 \mid \} \cdot \{ 1 \mid \} \{ 3 \mid \} \{ 1 \mid \} \{ 0 \mid \})$
$(\{ 2 \mid \} \cdot \{ 1 \mid \} \{ 1 \mid \} \{ 3 \mid \})$		$(\{ 1 \mid \} \cdot \{ \mid \} \{ 1 \mid \} \{ 0 \mid \})$

Interpretative action

$(\{1\}, \{1\}_{\{0\}}, \{1\}_{\{3\}})$	$(\{1\}, \{1\}_{\{1\}}, \{0\})$
$\wedge \gg (\{2\}, \{1\}_{\{1\}}, \{3\}) \times$	$\wedge \gg (\{1\}, \{2\}_{\{3\}}, \{1\})$
$(\{1\}, \{1\}_{\{0\}}, \{1\})$	$(\{1\}, \{1\}_{\{3\}}, \{1\}_{\{0\}})$
$(\{0\}, \{1\}_{\{0\}}, \{3\})$	$(\{1\}, \{1\}_{\{0\}})$
$\wedge \gg (\{2\}, \{1\}_{\{1\}}, \{3\}) \times$	$\wedge \gg (\{1\}, \{2\}_{\{3\}}, \{1\})$
$(\{1\}, \{1\}_{\{0\}}, \{1\})$	$(\{1\}, \{0\}_{\{3\}}, \{0\})$
$(\{1\}, \{1\}_{\{0\}}, \{1\}_{\{3\}})$	$(\{1\}, \{0\}_{\{3\}}, \{0\})$
$\wedge \gg (\{2\}, \{1\}_{\{1\}}, \{3\}) \times$	$\wedge \gg (\{1\}, \{2\}_{\{3\}}, \{1\})$
$(\{0\}, \{1\}_{\{0\}}, \{3\})$	$(\{1\}, \{1\}_{\{1\}}, \{0\})$
$(\{0\}, \{1\}_{\{0\}}, \{3\})$	$(\{1\}, \{1\}_{\{3\}}, \{1\}_{\{0\}})$
$\wedge \gg (\{2\}, \{1\}_{\{1\}}, \{3\}) \times$	$\wedge \gg (\{1\}, \{2\}_{\{3\}}, \{1\})$
$(\{1\}, \{1\}_{\{0\}}, \{1\}_{\{3\}})$	$(\{1\}, \{0\}_{\{3\}}, \{0\})$

$$\begin{array}{l}
 (\{\mid\}.\{1\mid\}_{\{0\mid\},\{1\mid\}}) \\
 \quad \wedge \gg (\{2\mid\}.\{1\mid\}_{\{1\mid\},\{3\mid\}}) \times \\
 (\{1\mid\}.\{1\mid\}_{\{0\mid\},\{1\mid\},\{3\mid\}})
 \end{array}
 \qquad
 \begin{array}{l}
 (\{1\mid\}.\{1\mid\}_{\{0\mid\},\{1\mid\},\{3\mid\}}) \\
 \quad \wedge \gg (\{1\mid\}.\{2\mid\}_{\{3\mid\},\{1\mid\}}) \\
 (\{1\mid\}.\{\mid\}_{\{1\mid\},\{0\mid\}})
 \end{array}$$

12. Pre-semiotic dual system

$$\begin{array}{l}
 (\{2\mid\}.\{1\mid\}_{\{1\mid\},\{3\mid\}}\{1\mid\}.\{1\mid\}_{\{0\mid\},\{1\mid\},\{3\mid\}}\{0\mid\}.\{1\mid\}_{\{0\mid\},\{3\mid\}}\{\mid\}.\{2\mid\} \\
 \quad \}_{\{1\mid\},\{2\mid\}}) \times (\{2\mid\}.\{\mid\}_{\{2\mid\},\{1\mid\}}\{1\mid\}.\{0\mid\}_{\{3\mid\},\{0\mid\}}\{1\mid\}.\{1\mid\}_{\{3\mid\},\{1\mid\},\{0\mid\}} \\
 \quad \{1\mid\}.\{2\mid\}_{\{3\mid\},\{1\mid\}})
 \end{array}$$

Qualitative action

$$\begin{array}{ll}
 \begin{array}{l}
 (\{1\mid\}.\{1\mid\}_{\{0\mid\},\{1\mid\},\{3\mid\}}) \\
 \quad \wedge \gg (\{\mid\}.\{2\mid\}_{\{1\mid\},\{2\mid\}}) \\
 (\{0\mid\}.\{1\mid\}_{\{0\mid\},\{3\mid\}})
 \end{array}
 & \times \qquad \begin{array}{l}
 (\{1\mid\}.\{0\mid\}_{\{3\mid\},\{0\mid\}}) \\
 \quad \wedge \gg (\{2\mid\}.\{\mid\}_{\{2\mid\},\{1\mid\}}) \\
 (\{1\mid\}.\{1\mid\}_{\{3\mid\},\{1\mid\},\{0\mid\}})
 \end{array} \\
 \\[10pt]
 \begin{array}{l}
 (\{2\mid\}.\{1\mid\}_{\{1\mid\},\{3\mid\}}) \\
 \quad \wedge \gg (\{\mid\}.\{2\mid\}_{\{1\mid\},\{2\mid\}}) \\
 (\{0\mid\}.\{1\mid\}_{\{0\mid\},\{3\mid\}})
 \end{array}
 & \times \qquad \begin{array}{l}
 (\{1\mid\}.\{0\mid\}_{\{3\mid\},\{0\mid\}}) \\
 \quad \wedge \gg (\{2\mid\}.\{\mid\}_{\{2\mid\},\{1\mid\}}) \\
 (\{1\mid\}.\{2\mid\}_{\{3\mid\},\{1\mid\}})
 \end{array} \\
 \\[10pt]
 \begin{array}{l}
 (\{0\mid\}.\{1\mid\}_{\{0\mid\},\{3\mid\}}) \\
 \quad \wedge \gg (\{\mid\}.\{2\mid\}_{\{1\mid\},\{2\mid\}}) \\
 (\{1\mid\}.\{1\mid\}_{\{0\mid\},\{1\mid\},\{3\mid\}})
 \end{array}
 & \times \qquad \begin{array}{l}
 (\{1\mid\}.\{1\mid\}_{\{3\mid\},\{1\mid\},\{0\mid\}}) \\
 \quad \wedge \gg (\{2\mid\}.\{\mid\}_{\{2\mid\},\{1\mid\}}) \\
 (\{1\mid\}.\{0\mid\}_{\{3\mid\},\{0\mid\}})
 \end{array} \\
 \\[10pt]
 \begin{array}{l}
 (\{2\mid\}.\{1\mid\}_{\{1\mid\},\{3\mid\}}) \\
 \quad \wedge \gg (\{\mid\}.\{2\mid\}_{\{1\mid\},\{2\mid\}}) \\
 (\{1\mid\}.\{2\mid\}_{\{1\mid\},\{3\mid\}})
 \end{array}
 & \times \qquad \begin{array}{l}
 (\{1\mid\}.\{1\mid\}_{\{3\mid\},\{1\mid\},\{0\mid\}}) \\
 \quad \wedge \gg (\{2\mid\}.\{\mid\}_{\{2\mid\},\{1\mid\}}) \\
 (\{1\mid\}.\{1\mid\}_{\{0\mid\},\{1\mid\},\{.}\})
 \end{array} \\
 \\[10pt]
 \begin{array}{l}
 (\{0\mid\}.\{1\mid\}_{\{0\mid\},\{3\mid\}}) \\
 \quad \wedge \gg (\{\mid\}.\{2\mid\}_{\{1\mid\},\{2\mid\}}) \\
 (\{2\mid\}.\{1\mid\}_{\{1\mid\},\{3\mid\}})
 \end{array}
 & \times \qquad \begin{array}{l}
 (\{1\mid\}.\{2\mid\}_{\{3\mid\},\{1\mid\}}) \\
 \quad \wedge \gg (\{2\mid\}.\{\mid\}_{\{2\mid\},\{1\mid\}}) \\
 (\{1\mid\}.\{0\mid\}_{\{3\mid\},\{0\mid\}})
 \end{array} \\
 \\[10pt]
 \begin{array}{l}
 (\{1\mid\}.\{1\mid\}_{\{0\mid\},\{1\mid\},\{3\mid\}}) \\
 \quad \wedge \gg (\{\mid\}.\{2\mid\}_{\{1\mid\},\{2\mid\}}) \\
 (\{2\mid\}.\{1\mid\}_{\{1\mid\},\{3\mid\}})
 \end{array}
 & \times \qquad \begin{array}{l}
 (\{1\mid\}.\{2\mid\}_{\{3\mid\},\{1\mid\}}) \\
 \quad \wedge \gg (\{2\mid\}.\{\mid\}_{\{2\mid\},\{1\mid\}}) \\
 (\{1\mid\}.\{1\mid\}_{\{3\mid\},\{1\mid\},\{0\mid\}})
 \end{array}
 \end{array}$$

Medial action

$$(\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \\ \wedge \gg (\{0\}, \{1\}, \{0\}, \{3\}) \quad \times \\ (\{\}, \{2\}, \{1\}, \{2\})$$

```
({2 | }.{ | }{2 | },{1 | })
Λ ≫ ({1 | }.{0 | }{3 | },{0 | })
({1 | }.{1 | }{3 | },{1 | },{0 | })
```

$$(\{2\}, \{1\}, \{3\}) \\ \wedge \gg (\{0\}, \{1\}, \{3\}) \quad \times \\ (\{\}, \{2\}, \{1\}, \{2\})$$

```
({2 | }.{ | }{2 | },{1 | })
Λ ≫ ({1 | }.{0 | }{3 | },{0 | })
({1 | }.{2 | }{3 | },{1 | })
```

$$(\{ \mid \}.\{2 \mid \}_{\{1 \mid \}.\{2 \mid \}}) \\ \wedge \gg (\{0 \mid \}.\{1 \mid \}_{\{0 \mid \}.\{3 \mid \}}) \quad \times \\ (\{1 \mid \}.\{1 \mid \}_{\{0 \mid \}.\{1 \mid \}.\{3 \mid \}})$$

$$\begin{aligned} & (\{1\mid\}\cdot\{1\mid\})_{\{3\mid\},\{1\mid\},\{0\mid\}} \\ \lambda \gg & (\{1\mid\}\cdot\{0\mid\})_{\{3\mid\},\{0\mid\}} \\ & (\{2\mid\}\cdot\{| \})_{\{2\mid\},\{1\mid\}} \end{aligned}$$

$$(\{2\}, \{1\}, \{1\}, \{3\}) \\ \wedge \gg (\{0\}, \{1\}, \{0\}, \{3\}) \quad \times \\ (\{1\}, \{1\}, \{0\}, \{1\}, \{3\})$$

```
({1 | }.{1 | }{3 | }{1 | }{0 | })
Λ ≫ ({1 | }.{0 | }{3 | }{0 | })
({1 | }.{2 | }{3 | }{1 | })
```

$$(\{ \mid \}.\{2 \mid \}_{\{1 \mid \}.\{2 \mid \}}) \\ \wedge \gg (\{0 \mid \}.\{1 \mid \}_{\{0 \mid \}.\{3 \mid \}}) \quad \times \\ (\{2 \mid \}.\{1 \mid \}_{\{1 \mid \}.\{3 \mid \}})$$

```
({1 | }.{2 | }{3 | },{1 | })
Λ ≫ ({1 | }.{0 | }{3 | },{0 | })
({2 | }.{| }{2 | },{1 | })
```

$$(\{1\}, \{1\}_{\{0\}}, \{1\}, \{3\}) \\ \wedge \gg (\{0\}, \{1\}_{\{0\}}, \{3\}) \quad \times \\ (\{2\}, \{1\}_{\{1\}}, \{3\})$$

```
({1 | }.{2 | }{3 | }{1 | })
  \gg ({1 | }.{0 | }{3 | }{0 | })
({1 | }.{1 | }{3 | }{1 | }{0 | })
```

Objectal action

$(\{0\}, \{1\}, \{2\})$ \times
 $\wedge \gg (\{1\}, \{2\}, \{3\})$

```

({2 | }.{ | }{2 | },{1 | })
λ ≫ ({1 | }.{1 | }{3 | },{1 | },{0 | })
({1 | }.{0 | }{3 | },{0 | })

```

$(\{2 | \}, \{1 | \}_{\{1 | \}}, \{3 | \})$
 $\wedge \gg (\{1 | \}. \{1 | \}_{\{0 | \}}, \{1 | \}, \{3 | \}) \quad \times$
 $(\{ | \}. \{2 | \}_{\{1 | \}}, \{2 | \})$

$$\begin{aligned} & (\{2\mid\}\cdot\{\mid\}_{\{2\mid\},\{1\mid\}}) \\ \wedge & \gg (\{1\mid\}\cdot\{1\mid\}_{\{3\mid\},\{1\mid\},\{0\mid\}}) \\ & (\{1\mid\}\cdot\{2\mid\}_{\{3\mid\},\{1\mid\}}) \end{aligned}$$

$(\{\mid\}, \{2\mid\}_{\{1\mid\}, \{2\mid\}})$
 $\wedge \gg (\{1\mid\}, \{1\mid\}_{\{0\mid\}, \{1\mid\}, \{3\mid\}}) \quad \times$
 $(\{0\mid\}, \{1\mid\}_{\{0\mid\}, \{3\mid\}})$

```
({1 | }.{0 | }{3 | },{0 | })
>> ({1 | }.{1 | }{3 | },{1 | },{0 | })
({2 | }.{ | }{2 | },{1 | })
```

$(\{2 \}.\{1 \}_{\{1 \}, \{3 \}})$	\times	$(\{1 \}.\{0 \}_{\{3 \}, \{0 \}})$
$\wedge \gg (\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}})$		$\wedge \gg (\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{0 \}.\{1 \}_{\{0 \}, \{3 \}})$		$(\{1 \}.\{2 \}_{\{3 \}, \{1 \}})$
$(\{0 \}.\{1 \}_{\{0 \}, \{3 \}})$	\times	$(\{1 \}.\{2 \}_{\{3 \}, \{1 \}})$
$\wedge \gg (\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}})$		$\wedge \gg (\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{2 \}.\{1 \}_{\{1 \}, \{3 \}})$		$(\{1 \}.\{0 \}_{\{3 \}, \{0 \}})$
$(\{ \}.\{2 \}_{\{1 \}, \{2 \}})$	\times	$(\{1 \}.\{2 \}_{\{3 \}, \{1 \}})$
$\wedge \gg (\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}})$		$\wedge \gg (\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{2 \}.\{1 \}_{\{1 \}, \{3 \}})$		$(\{2 \}.\{1 \}_{\{2 \}, \{1 \}})$

Interpretative action

$(\{1 \}. \{1 \}_{\{0 \} \{1 \} \{3 \}})$	$(\{2 \}. \{ \}_{\{2 \} \{1 \}})$
$\wedge \gg (\{2 \}. \{1 \}_{\{1 \} \{3 \}}) \times$	$\wedge \gg (\{1 \}. \{2 \}_{\{3 \} \{1 \}})$
$(\{ \}. \{2 \}_{\{1 \} \{2 \}})$	$(\{1 \}. \{1 \}_{\{3 \} \{1 \} \{0 \}})$
$(\{0 \}. \{1 \}_{\{0 \} \{3 \}})$	$(\{2 \}. \{ \}_{\{2 \} \{1 \}})$
$\wedge \gg (\{2 \}. \{1 \}_{\{1 \} \{3 \}}) \times$	$\wedge \gg (\{1 \}. \{2 \}_{\{3 \} \{1 \}})$
$(\{0 \}. \{1 \}_{\{0 \} \{3 \}})$	$(\{1 \}. \{0 \}_{\{3 \} \{0 \}})$
$(\{ \}. \{2 \}_{\{1 \} \{2 \}})$	$(\{1 \}. \{1 \}_{\{3 \} \{0 \}})$
$\wedge \gg (\{2 \}. \{1 \}_{\{1 \} \{3 \}}) \times$	$\wedge \gg (\{1 \}. \{2 \}_{\{3 \} \{1 \}})$
$(\{0 \}. \{1 \}_{\{0 \} \{3 \}})$	$(\{2 \}. \{ \}_{\{2 \} \{1 \}})$
$\wedge \gg (\{2 \}. \{1 \}_{\{1 \} \{3 \}}) \times$	$(\{1 \}. \{1 \}_{\{3 \} \{1 \} \{0 \}})$
$(\{ \}. \{2 \}_{\{1 \} \{2 \}})$	$(\{1 \}. \{1 \}_{\{3 \} \{1 \} \{0 \}})$
$\wedge \gg (\{2 \}. \{1 \}_{\{1 \} \{3 \}}) \times$	$\wedge \gg (\{1 \}. \{2 \}_{\{3 \} \{1 \}})$
$(\{ \}. \{1 \}_{\{0 \} \{1 \} \{3 \}})$	$(\{2 \}. \{ \}_{\{2 \} \{1 \}})$

13. Pre-semiotic dual system

$$\begin{aligned}
 & (\{2\}.\{1\}_{\{1\},\{3\}}\{1\}.\{1\}_{\{0\},\{1\},\{3\}}\{0\}.\{2\}_{\{2\},\{3\}}\{|}) \\
 & \{2\}_{\{1\},\{2\}} \times \\
 & (\{2\}.|\}_{\{2\},\{1\}}\{2\}.\{0\}_{\{3\},\{2\}}\{1\}.\{1\}_{\{3\},\{1\},\{0\}}\{1\} \\
 & \{2\}_{\{3\},\{1\}})
 \end{aligned}$$

Qualitative action

$$\begin{array}{ccc}
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) & \times & (\{2\}.\{0\}_{\{3\},\{2\}}) \\
 \lambda \gg (\{|).\{2\}_{\{1\},\{2\}}) & & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{0\}.\{2\}_{\{2\},\{3\}}) & & (\{1\}.\{1\}_{\{3\},\{1\},\{0\}})
 \\[10pt]
 (\{2\}.\{1\}_{\{1\},\{3\}}) & \times & (\{2\}.\{0\}_{\{3\},\{2\}}) \\
 \lambda \gg (\{|).\{2\}_{\{1\},\{2\}}) & & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{0\}.\{2\}_{\{2\},\{3\}}) & & (\{1\}.\{2\}_{\{3\},\{1\}})
 \\[10pt]
 (\{0\}.\{2\}_{\{2\},\{3\}}) & \times & (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
 \lambda \gg (\{|).\{2\}_{\{1\},\{2\}}) & & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) & & (\{2\}.\{0\}_{\{3\},\{2\}})
 \\[10pt]
 (\{2\}.\{1\}_{\{1\},\{3\}}) & \times & (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
 \lambda \gg (\{|).\{2\}_{\{1\},\{2\}}) & & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) & & (\{1\}.\{2\}_{\{3\},\{1\}})
 \\[10pt]
 (\{0\}.\{2\}_{\{2\},\{3\}}) & \times & (\{1\}.\{2\}_{\{3\},\{1\}}) \\
 \lambda \gg (\{|).\{2\}_{\{1\},\{2\}}) & & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{2\}.\{1\}_{\{1\},\{3\}}) & & (\{2\}.\{0\}_{\{3\},\{2\}})
 \\[10pt]
 (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) & \times & (\{1\}.\{2\}_{\{3\},\{1\}}) \\
 \lambda \gg (\{|).\{2\}_{\{1\},\{2\}}) & & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{2\}.\{1\}_{\{1\},\{3\}}) & & (\{1\}.\{1\}_{\{3\},\{1\},\{0\}})
 \end{array}$$

Medial action

$$\begin{aligned}
 & (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
 & \lambda \gg (\{0\}.\{2\}_{\{2\},\{3\}}) \quad \times \quad (\{2\}.|\}_{\{2\},\{1\}}) \\
 & (\{|).\{2\}_{\{1\},\{2\}}) \quad \quad \quad \lambda \gg (\{2\}.\{0\}_{\{3\},\{2\}}) \\
 & \quad \quad \quad (\{1\}.\{1\}_{\{3\},\{1\},\{0\}})
 \end{aligned}$$

$(\{2 \}.\{1 \}_{\{1 \}, \{3 \}})$	$(\{2 \}.\{ \}_{\{2 \}, \{1 \}})$
$\wedge \gg (\{0 \}.\{2 \}_{\{2 \}, \{3 \}}) \times$	$\wedge \gg (\{2 \}.\{0 \}_{\{3 \}, \{2 \}})$
$(\{ \}.\{2 \}_{\{1 \}, \{2 \}})$	$(\{1 \}.\{2 \}_{\{3 \}, \{1 \}})$
$\wedge \gg (\{0 \}.\{2 \}_{\{2 \}, \{3 \}}) \times$	$(\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}})$	$\wedge \gg (\{2 \}.\{0 \}_{\{3 \}, \{2 \}})$
$(\{2 \}.\{1 \}_{\{1 \}, \{3 \}})$	$(\{2 \}.\{ \}_{\{2 \}, \{1 \}})$
$\wedge \gg (\{0 \}.\{2 \}_{\{2 \}, \{3 \}}) \times$	$(\{1 \}.\{2 \}_{\{3 \}, \{1 \}})$
$(\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}})$	$(\{1 \}.\{2 \}_{\{3 \}, \{1 \}})$
$\wedge \gg (\{0 \}.\{2 \}_{\{2 \}, \{3 \}}) \times$	$\wedge \gg (\{2 \}.\{0 \}_{\{3 \}, \{2 \}})$
$(\{2 \}.\{1 \}_{\{1 \}, \{3 \}})$	$(\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$

Objectal action

$(\{0 \}.\{2 \}_{\{2 \}, \{3 \}})$	$(\{2 \}.\{ \}_{\{2 \}, \{1 \}})$
$\wedge \gg (\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}}) \times$	$\wedge \gg (\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{ \}.\{2 \}_{\{1 \}, \{2 \}})$	$(\{2 \}.\{0 \}_{\{3 \}, \{2 \}})$
$(\{2 \}.\{1 \}_{\{1 \}, \{3 \}})$	$(\{2 \}.\{ \}_{\{2 \}, \{1 \}})$
$\wedge \gg (\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}}) \times$	$\wedge \gg (\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{1 \}.\{2 \}_{\{1 \}, \{2 \}})$	$(\{1 \}.\{2 \}_{\{3 \}, \{1 \}})$
$\wedge \gg (\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}}) \times$	$(\{2 \}.\{0 \}_{\{3 \}, \{2 \}})$
$(\{0 \}.\{2 \}_{\{2 \}, \{3 \}})$	$\wedge \gg (\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{2 \}.\{1 \}_{\{1 \}, \{3 \}})$	$(\{2 \}.\{0 \}_{\{3 \}, \{2 \}})$
$\wedge \gg (\{1 \}.\{1 \}_{\{0 \}, \{1 \}, \{3 \}}) \times$	$\wedge \gg (\{1 \}.\{1 \}_{\{3 \}, \{1 \}, \{0 \}})$
$(\{0 \}.\{2 \}_{\{2 \}, \{3 \}})$	$(\{1 \}.\{2 \}_{\{3 \}, \{1 \}})$

$$\begin{array}{l}
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\wedge \gg (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
(\{2\}.\{1\}_{\{1\},\{3\}})
\end{array}
\times
\begin{array}{l}
(\{1\}.\{2\}_{\{3\},\{1\}}) \\
\wedge \gg (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
(\{2\}.\{0\}_{\{3\},\{2\}})
\end{array}$$

$$\begin{array}{l}
(\{\}\).\{2\}_{\{1\},\{2\}}) \\
\wedge \gg (\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
(\{2\}.\{1\}_{\{1\},\{3\}})
\end{array}
\times
\begin{array}{l}
(\{1\}.\{2\}_{\{3\},\{1\}}) \\
\wedge \gg (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
(\{2\}.\{\}\}_{\{2\},\{1\}})
\end{array}$$

Interpretative action

$$\begin{array}{l}
(\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \\
(\{\}\.{2\}_{\{1\},\{2\}})
\end{array}
\times
\begin{array}{l}
(\{2\}.\{\}\}_{\{2\},\{1\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{1\}.\{1\}_{\{3\},\{1\},\{0\}})
\end{array}$$

$$\begin{array}{l}
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \\
(\{\}\.{2\}_{\{1\},\{2\}})
\end{array}
\times
\begin{array}{l}
(\{2\}.\{\}\}_{\{2\},\{1\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{2\}.\{0\}_{\{3\},\{2\}})
\end{array}$$

$$\begin{array}{l}
(\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \\
(\{0\}.\{2\}_{\{2\},\{3\}})
\end{array}
\times
\begin{array}{l}
(\{2\}.\{0\}_{\{3\},\{2\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{1\}.\{1\}_{\{3\},\{1\},\{0\}})
\end{array}$$

$$\begin{array}{l}
(\{\}\.{2\}_{\{1\},\{2\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \\
(\{0\}.\{2\}_{\{2\},\{3\}})
\end{array}
\times
\begin{array}{l}
(\{2\}.\{0\}_{\{3\},\{2\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{2\}.\{\}\}_{\{2\},\{1\}})
\end{array}$$

$$\begin{array}{l}
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \\
(\{1\}.\{1\}_{\{0\},\{1\},\{3\}})
\end{array}
\times
\begin{array}{l}
(\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{2\}.\{0\}_{\{3\},\{2\}})
\end{array}$$

$$\begin{array}{l}
(\{\}\.{2\}_{\{1\},\{2\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \\
(\{1\}.\{1\}_{\{0\},\{1\},\{3\}})
\end{array}
\times
\begin{array}{l}
(\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{2\}.\{\}\}_{\{2\},\{1\}})
\end{array}$$

14. Pre-semiotic dual system

$(\{2| \}.\{1| \}_{\{1| \},\{3| \}}\{1| \}.\{2| \}_{\{1| \},\{3| \}}\{0| \}.\{2| \}_{\{2| \},\{3| \}}\{| \}).$
 $\{2| \}_{\{1| \},\{2| \}} \times$
 $(\{2| \}.\{| \}_{\{2| \},\{1| \}}\{2| \}.\{0| \}_{\{3| \},\{2| \}}\{2| \}.\{1| \}_{\{3| \},\{1| \}}\{1| \}).$
 $\{2| \}_{\{3| \},\{1| \}})$

Qualitative action

$(\{1 \}.\{2 \}_{\{1 \},\{3 \}})$	$\lambda \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}})$	\times	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$			$\lambda \gg (\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{2 \}.\{1 \}_{\{1 \},\{3 \}})$	$\lambda \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}})$	\times	$(\{2 \}.\{1 \}_{\{3 \},\{1 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$\lambda \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}})$	\times	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{1 \}.\{2 \}_{\{1 \},\{3 \}})$			$\lambda \gg (\{2 \}.\{1 \}_{\{2 \},\{1 \}})$
$(\{2 \}.\{1 \}_{\{1 \},\{3 \}})$	$\lambda \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}})$	\times	$(\{2 \}.\{1 \}_{\{3 \},\{1 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$\lambda \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}})$	\times	$(\{1 \}.\{2 \}_{\{3 \},\{1 \}})$
$(\{2 \}.\{1 \}_{\{1 \},\{3 \}})$			$\lambda \gg (\{2 \}.\{1 \}_{\{2 \},\{1 \}})$
$(\{1 \}.\{2 \}_{\{1 \},\{3 \}})$	$\lambda \gg (\{ \}.\{2 \}_{\{1 \},\{2 \}})$	\times	$(\{1 \}.\{2 \}_{\{3 \},\{1 \}})$
$(\{2 \}.\{1 \}_{\{1 \},\{3 \}})$			$\lambda \gg (\{2 \}.\{1 \}_{\{2 \},\{1 \}})$

Medial action

$(\{1 \}.\{2 \}_{\{1 \},\{3 \}})$	$\lambda \gg (\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	\times	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$			$\lambda \gg (\{2 \}.\{0 \}_{\{3 \},\{2 \}})$

$(\{2 \}.\{1 \}_{\{1 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$\wedge \gg (\{0 \}.\{2 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{1 \}.\{2 \}_{\{3 \},\{1 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{2 \}.\{1 \}_{\{3 \},\{1 \}})$
$\wedge \gg (\{0 \}.\{2 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{1 \}.\{2 \}_{\{1 \},\{3 \}})$	$(\{2 \}.\{2 \}_{\{3 \},\{1 \}})$
$(\{2 \}.\{1 \}_{\{1 \},\{3 \}})$	$(\{1 \}.\{2 \}_{\{3 \},\{1 \}})$
$\wedge \gg (\{0 \}.\{2 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{2 \}.\{1 \}_{\{1 \},\{3 \}})$	$(\{2 \}.\{1 \}_{\{3 \},\{1 \}})$
$(\{1 \}.\{2 \}_{\{1 \},\{3 \}})$	$(\{1 \}.\{2 \}_{\{3 \},\{1 \}})$
$\wedge \gg (\{0 \}.\{2 \}_{\{2 \},\{3 \}}) \times$	$\wedge \gg (\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{2 \}.\{1 \}_{\{1 \},\{3 \}})$	$(\{2 \}.\{1 \}_{\{3 \},\{1 \}})$

Objectal action

$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$\wedge \gg (\{1 \}.\{2 \}_{\{1 \},\{3 \}}) \times$	$\wedge \gg (\{2 \}.\{1 \}_{\{3 \},\{1 \}})$
$(\{ \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{2 \}.\{1 \}_{\{1 \},\{3 \}})$	$(\{2 \}.\{ \}_{\{2 \},\{1 \}})$
$\wedge \gg (\{1 \}.\{2 \}_{\{1 \},\{3 \}}) \times$	$\wedge \gg (\{2 \}.\{1 \}_{\{3 \},\{1 \}})$
$(\{1 \}.\{2 \}_{\{1 \},\{2 \}})$	$(\{1 \}.\{2 \}_{\{3 \},\{1 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}}) \times$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$(\{2 \}.\{1 \}_{\{1 \},\{3 \}})$	$(\{2 \}.\{0 \}_{\{3 \},\{2 \}})$
$\wedge \gg (\{1 \}.\{2 \}_{\{1 \},\{3 \}}) \times$	$\wedge \gg (\{2 \}.\{1 \}_{\{3 \},\{1 \}})$
$(\{0 \}.\{2 \}_{\{2 \},\{3 \}})$	$(\{1 \}.\{2 \}_{\{3 \},\{1 \}})$

$$\begin{array}{l}
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{1\},\{3\}}) \quad \times \\
(\{2\}.\{1\}_{\{1\},\{3\}}) \\
\\
(\{1\}.\{2\}_{\{1\},\{2\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{1\},\{3\}}) \quad \times \\
(\{2\}.\{1\}_{\{1\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{1\}.\{2\}_{\{3\},\{1\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{3\},\{1\}}) \\
(\{2\}.\{0\}_{\{3\},\{2\}})
\end{array}$$

Interpretative action

$$\begin{array}{l}
(\{1\}.\{2\}_{\{1\},\{3\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \quad \times \\
(\{1\}.\{2\}_{\{1\},\{2\}}) \\
\\
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \quad \times \\
(\{1\}.\{2\}_{\{1\},\{2\}}) \\
\\
(\{1\}.\{2\}_{\{1\},\{3\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \quad \times \\
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\\
(\{1\}.\{2\}_{\{1\},\{2\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \quad \times \\
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\\
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \quad \times \\
(\{1\}.\{2\}_{\{1\},\{3\}}) \\
\\
(\{1\}.\{2\}_{\{1\},\{2\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{1\},\{3\}}) \quad \times \\
(\{1\}.\{2\}_{\{1\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{\mid\}_{\{2\},\{1\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{2\}.\{1\}_{\{3\},\{1\}}) \\
\\
(\{2\}.\{\mid\}_{\{2\},\{1\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{2\}.\{0\}_{\{3\},\{2\}}) \\
\\
(\{2\}.\{0\}_{\{3\},\{2\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{2\}.\{1\}_{\{3\},\{1\}}) \\
\\
(\{2\}.\{0\}_{\{3\},\{2\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{2\}.\{1\}_{\{3\},\{1\}}) \\
\\
(\{2\}.\{1\}_{\{3\},\{1\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{3\},\{1\}}) \\
(\{2\}.\{\mid\}_{\{2\},\{1\}})
\end{array}$$

15. Pre-semiotic dual system

$$\begin{aligned}
 & (\{2\}.\{2\}_{\{1\},\{2\},\{3\}} \{1\}.\{2\}_{\{1\},\{3\}} \{0\}.\{2\}_{\{2\},\{3\}} \{|}) \\
 & \{2\}_{\{1\},\{2\}} \times \\
 & (\{2\}.|\}_{\{2\},\{1\}} \{2\}.\{0\}_{\{3\},\{2\}} \{2\}.\{1\}_{\{3\},\{1\}} \{2\} \\
 & \{2\}_{\{3\},\{2\},\{1\}})
 \end{aligned}$$

Qualitative action

$$\begin{array}{ccc}
 (\{1\}.\{2\}_{\{1\},\{3\}}) & & (\{2\}.\{0\}_{\{3\},\{2\}}) \\
 \lambda \gg (\{|.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{0\}.\{2\}_{\{2\},\{3\}}) & & (\{2\}.\{1\}_{\{3\},\{1\}}) \\
 \\
 (\{2\}.\{2\}_{\{1\},\{2\},\{3\}}) & & (\{2\}.\{0\}_{\{3\},\{2\}}) \\
 \lambda \gg (\{|.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{0\}.\{2\}_{\{2\},\{3\}}) & & (\{2\}.\{2\}_{\{3\},\{2\},\{1\}}) \\
 \\
 (\{0\}.\{2\}_{\{2\},\{3\}}) & & (\{2\}.\{1\}_{\{3\},\{1\}}) \\
 \lambda \gg (\{|.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{1\}.\{2\}_{\{1\},\{3\}}) & & (\{2\}.\{0\}_{\{3\},\{2\}}) \\
 \\
 (\{2\}.\{1\}_{\{1\},\{3\}}) & & (\{2\}.\{1\}_{\{3\},\{1\}}) \\
 \lambda \gg (\{|.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{1\}.\{2\}_{\{1\},\{3\}}) & & (\{1\}.\{2\}_{\{3\},\{1\}}) \\
 \\
 (\{0\}.\{2\}_{\{2\},\{3\}}) & & (\{1\}.\{2\}_{\{3\},\{1\}}) \\
 \lambda \gg (\{|.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{2\}.\{1\}_{\{1\},\{3\}}) & & (\{2\}.\{0\}_{\{3\},\{2\}}) \\
 \\
 (\{1\}.\{2\}_{\{1\},\{3\}}) & & (\{1\}.\{2\}_{\{3\},\{1\}}) \\
 \lambda \gg (\{|.\{2\}_{\{1\},\{2\}}) & \times & \lambda \gg (\{2\}.|\}_{\{2\},\{1\}}) \\
 (\{2\}.\{1\}_{\{1\},\{3\}}) & & (\{2\}.\{1\}_{\{3\},\{1\}})
 \end{array}$$

Medial action

$$\begin{aligned}
 & (\{1\}.\{2\}_{\{1\},\{3\}}) \\
 & \lambda \gg (\{0\}.\{2\}_{\{2\},\{3\}}) \quad \times \quad (\{2\}.|\}_{\{2\},\{1\}}) \\
 & (\{|.\{2\}_{\{1\},\{2\}})
 \end{aligned}$$

$$\begin{aligned}
 & (\{2\}.|\}_{\{2\},\{1\}}) \\
 & \lambda \gg (\{2\}.|\}_{\{3\},\{2\}}) \\
 & (\{2\}.\{1\}_{\{3\},\{1\}})
 \end{aligned}$$

$$\begin{array}{l}
(\{2| \}.\{2| \}_{\{1| \},\{2| \},\{3| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{ | \}.\{2| \}_{\{1| \},\{2| \}}) \\
\\
(\{ | \}.\{2| \}_{\{1| \},\{2| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \\
\\
(\{2| \}.\{2| \}_{\{1| \},\{2| \},\{3| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \\
\\
(\{ | \}.\{2| \}_{\{1| \},\{2| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{2| \}.\{2| \}_{\{1| \},\{2| \},\{3| \}}) \\
\\
(\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \\
\wedge \gg (\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \quad \times \\
(\{2| \}.\{2| \}_{\{1| \},\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{ | \}_{\{2| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{2| \}_{\{3| \},\{2| \},\{1| \}}) \\
\\
(\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{2| \}_{\{3| \},\{2| \},\{1| \}}) \\
\\
(\{2| \}.\{2| \}_{\{3| \},\{2| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
(\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
\\
(\{2| \}.\{2| \}_{\{3| \},\{2| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
(\{2| \}.\{2| \}_{\{3| \},\{2| \},\{1| \}})
\end{array}$$

Objectal action

$$\begin{array}{l}
(\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \\
\wedge \gg (\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \quad \times \\
(\{ | \}.\{2| \}_{\{1| \},\{2| \}}) \\
\\
(\{2| \}.\{2| \}_{\{1| \},\{2| \},\{3| \}}) \\
\wedge \gg (\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \quad \times \\
(\{ | \}.\{2| \}_{\{1| \},\{2| \}}) \\
\\
(\{ | \}.\{2| \}_{\{1| \},\{2| \}}) \\
\wedge \gg (\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \quad \times \\
(\{0| \}.\{2| \}_{\{2| \},\{3| \}}) \\
\\
(\{2| \}.\{2| \}_{\{1| \},\{2| \},\{3| \}}) \\
\wedge \gg (\{1| \}.\{2| \}_{\{1| \},\{3| \}}) \quad \times \\
(\{0| \}.\{2| \}_{\{2| \},\{3| \}})
\end{array}
\qquad
\begin{array}{l}
(\{2| \}.\{ | \}_{\{2| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
(\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
\\
(\{2| \}.\{2| \}_{\{2| \},\{1| \}}) \\
\wedge \gg (\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
(\{2| \}.\{2| \}_{\{3| \},\{2| \},\{1| \}}) \\
\\
(\{2| \}.\{0| \}_{\{3| \},\{2| \}}) \\
\wedge \gg (\{2| \}.\{1| \}_{\{3| \},\{1| \}}) \\
(\{2| \}.\{2| \}_{\{3| \},\{2| \},\{1| \}})
\end{array}$$

$$\begin{array}{l}
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{1\},\{3\}}) \times \\
(\{2\}.\{2\}_{\{1\},\{2\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{2\}_{\{3\},\{2\},\{1\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{3\},\{1\}}) \\
(\{2\}.\{0\}_{\{3\},\{2\}})
\end{array}$$

$$\begin{array}{l}
(\{\}\{2\}_{\{1\},\{2\}}) \\
\wedge \gg (\{1\}.\{2\}_{\{1\},\{3\}}) \times \\
(\{2\}.\{2\}_{\{1\},\{2\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{2\}_{\{3\},\{2\},\{1\}}) \\
\wedge \gg (\{2\}.\{1\}_{\{3\},\{1\}}) \\
(\{2\}.\{\mid\}_{\{2\},\{1\}})
\end{array}$$

Interpretative action

$$\begin{array}{l}
(\{1\}.\{2\}_{\{1\},\{3\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{1\},\{2\},\{3\}}) \times \\
(\{\}\{2\}_{\{1\},\{2\}})
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{\mid\}_{\{2\},\{1\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{3\},\{2\},\{1\}}) \\
(\{2\}.\{1\}_{\{3\},\{1\}})
\end{array}$$

$$\begin{array}{l}
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{1\},\{2\},\{3\}}) \times \\
(\{\}\{2\}_{\{1\},\{2\}})
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{\mid\}_{\{2\},\{1\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{3\},\{2\},\{1\}}) \\
(\{2\}.\{0\}_{\{3\},\{2\}})
\end{array}$$

$$\begin{array}{l}
(\{1\}.\{2\}_{\{1\},\{3\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{1\},\{2\},\{3\}}) \times \\
(\{0\}.\{2\}_{\{2\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{0\}_{\{3\},\{2\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{3\},\{2\},\{1\}}) \\
(\{2\}.\{1\}_{\{3\},\{1\}})
\end{array}$$

$$\begin{array}{l}
(\{\}\{2\}_{\{1\},\{2\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{1\},\{2\},\{3\}}) \times \\
(\{0\}.\{2\}_{\{2\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{0\}_{\{3\},\{2\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{3\},\{2\},\{1\}}) \\
(\{2\}.\{\mid\}_{\{2\},\{1\}})
\end{array}$$

$$\begin{array}{l}
(\{0\}.\{2\}_{\{2\},\{3\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{1\},\{2\},\{3\}}) \times \\
(\{1\}.\{2\}_{\{1\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{1\}_{\{3\},\{1\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{3\},\{2\},\{1\}}) \\
(\{2\}.\{0\}_{\{3\},\{2\}})
\end{array}$$

$$\begin{array}{l}
(\{\}\{2\}_{\{1\},\{2\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{1\},\{2\},\{3\}}) \times \\
(\{1\}.\{2\}_{\{1\},\{3\}})
\end{array}
\qquad
\begin{array}{l}
(\{2\}.\{1\}_{\{3\},\{1\}}) \\
\wedge \gg (\{2\}.\{2\}_{\{3\},\{2\},\{1\}}) \\
(\{2\}.\{\mid\}_{\{2\},\{1\}})
\end{array}$$

II. Action schemata of the 2·24 tetradic semiotic partial relations¹

1. Pre-semiotic dual system

$$(\{2\} \cdot \{0\} \{1\} \cdot \{0\} \{0\} \cdot \{0\} \{1\} \{1\} \cdot \{0\}) \times \\ (\{0\} \cdot \{1\} \{0\} \cdot \{0\} \{0\} \{1\} \{0\} \cdot \{2\})$$

Qualitative action

$$(\{0\} \cdot \{0\} \{0\} \{2\} \{3\}) \gg Y > (\{1\} \cdot \{0\} \{0\} \{2\}) \quad \times \quad (\{0\} \cdot \{1\} \{2\} \{0\}) \gg Y > (\{0\} \cdot \{0\} \{3\} \{2\} \{0\}) \\ (\{1\} \cdot \{0\} \{0\} \{3\})$$

$$(\{0\} \cdot \{0\} \{0\} \{1\} \{3\}) \gg Y > (\{1\} \cdot \{0\} \{0\} \{1\} \{2\}) \quad \times \quad (\{0\} \cdot \{1\} \{2\} \{0\}) \gg Y > (\{0\} \cdot \{0\} \{3\} \{2\} \{0\}) \\ (\{2\} \cdot \{0\} \{2\} \{3\})$$

$$(\{1\} \cdot \{0\} \{0\} \{1\} \{3\}) \gg Y > (\{1\} \cdot \{0\} \{0\} \{1\} \{2\}) \quad \times \quad (\{0\} \cdot \{1\} \{2\} \{0\}) \gg Y > (\{0\} \cdot \{1\} \{3\} \{2\} \{0\}) \\ (\{0\} \cdot \{0\} \{0\} \{2\} \{3\})$$

$$(\{1\} \cdot \{0\} \{0\} \{1\} \{3\}) \gg Y > (\{1\} \cdot \{0\} \{0\} \{1\} \{2\}) \quad \times \quad (\{0\} \cdot \{1\} \{2\} \{0\}) \gg Y > (\{0\} \cdot \{1\} \{3\} \{2\} \{0\}) \\ (\{2\} \cdot \{0\} \{2\} \{3\})$$

$$(\{0\} \cdot \{0\} \{0\} \{1\} \{3\}) \gg Y > (\{2\} \cdot \{0\} \{0\} \{1\} \{2\}) \quad \times \quad (\{0\} \cdot \{1\} \{2\} \{0\}) \gg Y > (\{0\} \cdot \{2\} \{3\} \{2\} \{0\}) \\ (\{1\} \cdot \{0\} \{0\} \{3\})$$

$$(\{2\} \cdot \{0\} \{0\} \{1\} \{3\}) \gg Y > (\{1\} \cdot \{0\} \{0\} \{1\} \{2\}) \quad \times \quad (\{0\} \cdot \{1\} \{2\} \{0\}) \gg Y > (\{0\} \cdot \{2\} \{3\} \{2\} \{0\}) \\ (\{0\} \cdot \{0\} \{0\} \{3\})$$

Medial action

$$(\{2\} \cdot \{0\} \{0\} \{2\} \{3\}) \gg Y > (\{1\} \cdot \{0\} \{0\} \{2\} \{3\}) \quad \times \quad (\{0\} \cdot \{0\} \{3\} \{2\} \{0\}) \gg Y > (\{0\} \cdot \{1\} \{2\} \{0\}) \\ (\{1\} \cdot \{0\} \{0\} \{3\})$$

$$(\{1\} \cdot \{0\} \{0\} \{1\} \{3\}) \gg Y > (\{0\} \cdot \{0\} \{0\} \{2\} \{3\}) \quad \times \quad (\{0\} \cdot \{0\} \{3\} \{2\} \{0\}) \gg Y > (\{0\} \cdot \{1\} \{2\} \{0\}) \\ (\{2\} \cdot \{0\} \{2\} \{3\})$$

$$(\{1\} \cdot \{0\} \{0\} \{2\} \{3\}) \gg Y > (\{0\} \cdot \{0\} \{0\} \{2\} \{3\}) \quad \times \quad (\{0\} \cdot \{0\} \{3\} \{2\} \{0\}) \gg Y > (\{0\} \cdot \{2\} \{3\} \{2\} \{0\}) \\ (\{2\} \cdot \{0\} \{2\} \{3\})$$

$$(\{2\} \cdot \{0\} \{0\} \{2\} \{3\}) \gg Y > (\{1\} \cdot \{0\} \{0\} \{2\} \{3\}) \quad \times \quad (\{0\} \cdot \{0\} \{3\} \{2\} \{0\}) \gg Y > (\{0\} \cdot \{1\} \{3\} \{2\} \{0\}) \\ (\{1\} \cdot \{0\} \{0\} \{2\})$$

1 Aus technischen Gründen muss das 2. Kap. in 8-Pkt-Satz wiedergegeben werden.
Ich bitte um Nachsicht.

$$\frac{(\{2\},\{0\}_{(2),\{3\}})}{(\{1\},\{0\}_{(0),\{3\}})} \gg \gamma > (\{0\},\{0\}_{(0),\{2\},\{3\}}) \quad \times \quad \frac{(\{0\},\{1\}_{(3),\{0\}})}{(\{0\},\{1\}_{(2),\{0\}})} \gg \gamma > (\{0\},\{2\}_{(3),\{2\}})$$

$$(\{2\}, \{0\}, \{0\}, \{1\}, \{3\}) \gg Y > (\{0\}, \{0\}, \{0\}, \{2\}, \{3\}) \times (\{0\}, \{0\}, \{3\}, \{2\}, \{0\}) \gg Y > (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{1\}, \{0\}, \{0\}, \{2\}, \{1\}) \qquad \qquad \qquad (\{0\}, \{1\}, \{1\}, \{2\}, \{0\})$$

Objectal action

$$(\{\{2\}\}, \{0\}, \{2\}, \{3\})) \gg \vee > (\{\{1\}\}, \{0\}, \{0\}, \{3\})) \quad \times \quad (\{0\}, \{1\}, \{3\}, \{0\}) \gg \vee > (\{0\}, \{1\}, \{2\}, \{0\}) \\ (\{0\}, \{0\}, \{0\}, \{2\}, \{3\}))$$

$$(\{\{0\}\}, \{0\})_{\{0\}, \{2\}, \{3\}, \{1\}} \gg \vee > (\{1\}, \{0\})_{\{0\}, \{3\}, \{1\}} \quad \times \quad (\{0\}, \{2\})_{\{3\}, \{2\}, \{1\}} \\ (\{2\}, \{0\})_{\{2\}, \{3\}, \{1\}} \qquad \qquad \qquad (\{0\}, \{1\})_{\{3\}, \{0\}, \{1\}} \gg \vee > (\{0\}, \{1\})_{\{2\}, \{0\}, \{1\}} \\ (\{0\}, \{0\})_{\{3\}, \{2\}, \{0\}, \{1\}}$$

$$(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}}) \gg \vee > (\{1\}, \{0\}_{\{0\}, \{3\}}) \quad \times \quad (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \qquad \qquad \qquad (\{0\}, \{1\}_{\{3\}, \{0\}}) \gg \vee > (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}}) \\ (\{0\}, \{1\}_{\{2\}, \{0\}})$$

$$(\{0\}, \{0\}_{(0)}, \{0\}_{(2)}, \{0\}_{(3)})) \gg \gamma > (\{1\}, \{0\}_{(0)}, \{0\}_{(3)}) \times (\{0\}, \{1\}_{(3)}, \{0\}_{(1)}) \gg \gamma > (\{0\}, \{0\}_{(3)}, \{2\}, \{0\}_{(1)})$$

$$(\{2\}, \{0\}, \{2\}, \{3\}) \gg \gamma > (\{1\}, \{0\}, \{0\}, \{3\}) \quad \times \quad (\{0\}, \{1\}, \{3\}, \{0\}) \gg \gamma > (\{0\}, \{2\}, \{3\}, \{2\})$$

$$(\{0\}, \{0\}, \{2\}, \{3\})$$

$$(\{2\}, \{0\}_{\{2\}, \{3\}}) \gg \vee > (\{1\}, \{0\}_{\{0\}, \{3\}}) \quad \times \quad (\{0\}, \{1\}_{\{3\}, \{0\}}) \gg \vee > (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{\mid\}, \{0\}_{\{0\}, \{2\}})$$

Interpretative action

$$(\{1\}, \{0\}, \{0\}, \{3\}) \gg Y > (\{2\}, \{0\}, \{2\}, \{3\}) \quad \times \quad (\{0\}, \{2\}, \{3\}, \{2\}) \gg Y > (\{0\}, \{1\}, \{2\}, \{0\})$$

$$(\{0\}, \{0\}, \{0\}, \{2\}, \{3\})$$

$$(\{\{0\}\}, \{\{0\}\}_{\{0\}, \{2\}, \{3\}}) \gg \gamma > (\{\{2\}\}, \{\{0\}\}_{\{2\}, \{3\}}) \quad \times \quad (\{\{0\}\}, \{\{1\}\}_{\{3\}, \{0\}}) \\ (\{\{1\}\}, \{\{0\}\}_{\{0\}, \{3\}}) \qquad \qquad \qquad (\{\{0\}\}, \{\{2\}\}_{\{3\}, \{2\}}) \gg \gamma > (\{\{0\}\}, \{\{1\}\}_{\{2\}, \{0\}}) \\ (\{\{0\}\}, \{\{0\}\}_{\{3\}, \{2\}, \{0\}})$$

$$\frac{(\{0\}, \{0\}, \{0\}, \{0\})}{(\{1\}, \{0\}, \{0\}, \{0\})} \gg \gamma > (\{2\}, \{0\}, \{2\}, \{3\}) \times \frac{(\{0\}, \{1\}, \{3\}, \{0\})}{(\{0\}, \{2\}, \{3\}, \{2\})} \gg \gamma > (\{0\}, \{0\}, \{3\}, \{2\}, \{0\})$$

$$\frac{(\{1\}, \{0\}, \{1\}_{\{0\}}, \{2\})}{(\{0\}, \{1\}, \{0\}, \{1\}_{\{2\}}, \{3\})} \gg Y > (\{2\}, \{1\}, \{0\}, \{1\}_{\{2\}}, \{3\}) \quad \times \quad \frac{(\{0\}, \{1\}, \{0\}, \{1\}_{\{3\}}, \{2\}, \{0\}, \{1\})}{(\{0\}, \{2\}, \{1\}, \{3\}, \{2\}, \{1\}, \{0\}, \{1\})}$$

$$(\{1\}, \{0\}, \{0\}, \{0\}, \{3\}) \gg \vee > (\{2\}, \{0\}, \{1\}, \{2\}, \{3\}) \quad \times \quad (\{0\}, \{2\}, \{3\}, \{2\}, \{0\}) \gg \vee > (\{0\}, \{1\}, \{3\}, \{1\}, \{0\}) \\ (\{1\}, \{0\}, \{0\}, \{1\}, \{2\}) \qquad \qquad \qquad (\{0\}, \{0\}, \{1\}, \{3\}, \{2\}, \{0\})$$

2. Pre-semiotic dual system

$\{ \{ 2 \} , \{ 3 \} , \{ 0 \} \} \{ 2 \} , \{ 3 \} \{ 1 \} \{ 1 \} , \{ 0 \} \} \{ 0 \} \} \{ 3 \} , \{ 1 \} \{ 0 \} \} \{ 0 \} \} \{ 0 \} \} \{ 0 \} \} \{ 1 \} \{ 1 \} \{ 1 \} , \{ 1 \} , \{ 1 \} \} \times$
 $\{ \{ 1 \} , \{ 3 \} , \{ 1 \} , \{ 1 \} , \{ 0 \} \} \{ 0 \} \} \{ 3 \} , \{ 1 \} , \{ 2 \} , \{ 0 \} \} \{ 0 \} \} \{ 1 \} , \{ 1 \} \{ 0 \} \} \{ 3 \} , \{ 2 \} , \{ 1 \} \}$

Qualitative action

$$(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}}) \gg \vee > (\{1\}, \{1\}_{\{0\}, \{1\}}) \quad \times \quad (\{1\}, \{1\}_{\{1\}, \{0\}}) \gg \vee > (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}}) \\ (\{1\}, \{0\}_{\{0\}, \{3\}}) \qquad \qquad \qquad (\{0\}, \{2\}_{\{3\}, \{2\}})$$

$$(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}}) \gg \gamma > (\{1\}, \{1\}_{\{0\}, \{1\}}) \quad \times \quad (\{1\}, \{1\}_{\{1\}, \{0\}, \{1\}}) \gg \gamma > (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}})$$

$$(\{1\}, \{0\}_{\{0\}, \{3\}}) \gg Y > (\{1\}, \{1\}_{\{0\}, \{1\}}) \quad \times \quad (\{1\}, \{\cdot\}_{\{1\}, \{0\}}) \gg Y > (\{0\}, \{1\}_{\{3\}, \{0\}, \{1\}})$$

$$(\{1\}, \{0\}_{\{0\}, \{3\}}) \gg \gamma > (\{1\}, \{1\}_{\{0\}, \{1\}}) \quad \times \quad (\{1\}, \{\}_{\{1\}, \{0\}}) \gg \gamma > (\{0\}, \{1\}_{\{3\}, \{2\}})$$

$$(\{2\}, \{0\}, \{1\}, \{2\}, \{3\}) \gg \gamma > (\{1\}, \{1\}, \{0\}, \{1\}) \quad \times \quad (\{1\}, \{1\}, \{1\}, \{0\}) \gg \gamma > (\{0\}, \{2\}, \{3\}, \{2\})$$

$$(\{1\}, \{0\})_{\{0\}, \{3\}}) \\ (\{2\}, \{0\})_{\{2\}, \{3\}}) \gg \vee > (\{1\}, \{1\})_{\{0\}, \{1\}}) \quad \times \quad (\{0\}, \{0\})_{\{3\}, \{2\}}) \\ (\{0\}, \{0\})_{\{3\}, \{2\}}) \gg \vee > (\{0\}, \{2\})_{\{3\}, \{2\}})$$

Medial action

$$(\{ \{ \} \}, \{ 1 \}, \{ 0 \}, \{ 1 \}) \gg Y > (\{ 0 \}, \{ 0 \}, \{ 0 \}, \{ 2 \}, \{ 3 \}) \quad \times \quad (\{ 0 \}, \{ 0 \}, \{ 1 \}, \{ 3 \}, \{ 0 \})$$

$$(\{1\}, \{0\}, \{0\}, \{3\}) \gg Y > (\{0\}, \{0\}, \{0\}, \{2\}, \{3\}) \times \{0\}, \{0\}, \{3\}, \{2\}, \{0\}) \gg Y > (\{1\}, \{1\}, \{1\}, \{0\})$$

$$(\{1\}, \{0\}) \gg Y > (\{0\}, \{1\})$$

$$\left(\{1\} \cdot \{0\} \cdot \{0\} \right)_{\{0\}, \{3\}, \{1\}} \gg Y > \left(\{0\} \cdot \{1\} \cdot \{0\} \right)_{\{0\}, \{2\}, \{3\}, \{1\}} \quad \times \quad \left(\{1\} \cdot \{1\} \cdot \{1\} \right)_{\{1\}, \{0\}, \{1\}}$$

$$\frac{(\{1\}, \{1\}_{\{0\}, \{1\}})}{(\{2\}, \{0\}_{\{2\}, \{3\}})} \gg \gamma > (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}}) \quad \times \quad \frac{(\{0\}, \{1\}_{\{3\}, \{0\}})}{(\{1\}, \{0\}_{\{0\}, \{3\}})} \gg \gamma > (\{0\}, \{2\}_{\{3\}, \{2\}})$$

$$(\{2\}, \{0\}, \{2\}, \{3\}) \gg Y > (\{0\}, \{0\}, \{1\}, \{2\}, \{3\}) \quad \times \quad (\{0\}, \{0\}, \{3\}, \{2\}, \{0\}) \gg Y > (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{1\}, \{1\}, \{0\}, \{1\}) \qquad \qquad \qquad (\{0\}, \{1\}, \{3\}, \{0\})$$

Objectal action

$$(\{\{2\}\}, \{0\}, \{2\}, \{3\})) \gg \vee > (\{\{1\}\}, \{0\}, \{3\}) \quad \times \quad (\{0\}, \{1\}, \{3\}, \{0\}, \{1\}) \\ (\{0\}, \{0\}, \{1\}, \{2\}, \{3\})) \qquad \qquad \qquad (\{0\}, \{2\}, \{3\}, \{1\}, \{0\})$$

$$(\{\{0\}\}, \{0\}, \{0\}, \{0\}, \{2\}, \{1\}, \{3\}, \{1\}) \gg \vee > (\{1\}, \{1\}, \{0\}, \{0\}, \{3\}) \quad \times \quad (\{0\}, \{0\}, \{2\}, \{1\}, \{3\}, \{2\}, \{1\}) \\ (\{2\}, \{0\}, \{0\}, \{2\}, \{3\}, \{1\}) \qquad \qquad \qquad (\{0\}, \{1\}, \{1\}, \{3\}, \{0\}, \{1\}) \gg \vee > (\{1\}, \{1\}, \{1\}, \{0\}, \{0\}, \{1\})$$

$$\frac{(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}}) \gg \vee > (\{1\}, \{0\}_{\{0\}, \{3\}})}{(\{2\}, \{0\}_{\{2\}, \{3\}})} \times \frac{(\{0\}, \{2\}_{\{3\}, \{2\}}) \gg \vee > (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}})}{(\{1\}, \{1\}_{\{1\}, \{0\}})}$$

$$(\{0\}, \{0\}, \{0\}, \{0\}, \{0\}, \{0\}) \gg \gamma > (\{1\}, \{0\}, \{0\}, \{0\}, \{0\}, \{0\}) \times \frac{(\{1\}, \{1\}, \{1\}, \{1\}, \{1\}, \{1\})}{(\{1\}, \{1\}, \{1\}, \{1\}, \{1\}, \{1\})}$$

$$(\{2\}, \{0\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{0\}, \{1\}, \{3\}) \quad \times \quad (\{0\}, \{1\}, \{3\}, \{0\}) \gg Y > (\{0\}, \{2\}, \{3\}, \{1\})$$

$$(\{0\}, \{0\}, \{0\}, \{1\}, \{2\}, \{3\}) \\ (\{2\}, \{0\}, \{0\}, \{1\}, \{2\}, \{3\}) \gg \vee > (\{1\}, \{0\}, \{0\}, \{3\}) \quad \times \quad (\{0\}, \{1\}, \{1\}, \{3\}, \{0\}) \gg \vee > (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{1\}, \{1\}, \{0\}, \{0\}, \{1\}) \qquad \qquad \qquad (\{0\}, \{0\}, \{0\}, \{1\}, \{2\}, \{1\})$$

Interpretative action

$$(\{\{1\}\}, \{0\}, \{0\}, \{3\}) \gg Y > (\{2\}, \{0\}, \{2\}, \{3\}) \quad \times \quad (\{0\}, \{2\}, \{3\}, \{2\}) \gg Y > (\{1\}, \{1\}, \{1\}, \{0\})$$

$$\left(\begin{array}{c} \{0\}, \{0\}, \{3\}, \{2\}, \{0\} \\ \{0\}, \{1\}, \{1\}, \{3\}, \{1\} \end{array} \right)$$

$$(\{\{0\}\}, \{0\}, \{0\}, \{2\}, \{3\}) \gg Y > (\{2\}, \{0\}, \{3\}, \{1\}) \quad \times \quad (\{0\}, \{2\}, \{3\}, \{2\}) \gg Y > (\{1\}, \{3\}, \{1\}, \{0\})$$

$$(\{0\}, \{0\}_{(1), (2), (3)}) \gg Y > (\{2\}, \{0\}_{(2), (3)}) \times (\{1\}, \{0\}_{(1), (3)})$$

$$(\{1\}, \{0\}, \{1\}, \{0\}, \{1\}) \gg Y > (\{2\}, \{0\}, \{2\}, \{3\}) \times (\{0\}, \{2\}, \{3\}, \{2\}) \gg Y > (\{0\}, \{0\}, \{3\}, \{2\}, \{0\}, \{1\})$$

$$(\{1\}, \{0\}) \gg Y > (\{2\}, \{1\}) \quad \times \quad (\{0\}, \{2\}) \gg Y > (\{1\}, \{3\})$$

$$\begin{array}{ccc} (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}}) \\ (\{1\}, \{0\}_{\{0\}, \{3\}, \{1\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{1\}}) \end{array} \times \begin{array}{c} (\{1\}, \{1\}_{\{1\}, \{0\}, \{1\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}, \{1\}}) \gg Y > (\{0\}, \{1\}_{\{3\}, \{0\}, \{1\}}) \\ (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}, \{1\}}) \end{array}$$

3. Pre-semiotic dual system

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}} \{1\}, \{0\}_{\{0\}, \{3\}, \{1\}} \{0\}, \{0\}_{\{0\}, \{2\}, \{3\}} \{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \times \\ (\{2\}, \{1\}_{\{2\}, \{1\}, \{1\}} \{0\}, \{0\}_{\{3\}, \{2\}, \{0\}, \{1\}} \{0\}, \{1\}_{\{3\}, \{0\}, \{1\}} \{0\}, \{2\}_{\{3\}, \{2\}, \{1\}}) \end{array}$$

Qualitative action

$$\begin{array}{ccc} (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \\ (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \times (\{2\}, \{1\}_{\{2\}, \{1\}, \{1\}}) \gg Y > (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}, \{1\}}) \\ (\{1\}, \{0\}_{\{0\}, \{3\}, \{1\}}) \end{array}$$

$$\begin{array}{ccc} (\{1\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \\ (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \times (\{2\}, \{1\}_{\{2\}, \{1\}, \{1\}}) \gg Y > (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}, \{1\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \end{array}$$

$$\begin{array}{ccc} (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \\ (\{1\}, \{0\}_{\{0\}, \{3\}, \{1\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \times (\{2\}, \{1\}_{\{2\}, \{1\}, \{1\}}) \gg Y > (\{0\}, \{1\}_{\{3\}, \{0\}, \{1\}}) \\ (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \end{array}$$

$$\begin{array}{ccc} (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \\ (\{1\}, \{0\}_{\{0\}, \{3\}, \{1\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \times (\{2\}, \{1\}_{\{2\}, \{1\}, \{1\}}) \gg Y > (\{0\}, \{1\}_{\{3\}, \{0\}, \{1\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \end{array}$$

$$\begin{array}{ccc} (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \times (\{2\}, \{1\}_{\{2\}, \{1\}, \{1\}}) \gg Y > (\{0\}, \{2\}_{\{3\}, \{2\}, \{1\}}) \\ (\{1\}, \{0\}_{\{0\}, \{3\}, \{1\}}) \end{array}$$

$$\begin{array}{ccc} (\{1\}, \{0\}_{\{0\}, \{3\}, \{1\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \times (\{2\}, \{1\}_{\{2\}, \{1\}, \{1\}}) \gg Y > (\{0\}, \{2\}_{\{3\}, \{2\}, \{1\}}) \\ (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \end{array}$$

Medial action

$$\begin{array}{ccc} (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \gg Y > (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \times (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}, \{1\}}) \gg Y > (\{2\}, \{1\}_{\{2\}, \{1\}, \{1\}}) \\ (\{1\}, \{0\}_{\{0\}, \{3\}, \{1\}}) \end{array}$$

$$\begin{array}{ccc} (\{1\}, \{0\}_{\{0\}, \{3\}, \{1\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \gg Y > (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \times (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}, \{1\}}) \gg Y > (\{2\}, \{1\}_{\{2\}, \{1\}, \{1\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \end{array}$$

$$\begin{array}{ccc} (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \\ (\{1\}, \{0\}_{\{0\}, \{3\}, \{1\}}) \gg Y > (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \times (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}, \{1\}}) \gg Y > (\{0\}, \{1\}_{\{3\}, \{0\}, \{1\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \end{array}$$

$$\begin{array}{ccc} (\{2\}, \{0\}_{\{2\}, \{3\}, \{1\}}) \\ (\{1\}, \{0\}_{\{0\}, \{3\}, \{1\}}) \gg Y > (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}, \{1\}}) \times (\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}, \{1\}}) \gg Y > (\{0\}, \{1\}_{\{3\}, \{0\}, \{1\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}}) \end{array}$$

$$\frac{(\{1\}, \{2\}_{\{1\}, \{2\}})}{(\{2\}, \{0\}_{\{2\}, \{3\}}) \gg Y > (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}})} \times \frac{(\{0\}, \{1\}_{\{3\}, \{0\}})}{(\{2\}, \{1\}_{\{2\}, \{1\}})}$$

$$\frac{(\{1\}, \{0\}_{\{0\}, \{3\}})}{(\{2\}, \{0\}_{\{2\}, \{3\}}) \gg Y > (\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}})} \times \frac{(\{2\}, \{1\}_{\{2\}, \{1\}})}{(\{0\}, \{1\}_{\{3\}, \{0\}})}$$

Objectal action

$$\frac{(\{2\}, \{0\}_{\{2\}, \{3\}})}{(\{1\}, \{2\}_{\{1\}, \{2\}}) \gg Y > (\{1\}, \{0\}_{\{0\}, \{3\}})} \times \frac{(\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}})}{(\{0\}, \{2\}_{\{3\}, \{2\}})}$$

$$\frac{(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}})}{(\{1\}, \{2\}_{\{1\}, \{2\}}) \gg Y > (\{1\}, \{0\}_{\{0\}, \{3\}})} \times \frac{(\{0\}, \{2\}_{\{3\}, \{2\}})}{(\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}})}$$

$$\frac{(\{1\}, \{2\}_{\{1\}, \{2\}})}{(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}}) \gg Y > (\{1\}, \{0\}_{\{0\}, \{3\}})} \times \frac{(\{0\}, \{2\}_{\{3\}, \{2\}})}{(\{2\}, \{1\}_{\{2\}, \{1\}})}$$

$$\frac{(\{2\}, \{0\}_{\{2\}, \{3\}})}{(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}}) \gg Y > (\{1\}, \{0\}_{\{0\}, \{3\}})} \times \frac{(\{2\}, \{1\}_{\{2\}, \{1\}})}{(\{0\}, \{1\}_{\{3\}, \{0\}})}$$

$$\frac{(\{1\}, \{2\}_{\{1\}, \{2\}})}{(\{2\}, \{0\}_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{0\}_{\{0\}, \{3\}})} \times \frac{(\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}})}{(\{2\}, \{1\}_{\{2\}, \{1\}})}$$

$$\frac{(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}})}{(\{2\}, \{0\}_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{0\}_{\{0\}, \{3\}})} \times \frac{(\{2\}, \{1\}_{\{2\}, \{1\}})}{(\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}})}$$

Interpretative action

$$\frac{(\{1\}, \{0\}_{\{0\}, \{3\}})}{(\{1\}, \{2\}_{\{1\}, \{2\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}})} \times \frac{(\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}})}{(\{0\}, \{1\}_{\{3\}, \{0\}})}$$

$$\frac{(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}})}{(\{1\}, \{2\}_{\{1\}, \{2\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}})} \times \frac{(\{0\}, \{1\}_{\{3\}, \{0\}})}{(\{0\}, \{0\}_{\{3\}, \{2\}, \{0\}})}$$

$$\frac{(\{1\}, \{2\}_{\{1\}, \{2\}})}{(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}})} \times \frac{(\{0\}, \{1\}_{\{3\}, \{0\}})}{(\{2\}, \{1\}_{\{2\}, \{1\}})}$$

$$\frac{(\{1\}, \{0\}_{\{0\}, \{3\}})}{(\{0\}, \{0\}_{\{0\}, \{2\}, \{3\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}})} \times \frac{(\{2\}, \{1\}_{\{2\}, \{1\}})}{(\{0\}, \{1\}_{\{3\}, \{0\}})}$$

$$\begin{array}{c} (\{1\}, \{2\}, \{1\}, \{2\}) \\ (\{1\}, \{0\}, \{0\}, \{3\}) \gg Y > (\{2\}, \{0\}, \{2\}, \{3\}) \\ (\{0\}, \{0\}, \{1\}, \{2\}, \{3\}) \end{array} \times \begin{array}{c} (\{0\}, \{0\}, \{3\}, \{2\}, \{0\}) \\ (\{0\}, \{2\}, \{1\}, \{3\}) \gg Y > (\{0\}, \{1\}, \{3\}, \{0\}) \\ (\{2\}, \{1\}, \{2\}, \{1\}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{0\}, \{0\}, \{2\}, \{3\}) \\ (\{1\}, \{0\}, \{0\}, \{3\}) \gg Y > (\{2\}, \{0\}, \{2\}, \{3\}) \\ (\{1\}, \{2\}, \{1\}, \{2\}) \end{array} \times \begin{array}{c} (\{2\}, \{1\}, \{2\}, \{1\}) \\ (\{0\}, \{2\}, \{2\}, \{1\}) \gg Y > (\{0\}, \{1\}, \{3\}, \{0\}) \\ (\{0\}, \{0\}, \{3\}, \{2\}, \{0\}) \end{array}$$

4. Pre-semiotic system

$$\begin{array}{c} (\{2\}, \{0\}, \{2\}, \{3\}) \{1\}, \{0\}, \{3\}, \{0\}, \{1\}, \{1\}, \{0\}, \{1\}, \{1\} \\ \times (\{1\}, \{1\}, \{0\}, \{1\}, \{0\}, \{0\}, \{0\}, \{1\}, \{3\}, \{0\}, \{0\}, \{2\}, \{3\}, \{2\}) \end{array}$$

Qualitative action

$$\begin{array}{c} (\{2\}, \{0\}, \{2\}, \{3\}) \\ (\{0\}, \{1\}, \{0\}, \{3\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}) \\ (\{1\}, \{0\}, \{0\}, \{3\}) \end{array} \times \begin{array}{c} (\{0\}, \{1\}, \{3\}, \{0\}) \\ (\{1\}, \{1\}, \{0\}) \gg Y > (\{1\}, \{0\}, \{3\}, \{0\}) \\ (\{0\}, \{2\}, \{3\}, \{2\}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{0\}, \{0\}, \{3\}) \\ (\{0\}, \{1\}, \{0\}, \{3\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}) \\ (\{2\}, \{0\}, \{2\}, \{3\}) \end{array} \times \begin{array}{c} (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{1\}, \{1\}, \{0\}) \gg Y > (\{1\}, \{0\}, \{3\}, \{0\}) \\ (\{0\}, \{1\}, \{3\}, \{0\}) \end{array}$$

$$\begin{array}{c} (\{2\}, \{0\}, \{2\}, \{3\}) \\ (\{1\}, \{0\}, \{0\}, \{3\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}) \\ (\{0\}, \{1\}, \{0\}, \{3\}) \end{array} \times \begin{array}{c} (\{1\}, \{0\}, \{3\}, \{0\}) \\ (\{1\}, \{1\}, \{0\}) \gg Y > (\{0\}, \{1\}, \{3\}, \{0\}) \\ (\{0\}, \{2\}, \{3\}, \{2\}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{1\}, \{0\}, \{3\}) \\ (\{1\}, \{0\}, \{0\}, \{3\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}) \\ (\{2\}, \{0\}, \{2\}, \{3\}) \end{array} \times \begin{array}{c} (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{1\}, \{1\}, \{0\}) \gg Y > (\{0\}, \{1\}, \{3\}, \{0\}) \\ (\{1\}, \{0\}, \{3\}, \{0\}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{1\}, \{0\}, \{3\}) \\ (\{2\}, \{0\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}) \\ (\{1\}, \{0\}, \{0\}, \{3\}) \end{array} \times \begin{array}{c} (\{0\}, \{1\}, \{3\}, \{0\}) \\ (\{1\}, \{1\}, \{0\}) \gg Y > (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{0\}, \{1\}, \{3\}, \{0\}) \end{array}$$

Medial action

$$\begin{array}{c} (\{2\}, \{0\}, \{2\}, \{3\}) \\ (\{1\}, \{1\}, \{0\}, \{1\}) \gg Y > (\{0\}, \{1\}, \{1\}, \{0\}, \{3\}) \\ (\{1\}, \{0\}, \{0\}, \{3\}) \end{array} \times \begin{array}{c} (\{0\}, \{1\}, \{3\}, \{0\}) \\ (\{1\}, \{0\}, \{3\}, \{0\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}) \\ (\{0\}, \{2\}, \{3\}, \{2\}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{0\}, \{0\}, \{3\}) \\ (\{1\}, \{1\}, \{0\}, \{1\}) \gg Y > (\{0\}, \{1\}, \{1\}, \{0\}, \{3\}) \\ (\{2\}, \{0\}, \{2\}, \{3\}) \end{array} \times \begin{array}{c} (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{1\}, \{0\}, \{3\}, \{0\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}) \\ (\{0\}, \{1\}, \{3\}, \{0\}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{1\}, \{0\}, \{1\}) \\ (\{1\}, \{0\}, \{0\}, \{3\}) \gg Y > (\{0\}, \{1\}, \{1\}, \{0\}, \{3\}) \\ (\{2\}, \{0\}, \{2\}, \{3\}) \end{array} \times \begin{array}{c} (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{1\}, \{0\}, \{3\}, \{0\}) \gg Y > (\{0\}, \{1\}, \{3\}, \{0\}) \\ (\{1\}, \{1\}, \{0\}, \{1\}) \end{array}$$

$$\begin{array}{c} (\{2\}, \{0\})_{(2)}, (\{3\}, \{1\}) \\ (\{1\}, \{0\})_{(1)}, (\{3\}, \{2\}) \end{array} \gg Y > (\{0\}, \{1\})_{(0)}, (\{3\}, \{2\}) \times \begin{array}{c} (\{1\}, \{0\})_{(1)}, (\{3\}, \{0\}) \\ (\{0\}, \{1\})_{(1)}, (\{2\}, \{1\}) \end{array} \gg Y > (\{0\}, \{1\})_{(1)}, (\{3\}, \{0\})$$

$$(\{2\}, \{0\}, \{0\}) \gg Y > (\{0\}, \{1\}, \{3\}) \times (\{1\}, \{0\}, \{3\}) \gg Y > (\{0\}, \{2\}, \{3\})$$

$$\begin{array}{ccc} (\{1\}, \{0\}, \{0\}, \{3\}) & & (\{1\}, \{1\}, \{1\}, \{0\}) \\ (\{2\}, \{0\}, \{0\}, \{2\}, \{3\}) \gg \succ (\{0\}, \{1\}, \{0\}, \{3\}) \times & & (\{1\}, \{0\}, \{3\}, \{0\}) \gg \succ (\{0\}, \{2\}, \{2\}, \{3\}, \{2\}) \\ (\{1\}, \{1\}, \{0\}, \{1\}) & & (\{0\}, \{1\}, \{3\}, \{0\}) \end{array}$$

Objectal action

$$\begin{array}{c} (\{2\}, \{0\}, \{2\}, \{3\}) \\ (\{1\}, \{1\}, \{0\}, \{1\}) \gg Y > (\{1\}, \{0\}, \{0\}, \{3\}) \times \\ (\{0\}, \{1\}, \{1\}, \{3\}) \end{array} \quad \begin{array}{c} (\{1\}, \{0\}, \{3\}, \{0\}) \\ (\{0\}, \{1\}, \{3\}, \{2\}) \gg Y > (\{1\}, \{1\}, \{1\}, \{0\}) \\ (\{0\}, \{2\}, \{3\}, \{2\}) \end{array}$$

$$(\{ \{ 0 \mid \} ; \{ 1 \mid \}_{\{ 0 \mid \} ; \{ 3 \mid \}} \}) \gg \text{Y} > (\{ 1 \mid \} ; \{ 0 \mid \}_{\{ 0 \mid \} ; \{ 3 \mid \}}) \times \\ (\{ 0 \mid \} ; \{ 1 \mid \}_{\{ 3 \mid \} ; \{ 0 \mid \}}) \gg \text{Y} > (\{ 1 \mid \} ; \{ 1 \mid \}_{\{ 1 \mid \} ; \{ 0 \mid \}}) \\ (\{ 2 \mid \} ; \{ 0 \mid \}_{\{ 2 \mid \} ; \{ 3 \mid \}}) \qquad \qquad \qquad (\{ 0 \mid \} ; \{ 2 \mid \}_{\{ 3 \mid \} ; \{ 2 \mid \}}) \\ (\{ 1 \mid \} ; \{ 0 \mid \}_{\{ 3 \mid \} ; \{ 0 \mid \}})$$

$$(\{0\}, \{1 | \}_{\{0\}, \{3\}}) \gg \text{Y} > (\{1 | \}_{\{0\}, \{3\}}) \times (\{0 | \}_{\{2 | \}_{\{3\}, \{2\}}})$$

$$\frac{(\{2\} \cdot \{0\})_{\{2\},\{3\}}}{(\{0\} \cdot \{1\})_{\{0\},\{3\}}) \gg Y > (\{1\} \cdot \{0\})_{\{0\},\{3\}}} \times \frac{(\{1\} \cdot \{1\})_{\{1\},\{0\}}}{(\{0\} \cdot \{1\})_{\{3\},\{0\}}) \gg Y > (\{1\} \cdot \{0\})_{\{3\},\{0\}}} \\ \frac{(\{1\} \cdot \{1\})_{\{0\},\{1\}})}{(\{1\} \cdot \{1\})_{\{0\},\{1\}})}$$

$$\begin{array}{c} (\{\mid\},\{1\},\{0\},\{1\}) \\ (\{2\},\{0\},\{2\},\{3\}) \gg \vee \triangleright (\{1\},\{1\},\{0\},\{3\}) \times \\ (\{0\},\{1\},\{1\},\{3\}) \end{array} \quad \begin{array}{c} (\{1\},\{0\},\{3\},\{0\}) \\ (\{0\},\{2\},\{3\},\{1\}) \gg \vee \triangleright (\{0\},\{2\},\{3\},\{2\}) \\ (\{1\},\{1\},\{1\},\{0\}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{1\}_{\{0\}, \{3\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{0\}_{\{0\}, \{3\}}) \times \\ (\{1\}, \{1\}_{\{0\}, \{1\}}) \end{array} \quad \begin{array}{c} (\{1\}, \{1\}_{\{1\}, \{0\}}) \\ (\{0\}, \{1\}_{\{3\}, \{0\}}) \gg Y > (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{1\}, \{0\}_{\{3\}, \{0\}}) \end{array}$$

Interpretative action

$$(\{1\}, \{0\}, \{3\}) \gg Y > (\{2\}, \{0\}, \{2\}, \{3\}) \times (\{0\}, \{2\}, \{3\}, \{2\}) \gg Y > (\{1\}, \{1\}, \{1\}, \{0\})$$

$$(\{\{0\}\}, \{1\}, \{0\}, \{3\})) \quad (\{\{0\}\}, \{1\}, \{3\}, \{0\})) \\ (\{\{1\}\}, \{1\}, \{0\}, \{1\}, \{1\})) \gg y > (\{\{2\}\}, \{0\}, \{2\}, \{3\})) \times \\ (\{\{0\}\}, \{2\}, \{3\}, \{2\})) \gg y > (\{\{1\}\}, \{1\}, \{1\}, \{0\})) \\ (\{\{1\}\}, \{0\}, \{3\}, \{0\}))$$

$$\begin{array}{c} (\{\mid\}, \cdot, \{1\}, \cdot, \{0\}, \cdot, \{1\}) \\ (\{0\}, \cdot, \{1\}, \cdot, \{0\}, \cdot, \{3\}) \gg Y > (\{2\}, \cdot, \{0\}, \cdot, \{2\}, \cdot, \{3\}) \times \\ (\{1\}, \cdot, \{0\}, \cdot, \{0\}, \cdot, \{3\}) \end{array} \quad \begin{array}{c} (\{0\}, \cdot, \{1\}, \cdot, \{3\}, \cdot, \{0\}) \\ (\{0\}, \cdot, \{2\}, \cdot, \{3\}, \cdot, \{2\}) \gg Y > (\{1\}, \cdot, \{0\}, \cdot, \{3\}, \cdot, \{0\}) \\ (\{1\}, \cdot, \{1\}, \cdot, \{1\}, \cdot, \{0\}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{0\}, \{3\}) \\ (\{0\}, \{1\}, \{0\}, \{3\}) \gg Y > (\{2\}, \{0\}, \{2\}, \{3\}) \times \\ (\{1\}, \{1\}, \{1\}) \end{array} \quad \begin{array}{c} (\{1\}, \{1\}, \{0\}) \\ (\{0\}, \{2\}, \{3\}, \{2\}) \gg Y > (\{1\}, \{0\}, \{3\}, \{0\}) \\ (\{0\}, \{1\}, \{3\}, \{0\}) \end{array}$$

$$\begin{array}{c} (\{\mid\}, \{\cdot\}_{\{0\}}, \{\cdot\}_{\{1\}}) \\ (\{\mid\}, \{0\}_{\{0\}}, \{3\}_{\{1\}}) \gg Y > (\{2\}, \{0\}_{\{2\}}, \{3\}) \times \\ (\{0\}, \{1\}_{\{0\}}, \{3\}) \end{array} \quad \begin{array}{c} (\{\mid\}, \{0\}_{\{3\}}, \{0\}_{\{1\}}) \\ (\{0\}, \{2\}_{\{3\}}, \{2\}_{\{1\}}) \gg Y > (\{0\}, \{1\}_{\{3\}}, \{0\}_{\{1\}}) \\ (\{\mid\}, \{1\}_{\{1\}}, \{0\}_{\{1\}}) \end{array}$$

$$(\{0\}, \{1\}, \{2\}) \quad (\{1\}, \{2\}, \{3\})$$

$$(\{1\}, \{0\}, \{3\}) \gg \text{Y} > (\{2\}, \{0\}, \{3\}) \times (\{0\}, \{2\}, \{1\}) \gg \text{Y} > (\{0\}, \{1\}, \{3\})$$

$$(\{1\}, \{1\}, \{0\}) \quad (\{1\}, \{0\}, \{0\})$$

5. Pre-semiotic dual system

$$\left(\{2\}.\{3\}.\{0\}.\{1\}.\{2\}.\{3\}.\{1\} \right) \cdot \left(\{1\}.\{0\}.\{1\}.\{3\}.\{0\} \right) \cdot \left(\{1\}.\{0\}.\{1\}.\{3\}.\{1\} \right) \cdot \left(\{1\}.\{0\}.\{1\}.\{3\}.\{1\} \right) \times \\ \left(\{2\}.\{3\}.\{1\}.\{2\}.\{1\}.\{1\} \right) \cdot \left(\{1\}.\{0\}.\{3\}.\{1\}.\{0\} \right) \cdot \left(\{0\}.\{1\}.\{3\}.\{1\}.\{0\} \right) \cdot \left(\{0\}.\{1\}.\{2\}.\{1\}.\{3\} \right)$$

Qualitative action

$$(\{0\}, \{1\}, \{0\}, \{1\}) \gg Y > (\{1\}, \{2\}, \{1\}, \{2\}) \quad \times \quad (\{2\}, \{1\}, \{2\}, \{1\}) \gg Y > (\{1\}, \{0\}, \{3\}, \{0\})$$

$$(\{1\}, \{2\}, \{0\}, \{3\})$$

$$\begin{array}{c} (\{1\}, \{0\}, \{3\}) \\ (\{0\}, \{1\}, \{0\}, \{3\}) \gg Y > (\{1\}, \{2\}, \{1\}, \{2\}) \quad \times \quad (\{2\}, \{1\}, \{2\}, \{1\}) \\ (\{2\}, \{0\}, \{2\}, \{3\}) \end{array} \qquad \begin{array}{c} (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{0\}, \{1\}, \{3\}, \{0\}) \gg Y > (\{1\}, \{0\}, \{3\}, \{0\}) \\ (\{0\}, \{1\}, \{3\}, \{0\}) \end{array}$$

$$\begin{array}{c} (\{2\}, \{0\}, \{3\}) \\ (\{1\}, \{0\}, \{0\}, \{3\}) \gg Y > (\{1\}, \{2\}, \{1\}, \{2\}) \quad \times \quad (\{1\}, \{0\}, \{3\}, \{0\}) \\ (\{0\}, \{1\}, \{1\}, \{0\}, \{3\}) \end{array}$$

$$(\{0\}, \{1\}, \{2\}) \gg Y > (\{0\}, \{1\}, \{2\}) \times (\{2\}, \{1\}, \{0\}) \gg Y > (\{0\}, \{1\}, \{3\})$$

$$(\{0\}, \{1\}_{\{0\}}, \{3\}) \\ (\{2\}, \{0\}_{\{2\}}, \{3\}) \gg Y > (\{0\}, \{2\}_{\{1\}}, \{1\}) \quad \times \quad (\{2\}, \{\cdot\}_{\{2\}}, \{1\}) \gg Y > (\{0\}, \{2\}_{\{3\}}, \{0\}) \\ (\{1\}, \{0\}_{\{3\}}, \{1\})$$

$$(\{1\}, \{0\})_{\{0\}, \{3\}}) \\ (\{2\}, \{0\})_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{2\})_{\{1\}, \{2\}}) \quad \times \quad (\{2\}, \{\cdot\})_{\{2\}, \{1\}}) \gg Y > (\{0\}, \{2\})_{\{3\}, \{2\}}) \\ (\{0\}, \{1\})_{\{0\}, \{2\}}) \\ (\{0\}, \{1\})_{\{2\}, \{0\}})$$

Medial action

$$(\{2\}, \{0\})_{(2), (3)}) \\ (\{1\}, \{2\})_{(1), (2)}) \gg Y > (\{0\}, \{1\})_{(0), (3)}) \times \\ (\{1\}, \{0\})_{(3), (0)})$$

$$(\{1\}, \{0\}, \{1\}, \{3\}) \quad (\{0\}, \{1\}, \{2\}, \{3\}) \\ (\{1\}, \{2\}, \{1\}, \{2\}) \gg Y > (\{0\}, \{1\}, \{0\}, \{3\}) \times (\{1\}, \{0\}, \{3\}, \{0\}) \gg Y > (\{2\}, \{1\}, \{2\}, \{1\}) \\ (\{2\}, \{3\}, \{0\}, \{3\}, \{1\}, \{2\}) \quad (\{0\}, \{1\}, \{1\}, \{2\}, \{0\}, \{1\})$$

$$(\{1\}, \{2\}, \{3\}) \gg Y > (\{0\}, \{1\}, \{2\}) \times (\{1\}, \{0\}, \{3\}) \gg Y > (\{0\}, \{1\}, \{3\})$$

$$(\{1\}, \{0\}) \gg Y > (\{0\}, \{1\}) \times (\{1\}, \{0\}) \gg Y > (\{0\}, \{1\})$$

$$(\{1\}, \{2\})_{\{1\}, \{2\}}) \quad (\{0\}, \{1\})_{\{3\}, \{0\}}) \\ (\{2\}, \{0\})_{\{2\}, \{3\}}) \gg \succ (\{0\}, \{1\})_{\{0\}, \{3\}}) \times \quad (\{1\}, \{0\})_{\{3\}, \{0\}}) \gg \succ (\{0\}, \{2\})_{\{3\}, \{2\}}) \\ (\{1\}, \{0\})_{\{0\}, \{3\}}) \quad (\{2\}, \{1\})_{\{2\}, \{1\}})$$

$$\begin{array}{c} (\{1\}, \{0\}, \{0\}) \\ (\{2\}, \{1\}, \{2\}) \end{array} \gg \gamma > (\{0\}, \{1\}, \{0\}) \times \begin{array}{c} (\{2\}, \{1\}, \{1\}) \\ (\{0\}, \{1\}, \{2\}) \end{array}$$

Objectal action

$$\begin{array}{c} (\{2\}, \{0\}, \{2\}, \{3\}) \\ (\{1\}, \{2\}, \{1\}, \{2\}) \end{array} \gg Y > (\{1\}, \{0\}, \{0\}, \{3\}) \times \begin{array}{c} (\{1\}, \{0\}, \{3\}, \{0\}) \\ (\{0\}, \{1\}, \{2\}, \{1\}) \end{array}$$

$$((\{0\}, \{1\}, \{0\}, \{3\})) \gg \text{Y} > ((\{1\}, \{0\}, \{0\}, \{3\})) \times ((\{0\}, \{1\}, \{3\}, \{0\})) \gg \text{Y} > ((\{2\}, \{1\}, \{1\}, \{2\}))$$

$$((\{2\}, \{0\}, \{2\}, \{3\})) \qquad \qquad \qquad ((\{1\}, \{0\}, \{3\}, \{0\}))$$

$$\begin{array}{c} (\{\mid\}, \{2\}, \{1\}, \{2\}) \\ (\{0\}, \{1\}, \{0\}, \{3\}) \gg Y > (\{1\}, \{0\}, \{0\}, \{3\}) \times \\ (\{2\}, \{0\}, \{2\}, \{3\}) \end{array} \quad \begin{array}{c} (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{0\}, \{1\}, \{3\}, \{0\}) \gg Y > (\{1\}, \{0\}, \{3\}, \{0\}) \\ (\{2\}, \{1\}, \{2\}, \{1\}) \end{array}$$

$$\frac{(\{2\}, \{0\}, \{2\}, \{3\})}{(\{0\}, \{1\}, \{0\}, \{3\})} \gg Y > \frac{(\{1\}, \{0\}, \{0\}, \{3\})}{(\{1\}, \{1\}, \{3\}, \{0\})} \times \frac{(\{2\}, \{1\}, \{2\}, \{4\})}{(\{0\}, \{1\}, \{3\}, \{0\})} \gg Y > \frac{(\{1\}, \{0\}, \{3\}, \{0\})}{(\{0\}, \{2\}, \{3\}, \{2\})}$$

$$(\{1\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{0\}, \{3\}) \times (\{0\}, \{1\}, \{3\}) \gg Y > (\{0\}, \{1\}, \{3\})$$

$$(\{0\}, \{1\}_{\{0\}}, \{3\}) \quad (\{2\}, \{1\}_{\{2\}}, \{1\}) \\ (\{2\}, \{0\}_{\{2\}}, \{3\}) \gg Y > (\{1\}, \{0\}_{\{0\}}, \{3\}) \times (\{0\}, \{1\}_{\{3\}}, \{0\}) \gg Y > (\{0\}, \{2\}_{\{3\}}, \{2\}) \\ (\{1\}, \{2\}_{\{1\}}, \{2\})$$

Interpretative action

$$(\{\{1\}\}, \{0\}, \{3\}) \quad (\{\{1\}\}, \{0\}, \{3\}) \\ (\{\{1\}\}, \{2\}, \{1\}) \gg Y > (\{\{2\}\}, \{0\}, \{3\}) \quad \times \quad (\{0\}, \{2\}, \{3\}) \gg Y > (\{\{2\}\}, \{1\}, \{1\}) \\ (\{0\}, \{1\}, \{3\}) \quad (\{0\}, \{1\}, \{3\})$$

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}}) \times (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{2\}, \{1\}_{\{3\}, \{0\}})$$

$$(\{0\}, \{1\}, \{2\}) \gg Y \succ (\{2\}, \{0\}, \{1\}) \times (\{0\}, \{2\}, \{1\}) \gg Y \succ (\{1\}, \{0\}, \{3\})$$

$$(\{1\}, \{0\}, \{0\}, \{3\}) \quad (\{2\}, \{\cdot\}, \{1\}, \{2\}) \\ (\{0\}, \{1\}, \{1\}, \{0\}, \{3\}) \gg Y_1 > (\{2\}, \{0\}, \{1\}, \{3\}) \quad \times \quad (\{0\}, \{2\}, \{1\}, \{2\}) \gg Y_2 > (\{1\}, \{0\}, \{3\}, \{0\})$$

$$(\{1\}, \{2\}, \{3\}) \gg Y > (\{0\}, \{1\}, \{2\}, \{3\}) \quad \times \quad (\{0\}, \{2\}, \{3\}, \{1\}) \gg Y > (\{0\}, \{1\}, \{3\}, \{0\})$$

$$\begin{array}{c} (\{0\}, \{1\}_{\{0\}}, \{3\}) \\ (\{1\}, \{0\}_{\{0\}}, \{3\}) \gg Y > (\{2\}, \{0\}_{\{2\}}, \{3\}) \times \\ (\{1\}, \{2\}_{\{1\}}, \{2\}) \end{array} \quad \begin{array}{c} (\{2\}, \{1\}_{\{2\}}, \{1\}) \\ (\{0\}, \{2\}_{\{3\}}, \{2\}) \gg Y > (\{0\}, \{1\}_{\{3\}}, \{0\}) \\ (\{1\}, \{0\}_{\{3\}}, \{0\}) \end{array}$$

6. Pre-semiotic dual system

$\{ \{ 2 | \} , \{ 0 | \} , \{ 2 | \} , \{ 3 | \} , \{ 1 | \} , \{ 0 | \} , \{ 0 | \} , \{ 3 | \} , \{ 0 | \} , \{ 2 | \} , \{ 2 | \} , \{ 2 | \} , \{ 1 | \} , \{ 2 | \} \} \times$
 $\{ \{ 2 | \} , \{ 1 | \} , \{ 2 | \} , \{ 1 | \} , \{ 2 | \} , \{ 0 | \} , \{ 3 | \} , \{ 2 | \} , \{ 0 | \} , \{ 1 | \} , \{ 3 | \} , \{ 0 | \} , \{ 0 | \} , \{ 2 | \} , \{ 3 | \} , \{ 2 | \} \}$

Qualitative action

$$\begin{array}{ccc} (\{2\}, \{0\}, \{2\}, \{3\}) & & (\{0\}, \{1\}, \{3\}, \{0\}) \\ (\{0\}, \{2\}, \{2\}, \{3\}) \gg \succ (\{1\}, \{2\}, \{1\}, \{2\}) & \times & (\{2\}, \{1\}, \{2\}, \{1\}) \gg \succ (\{2\}, \{0\}, \{3\}, \{2\}) \\ (\{1\}, \{0\}, \{0\}, \{3\}) & & (\{0\}, \{2\}, \{3\}, \{2\}) \end{array}$$

$$(\{0\}, \{2 | \}_{\{2\}, \{3\}}) \gg \text{Y} > (\{1\}, \{2 | \}_{\{1\}, \{2\}}) \quad \times \quad (\{2 | \}, \{1 | \}_{\{2\}, \{1\}}) \gg \text{Y} > (\{2 | \}, \{0 | \}_{\{3\}, \{2\}}) \\ (\{2 | \}, \{0 | \}_{\{2\}, \{3\}}) \qquad \qquad \qquad (\{0\}, \{2 | \}_{\{2\}, \{3\}}) \qquad \qquad \qquad (\{0\}, \{1 | \}_{\{3\}, \{0\}})$$

$$\begin{array}{c} (\{2\}, \{0\}, \{3\}) \\ (\{1\}, \{0\}, \{0, 3\}) \gg \gamma > (\{1\}, \{2\}, \{1, 2\}) \quad \times \quad (\{2\}, \{1\}, \{2, 1\}) \\ (\{0\}, \{2\}, \{2, 3\}) \end{array}$$

$$(\{0\}, \{2\})_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{2\})_{\{1\}, \{2\}}) \times (\{2\}, \{1\})_{\{2\}, \{1\}}) \gg Y > (\{0\}, \{1\})_{\{3\}, \{0\}}) \\ (\{2\}, \{0\})_{\{2\}, \{3\}})$$

$$(\{0\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{2\}, \{1\}) \quad \times \quad (\{2\}, \{1\}, \{2\}) \gg Y > (\{0\}, \{2\}, \{3\}, \{0\})$$

$$(\{1\}, \{0\}, \{3\}) \quad \quad (\{2\}, \{0\}, \{3\}) \\ (\{2\}, \{0\}, \{3\}) \gg Y > (\{1\}, \{2\}, \{1\}) \quad \times \quad (\{2\}, \{1\}, \{2\}, \{1\}) \gg Y > (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{0\}, \{2\}, \{3\}) \\ (\{0\}, \{1\}, \{3\}, \{1\})$$

Medial action

$$(\{2\}, \{0\}, \{2\}, \{3\}) \quad (\{0\}, \{1\}, \{3\}, \{0, 1\}) \\ (\{\}, \{2\}, \{1\}, \{2\}) \gg Y > (\{0\}, \{2\}, \{2\}, \{3\}) \times \quad (\{2\}, \{0\}, \{3\}, \{2\}) \gg Y > (\{2\}, \{1\}, \{2\}, \{1\}) \\ (\{1\}, \{0\}, \{3\}, \{0, 1, 2\}) \quad (\{0\}, \{2\}, \{2\}, \{1, 2\})$$

$$(\{1\}, \{0\}, \{3\}) \quad (\{0\}, \{2\}, \{3, 2\}) \\ (\{1\}, \{2\}, \{1, 2\}) \gg Y > (\{0\}, \{2\}, \{2, 1, 3\}) \times \\ (\{2\}, \{0\}, \{3, 2\}) \gg Y > (\{2\}, \{1\}, \{2, 1, 1\}) \\ (\{2\}, \{1\}, \{2, 1, 1\})$$

$$(\{1\}, \{2\})_{\{1\}, \{2\}}) \\ (\{1\}, \{0\})_{\{0\}, \{3\}}) \gg Y > (\{0\}, \{2\})_{\{2\}, \{3\}}) \times \\ (\{2\}, \{0\})_{\{2\}, \{3\}}) \gg Y > (\{0\}, \{1\})_{\{3\}, \{0\}}) \\ (\{2\}, \{1\})_{\{3\}, \{0\}})$$

$$(\{1\}, \{0\})_{(0), (3)}) \gg \gamma > (\{0\}, \{2\})_{(2), (3)}) \quad \times \quad (\{2\}, \{0\})_{(3), (2)}) \gg \gamma > (\{0\}, \{1\})_{(1), (0)})$$

$$\begin{array}{c} (\{\mid\},\{2\},\{1\},\{2\}) \\ (\{2\},\{0\},\{2\},\{3\}) \gg Y > (\{0\},\{2\},\{2\},\{3\}) \times \\ (\{\mid\},\{0\},\{0\},\{3\}) \end{array} \quad \begin{array}{c} (\{0\},\{1\},\{3\},\{0\}) \\ (\{2\},\{0\},\{3\},\{2\}) \gg Y > (\{0\},\{2\},\{3\},\{2\}) \\ (\{2\},\{1\},\{2\},\{1\}) \end{array}$$

$$(\{2\}, \{0\}_{\{2\}, \{3\}}) \gg \gamma > (\{0\}, \{2\}_{\{2\}, \{3\}}) \times (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \qquad \qquad \qquad (\{2\}, \{0\}_{\{3\}, \{2\}}) \gg \gamma > (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{0\}, \{1\}_{\{3\}, \{0\}})$$

Objectal action

$$((\{2\} \cdot \{0\})_{\{2\}}, \{3\})) \gg Y > ((\{1\} \cdot \{0\})_{\{0\}}, \{3\})) \times ((\{0\} \cdot \{1\})_{\{0\}}, \{3\})) \gg Y > ((\{2\} \cdot \{1\})_{\{2\}}, \{1\}))$$

$$((\{0\} \cdot \{2\})_{\{2\}}, \{3\})) \qquad \qquad \qquad ((\{0\} \cdot \{2\})_{\{3\}}, \{2\}))$$

$$(\{\{0\}\};\{2\})_{\{1\},\{3\}}) \gg Y > (\{1\};\{0\})_{\{0\},\{3\}}) \times (\{0\};\{1\})_{\{3\},\{0\}}) \gg Y > (\{2\};\{1\})_{\{2\},\{1\}})$$

$$\begin{array}{c} (\{ \mid \}, \{ 2 \mid \}_{\{ 1 \}, \{ 2 \}, \{ \}}) \\ (\{ 0 \mid \}, \{ 2 \mid \}_{\{ 2 \}, \{ 3 \}, \{ \}}) \gg Y > (\{ 1 \mid \}, \{ 0 \mid \}_{\{ 0 \}, \{ 3 \}, \{ \}}) \times \\ (\{ 2 \mid \}, \{ 0 \mid \}_{\{ 2 \}, \{ 3 \}, \{ \}}) \end{array} \quad \begin{array}{c} (\{ 0 \mid \}, \{ 2 \mid \}_{\{ 3 \}, \{ 2 \}, \{ \}}) \\ (\{ 0 \mid \}, \{ 1 \mid \}_{\{ 3 \}, \{ 0 \}, \{ \}}) \gg Y > (\{ 2 \mid \}, \{ 0 \mid \}_{\{ 3 \}, \{ 2 \}, \{ \}}) \\ (\{ 2 \mid \}, \{ 1 \mid \}_{\{ 2 \}, \{ 1 \}, \{ \}}) \end{array}$$

$$(\{2\}, \{0\}, \{2\}, \{3\}) \quad (\{2\}, \{1\}, \{2\}, \{1\}) \\ (\{0\}, \{2\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{0\}, \{0\}, \{3\}) \times (\{0\}, \{1\}, \{3\}, \{0\}) \gg Y > (\{2\}, \{0\}, \{3\}, \{2\}) \\ (\{1\}, \{2\}, \{3\}, \{1\}, \{2\}) \quad (\{0\}, \{2\}, \{2\}, \{3\}, \{2\})$$

$$\left(\{1\}, \{2\}_{\{1\}, \{2\}} \right) \gg Y > \left(\{1\}, \{0\}_{\{0\}, \{3\}} \right) \times \left(\{0\}, \{1\}_{\{3\}, \{0\}} \right) \gg Y > \left(\{0\}, \{2\}_{\{3\}, \{2\}} \right)$$

$$(\{0\}, \{2\})_{\{2\}, \{3\}}) \\ (\{2\}, \{0\})_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{0\})_{\{0\}, \{3\}}) \times \\ (\{0\}, \{1\})_{\{3\}, \{0\}}) \gg Y > (\{0\}, \{2\})_{\{2\}, \{3\}}) \\ (\{1\}, \{2\})_{\{1\}, \{2\}})$$

Interpretative action

$$(\{\{1\}\}, \{0\}, \{3\}) \quad \quad \quad (\{2\}, \{0\}, \{2\}, \{3\}) \\ (\{\{1\}, \{2\}, \{1\}, \{2\}\}) \gg Y > (\{2\}, \{0\}, \{2\}, \{3\}) \quad \times \quad (\{0\}, \{2\}, \{2\}, \{3\}) \gg Y > (\{2\}, \{1\}, \{2\}, \{1\}) \\ (\{0\}, \{2\}, \{2\}, \{3\}) \quad \quad \quad (\{0\}, \{1\}, \{3\}, \{1\}, \{0\})$$

$$(\{0\}, \{2\})_{\{1\}, \{3\}}) \gg Y > (\{2\}, \{0\})_{\{2\}, \{3\}}) \times (\{0\}, \{1\})_{\{3\}, \{0\}}) \\ (\{1\}, \{2\})_{\{1\}, \{2\}}) \gg Y > (\{2\}, \{1\})_{\{2\}, \{1\}})$$

$$(\{0\}, \{2\})_{(2)}, (\{1\}, \{2\})_{(1)}) \gg Y > (\{2\}, \{0\})_{(2)}, (\{1\}, \{3\})_{(1)}) \times (\{0\}, \{1\})_{(3)}, (\{0\})_{(0)})$$

$$(\{0\}, \{2\}) \gg Y > (\{1\}, \{3\}) \quad \times \quad (\{0\}, \{2\}) \gg Y > (\{1\}, \{3\})$$

$$(\{1\}, \{2\}, \{3\}) \gg Y > (\{2\}, \{0\}, \{3\}) \quad \times \quad (\{0\}, \{2\}, \{3\}) \gg Y > (\{0\}, \{1\}, \{0\}, \{3\})$$

$$\begin{array}{c}
(\{0\}, \{2\})_{(2), (3)} \\
(\{1\}, \{0\})_{(0), (3)} \gg Y > (\{2\}, \{0\})_{(2), (3)} \times \\
(\{1\}, \{2\})_{(1), (2)}
\end{array} \quad \times \quad
\begin{array}{c}
(\{2\}, \{1\})_{(2), (1)} \\
(\{0\}, \{2\})_{(3), (2)} \gg Y > (\{0\}, \{1\})_{(3), (0)} \\
(\{2\}, \{0\})_{(3), (2)}
\end{array}$$

7. Pre-semiotic dual system

$$\begin{array}{c}
(\{2\}, \{0\})_{(2), (3)} \{1\}, \{1\}_{(0), (1)}, \{0\}, \{1\}_{(0), (3)} \{1\}, \{1\}_{(0), (1)} \times \\
(\{1\}, \{1\})_{(1), (0)} \{1\}, \{0\}_{(3), (0)} \{1\}, \{1\}_{(3), (1), (0)} \{0\}, \{2\}_{(3), (2)}
\end{array}$$

Qualitative action

$$\begin{array}{c}
(\{2\}, \{0\})_{(2), (3)} \\
(\{0\}, \{1\})_{(0), (3)} \gg Y > (\{1\}, \{1\})_{(1), (1)} \\
(\{1\}, \{1\})_{(0), (1), (3)}
\end{array} \quad \times \quad
\begin{array}{c}
(\{1\}, \{1\})_{(3), (1), (0)} \\
(\{1\}, \{1\})_{(1), (0)} \gg Y > (\{1\}, \{0\})_{(3), (0)} \\
(\{0\}, \{2\})_{(3), (2)}
\end{array}$$

$$\begin{array}{c}
(\{1\}, \{1\})_{(0), (1), (3)} \\
(\{0\}, \{1\})_{(0), (3)} \gg Y > (\{1\}, \{1\})_{(0), (1)} \\
(\{2\}, \{0\})_{(2), (3)}
\end{array} \quad \times \quad
\begin{array}{c}
(\{0\}, \{2\})_{(3), (2)} \\
(\{1\}, \{1\})_{(1), (0)} \gg Y > (\{1\}, \{0\})_{(3), (0)} \\
(\{1\}, \{1\})_{(3), (1), (0)}
\end{array}$$

$$\begin{array}{c}
(\{2\}, \{0\})_{(2), (3)} \\
(\{1\}, \{1\})_{(0), (1), (3)} \gg Y > (\{1\}, \{1\})_{(0), (1)} \\
(\{0\}, \{1\})_{(0), (3)}
\end{array} \quad \times \quad
\begin{array}{c}
(\{1\}, \{0\})_{(3), (0)} \\
(\{1\}, \{1\})_{(1), (0)} \gg Y > (\{1\}, \{1\})_{(3), (1), (0)} \\
(\{0\}, \{2\})_{(3), (2)}
\end{array}$$

$$\begin{array}{c}
(\{0\}, \{1\})_{(0), (3)} \\
(\{2\}, \{0\})_{(2), (3)} \gg Y > (\{1\}, \{1\})_{(0), (1)} \\
(\{2\}, \{0\})_{(2), (3)}
\end{array} \quad \times \quad
\begin{array}{c}
(\{0\}, \{2\})_{(3), (2)} \\
(\{1\}, \{1\})_{(1), (0)} \gg Y > (\{0\}, \{2\})_{(3), (2)} \\
(\{1\}, \{0\})_{(3), (0)}
\end{array}$$

$$\begin{array}{c}
(\{1\}, \{1\})_{(0), (1), (3)} \\
(\{2\}, \{0\})_{(2), (3)} \gg Y > (\{1\}, \{1\})_{(0), (1)} \\
(\{0\}, \{1\})_{(0), (3)}
\end{array} \quad \times \quad
\begin{array}{c}
(\{1\}, \{0\})_{(3), (0)} \\
(\{1\}, \{1\})_{(1), (0)} \gg Y > (\{0\}, \{2\})_{(3), (2)} \\
(\{1\}, \{1\})_{(3), (1), (0)}
\end{array}$$

Medial action

$$\begin{array}{c}
(\{2\}, \{0\})_{(2), (3)} \\
(\{1\}, \{1\})_{(0), (1), (1)} \gg Y > (\{0\}, \{1\})_{(0), (3)} \\
(\{1\}, \{1\})_{(0), (1), (3)}
\end{array} \quad \times \quad
\begin{array}{c}
(\{1\}, \{1\})_{(3), (1), (0)} \\
(\{1\}, \{0\})_{(3), (0)} \gg Y > (\{1\}, \{1\})_{(1), (0)} \\
(\{0\}, \{2\})_{(3), (2)}
\end{array}$$

$$\begin{array}{c}
(\{1\}, \{1\})_{(0), (1), (3)} \\
(\{1\}, \{1\})_{(0), (1)} \gg Y > (\{0\}, \{1\})_{(0), (3)} \\
(\{2\}, \{0\})_{(2), (3)}
\end{array} \quad \times \quad
\begin{array}{c}
(\{0\}, \{2\})_{(3), (2)} \\
(\{1\}, \{0\})_{(3), (0)} \gg Y > (\{1\}, \{1\})_{(1), (0)} \\
(\{1\}, \{1\})_{(3), (1), (0)}
\end{array}$$

$$\begin{array}{c}
(\{1\}, \{1\})_{(0), (1)} \\
(\{1\}, \{1\})_{(0), (1), (3)} \gg Y > (\{0\}, \{1\})_{(0), (3)} \\
(\{2\}, \{0\})_{(2), (3)}
\end{array} \quad \times \quad
\begin{array}{c}
(\{0\}, \{2\})_{(3), (2)} \\
(\{1\}, \{0\})_{(3), (0)} \gg Y > (\{1\}, \{1\})_{(3), (1), (0)} \\
(\{1\}, \{1\})_{(1), (0)}
\end{array}$$

$$\begin{array}{c}
(\{2\}, \{0\})_{(2), (3)} \\
(\{1\}, \{1\})_{(0), (1), (3)} \gg Y > (\{0\}, \{1\})_{(0), (3)} \\
(\{1\}, \{1\})_{(0), (1)}
\end{array} \quad \times \quad
\begin{array}{c}
(\{1\}, \{1\})_{(1), (0)} \\
(\{1\}, \{0\})_{(3), (0)} \gg Y > (\{1\}, \{1\})_{(3), (1), (0)} \\
(\{0\}, \{2\})_{(3), (2)}
\end{array}$$

$$\begin{array}{ccc} (\{ \mid \}.\{1 \mid \}_{\{0 \mid \},\{1 \mid \}}) & & (\{1 \mid \}.\{1 \mid \}_{\{3 \mid \},\{1 \mid \},\{0 \mid \}}) \\ (\{2 \mid \}.\{0 \mid \}_{\{2 \mid \},\{3 \mid \}}) \gg \text{ } Y \text{ } > (\{0 \mid \}.\{1 \mid \}_{\{0 \mid \},\{3 \mid \}}) & \times & (\{1 \mid \}.\{0 \mid \}_{\{3 \mid \},\{0 \mid \}}) \gg \text{ } Y \text{ } > (\{0 \mid \}.\{2 \mid \}_{\{3 \mid \},\{2 \mid \}}) \\ (\{1 \mid \}.\{1 \mid \}_{\{0 \mid \},\{1 \mid \},\{3 \mid \}}) & & (\{1 \mid \}.\{1 \mid \}_{\{1 \mid \},\{0 \mid \}}) \end{array}$$

$$(\{2\}, \{0\}, \{1\}, \{0\}, \{1\}, \{3\}) \gg \vee > (\{0\}, \{1\}, \{0\}, \{3\}) \quad \times \quad (\{1\}, \{0\}, \{1\}, \{0\}, \{1\}) \gg \vee > (\{0\}, \{2\}, \{3\}, \{2\}, \{1\})$$

$$\quad \quad \quad (\{1\}, \{1\}, \{0\}, \{1\})$$

Objectal action

$$(\{ \{ 2 \} \}, \{ 0 \}, \{ 2 \}), \{ 3 \}) \quad \quad (\{ 1 \}, \{ 0 \}, \{ 3 \}, \{ 0 \}, \{ 1 \}) \\ (\{ \{ 1 \}, \{ 1 \}, \{ 0 \}, \{ 1 \}, \{ 1 \} \}) \gg \gamma > (\{ \{ 1 \}, \{ 1 \}, \{ 0 \}, \{ 1 \}, \{ 1 \}, \{ 3 \} \}) \times (\{ 1 \}, \{ 1 \}, \{ 3 \}, \{ 1 \}, \{ 1 \}, \{ 0 \}) \gg \gamma > (\{ \{ 1 \}, \{ 1 \}, \{ 1 \}, \{ 0 \} \}) \\ (\{ 0 \}, \{ 2 \}, \{ 1 \}, \{ 0 \}, \{ 1 \}, \{ 3 \}) \quad \quad (\{ 0 \}, \{ 2 \}, \{ 2 \}, \{ 3 \}, \{ 1 \}, \{ 2 \})$$

$$(\{ \{ 0 \} \}, \{ 1 \}, \{ 0 \}, \{ 3 \}, \{ 1 \}) \gg \gamma > (\{ 1 \}, \{ 1 \}, \{ 0 \}, \{ 1 \}, \{ 3 \}) \times (\{ 1 \}, \{ 1 \}, \{ 3 \}, \{ 1 \}, \{ 0 \}) \gg \gamma > (\{ 1 \}, \{ 1 \}, \{ 1 \}, \{ 0 \})$$

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg \gamma > (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \times (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \gg \gamma > (\{1\}, \{0\}_{\{3\}, \{0\}})$$

$$\begin{aligned} & (\{2\}, \{0\})_{(2), (3)}) \\ (\{0\}, \{1\})_{(0), (3)}) & \gg \gamma > (\{1\}, \{1\})_{(0), (1), (3)}) \quad \times \quad (\{1\}, \{1\})_{(3), (1), (0)}) \\ (\{1\}, \{1\})_{(0), (1), (1)}) & \end{aligned}$$

$$(\{1\}, \{1\}, \{0\}, \{1\}) \quad (\{1\}, \{0\}, \{1\}) \\ (\{2\}, \{0\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \times (\{1\}, \{1\}, \{3\}, \{1\}, \{0\}) \gg Y > (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{0\}, \{1\}, \{1\}, \{3\}) \quad (\{1\}, \{1\}, \{1\}, \{0\})$$

$$(\{0\}, \{1\})_{\{0\}, \{3\}}) \\ (\{2\}, \{0\})_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{1\})_{\{0\}, \{1\}, \{3\}}) \times (\{1\}, \{1\})_{\{3\}, \{1\}, \{0\}}) \gg Y > (\{0\}, \{2\})_{\{3\}, \{2\}}) \\ (\{1\}, \{1\})_{\{0\}, \{1\}, \{3\}}) \\ (\{1\}, \{0\})_{\{3\}, \{1\}, \{3\}})$$

Interpretative action

$$(\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}}) \times (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{0\}, \{1\}})$$

$$(\{\{0\}\}, \{\{1\}\}_{\{0\}}, \{\{3\}\}) \gg Y > (\{\{2\}\}, \{\{0\}\}_{\{2\}}, \{\{3\}\}) \times (\{\{0\}\}, \{\{2\}\}_{\{3\}}, \{\{2\}\}) \gg Y > (\{\{1\}\}, \{\{1\}\}_{\{3\}}, \{\{1\}\}_{\{0\}})$$

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}}) \quad \times \quad (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{1\}, \{0\}_{\{3\}, \{0\}})$$

$$(\{0\}, \{1\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{0\}, \{2\}, \{3\}) \quad \times \quad (\{0\}, \{2\}, \{3\}, \{2\}) \gg Y > (\{1\}, \{0\}, \{3\}, \{0\})$$

$$(\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \gg \gamma > (\{2\}, \{0\}, \{2\}, \{3\}) \times (\{0\}, \{2\}, \{3\}, \{2\}) \gg \gamma > (\{1\}, \{1\}, \{1\}, \{3\}, \{1\}, \{0\})$$

$$\begin{array}{c} (\{0\}, \{1\}_{\{0\}, \{3\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}}) \times \\ (\{1\}, \{1\}_{\{0\}, \{1\}}) \end{array} \quad \begin{array}{c} (\{1\}, \{1\}_{\{1\}, \{0\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{1\}, \{0\}_{\{3\}, \{0\}}) \end{array}$$

8. Pre-semiotic dual system

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}}) \{1\}, \{1\}_{\{0\}, \{1\}, \{3\}} \{0\}, \{1\}_{\{0\}, \{3\}} \{1\}, \{2\}_{\{1\}, \{2\}} \times \\ (\{2\}, \{1\}_{\{2\}, \{1\}}) \{1\}, \{0\}_{\{3\}, \{0\}} \{1\}, \{1\}_{\{3\}, \{1\}, \{0\}} \{0\}, \{2\}_{\{3\}, \{2\}} \end{array}$$

Qualitative action

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}}) \\ (\{0\}, \{1\}_{\{0\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{1\}, \{0\}_{\{3\}, \{0\}}) \\ (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \\ (\{0\}, \{1\}_{\{1\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg Y > (\{1\}, \{0\}_{\{3\}, \{1\}, \{0\}}) \\ (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \end{array}$$

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{0\}, \{1\}_{\{0\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{1\}, \{0\}_{\{3\}, \{0\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{1\}, \{0\}_{\{3\}, \{0\}}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{1\}_{\{0\}, \{3\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{1\}, \{0\}_{\{3\}, \{0\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{0\}, \{1\}_{\{0\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{1\}, \{0\}_{\{3\}, \{0\}}) \\ (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg Y > (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{1\}, \{0\}_{\{3\}, \{0\}}) \end{array}$$

Medial action

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \gg Y > (\{0\}, \{1\}_{\{0\}, \{3\}}) \times \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{1\}, \{0\}_{\{3\}, \{0\}}) \gg Y > (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \gg Y > (\{0\}, \{1\}_{\{0\}, \{3\}}) \times \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{1\}, \{0\}_{\{3\}, \{0\}}) \gg Y > (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{2\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{0\}, \{1\}_{\{0\}, \{3\}}) \times \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{1\}, \{0\}_{\{3\}, \{0\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{2\}, \{1\}_{\{2\}, \{1\}}) \end{array}$$

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{0\}, \{1\}_{\{0\}, \{3\}}) \times \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \end{array} \quad \begin{array}{c} (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{1\}, \{0\}_{\{3\}, \{0\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \end{array}$$

$$\begin{array}{ccc} (\{ \mid \}, \{ 2 \mid \}_{\{1\}, \{2\}}) & & (\{ 1 \mid \}, \{ 1 \mid \}_{\{3\}, \{1\}, \{0\}}) \\ (\{2 \mid \}, \{ 0 \mid \}_{\{2\}, \{3\}}) \gg \succ (\{0 \mid \}, \{ 1 \mid \}_{\{0\}, \{3\}}) & \times & (\{1 \mid \}, \{ 0 \mid \}_{\{3\}, \{0\}}) \gg \succ (\{0 \mid \}, \{ 2 \mid \}_{\{3\}, \{2\}}) \\ (\{1 \mid \}, \{ 1 \mid \}_{\{0\}, \{1\}, \{3\}}) & & (\{2 \mid \}, \{ 1 \mid \}_{\{2\}, \{1\}}) \end{array}$$

$$(\{2\}.\{0\}.\{0\}) \gg \vee > (\{0\}.\{1\}.\{0\}).\{3\}) \quad \times \quad (\{2\}.\{1\}.\{2\}) \gg \vee > (\{0\}.\{2\}.\{3\}).\{2\})$$

$$(\{1\}.\{2\}.\{1\})$$

Objectal action

$$((\{2\}, \{0\}, \{2\}, \{3\})) \gg \text{Y} > ((\{1\}, \{1\}, \{0\}, \{1\}, \{3\})) \times ((\{1\}, \{1\}, \{3\}, \{1\}, \{0\})) \gg \text{Y} > ((\{2\}, \{1\}, \{2\}, \{1\}))$$

$$((\{0\}, \{1\}, \{0\}, \{3\})) \qquad \qquad \qquad ((\{0\}, \{2\}, \{3\}, \{2\}))$$

$$(\{ \{ 0 \} \}, \{ 1 \}, \{ 0 \}, \{ 3 \}, \{ 1 \}) \quad (\{ 0 \}, \{ 2 \}, \{ 3 \}, \{ 2 \}, \{ 1 \}) \\ (\{ \{ 1 \} \}, \{ 2 \}, \{ 1 \}, \{ 1 \}, \{ 2 \}, \{ 1 \}) \gg \gamma > (\{ 1 \}, \{ 1 \}, \{ 0 \}, \{ 1 \}, \{ 3 \}, \{ 1 \}) \times (\{ 1 \}, \{ 1 \}, \{ 3 \}, \{ 1 \}, \{ 0 \}, \{ 1 \}) \gg \gamma > (\{ 2 \}, \{ 1 \}, \{ 2 \}, \{ 1 \}, \{ 1 \}) \\ (\{ 2 \}, \{ 1 \}, \{ 0 \}, \{ 1 \}, \{ 2 \}, \{ 1 \}, \{ 3 \}, \{ 1 \}) \quad (\{ 1 \}, \{ 0 \}, \{ 1 \}, \{ 3 \}, \{ 1 \}, \{ 0 \}, \{ 1 \})$$

$$\begin{array}{c} (\{ \mid \}, \{ 2 \mid \}_{\{1\}}, \{ 2 \mid \}) \\ (\{ 0 \mid \}, \{ 1 \mid \}_{\{0\}}, \{ 3 \mid \}) \gg \gamma > (\{ 1 \mid \}, \{ 1 \mid \}_{\{0\}}, \{ 1 \mid \}_{\{3\}}) \end{array} \times \begin{array}{c} (\{ 0 \mid \}, \{ 2 \mid \}_{\{3\}}, \{ 2 \mid \}) \\ (\{ 1 \mid \}, \{ 1 \mid \}_{\{3\}}, \{ 1 \mid \}_{\{0\}}) \gg \gamma > (\{ 1 \mid \}, \{ 0 \mid \}_{\{3\}}, \{ 0 \mid \}) \\ (\{ 2 \mid \}, \{ 0 \mid \}_{\{2\}}, \{ 3 \mid \}) \end{array}$$

$$(\{0\}, \{1\}, \{0\}, \{1\}, \{0\}, \{1\}) \gg \text{Y} > (\{1\}, \{0\}, \{1\}, \{0\}, \{1\}, \{0\}) \times (\{1\}, \{0\}, \{1\}, \{0\}, \{1\}, \{0\}) \gg \text{Y} > (\{1\}, \{0\}, \{1\}, \{0\}, \{1\}, \{0\})$$

$$(\{2\}, \{0\}, \{1\}, \{3\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \times (\{1\}, \{1\}, \{3\}, \{1\}, \{0\}) \gg Y > (\{0\}, \{2\}, \{1\}, \{3\})$$

$$\begin{array}{c} (\{0\}, \{1\}, \{0\}, \{3\}) \\ (\{2\}, \{0\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \quad \times \quad (\{1\}, \{1\}, \{3\}, \{1\}, \{0\}) \\ (\{1\}, \{2\}, \{1\}, \{2\}, \{1\}) \end{array} \quad \begin{array}{c} (\{2\}, \{1\}, \{2\}, \{1\}) \\ (\{0\}, \{2\}, \{3\}, \{2\}) \gg Y > (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{1\}, \{2\}, \{0\}, \{3\}, \{0\}) \end{array}$$

Interpretative action

$$(\{1\}, \{1\}_{\{0\}}, \{1\}_{\{3\}}) \quad \times \quad (\{1\}, \{0\}_{\{3\}}, \{0\}_{\{1\}}) \\ (\{1\}, \{2\}_{\{1\}}, \{2\}_{\{1\}}) \gg Y > (\{2\}, \{0\}_{\{2\}}, \{3\}) \quad \times \quad (\{0\}, \{2\}_{\{3\}}, \{2\}_{\{1\}}) \\ (\{0\}, \{1\}_{\{3\}}, \{1\}_{\{3\}}) \quad (\{1\}, \{1\}_{\{3\}}, \{1\}_{\{0\}})$$

$$(\{\{\} \},\{2| \}_{\{1| \},\{2| \}}) \gg Y > (\{2| \},\{0| \}_{\{2| \},\{3| \}}) \quad \times \quad (\{\{\} \},\{1| \}_{\{3| \},\{1| \},\{0| \}}) \\ (\{1| \},\{1| \}_{\{3| \},\{1| \},\{0| \}}) \gg Y > (\{2| \},\{1| \}_{\{2| \},\{1| \}})$$

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg \text{Y} > (\{2\}, \{0\}_{\{2\}, \{3\}}) \quad \times \quad (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg \text{Y} > (\{1\}, \{0\}_{\{3\}, \{0\}})$$

$$(\{0\}, \{1\}, \{2\}, \{3\}) \gg \text{Y} > (\{2\}, \{0\}, \{1\}, \{3\}) \quad \times \quad (\{0\}, \{2\}, \{3\}, \{1\}, \{2\}) \gg \text{Y} > (\{1\}, \{0\}, \{3\}, \{0\}, \{1\})$$

$$(\{1\}, \{2\}, \{3\}) \gg \gamma > (\{2\}, \{0\}, \{3\}) \times (\{0\}, \{2\}, \{3\}) \gg \gamma > (\{1\}, \{1\}, \{3\}, \{0\})$$

$$\begin{array}{c} (\{0\}, \{1\}_{\{0\}, \{3\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}}) \times \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \end{array} \quad \begin{array}{c} (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{1\}, \{0\}_{\{3\}, \{0\}}) \end{array}$$

9. Pre-semiotic dual system

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}} \{1\}, \{1\}_{\{0\}, \{1\}, \{3\}} \{0\}, \{2\}_{\{2\}, \{3\}} \{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{2\}, \{1\}_{\{2\}, \{1\}} \{2\}, \{0\}_{\{3\}, \{2\}} \{1\}, \{1\}_{\{3\}, \{1\}, \{0\}} \{0\}, \{2\}_{\{3\}, \{2\}}) \end{array}$$

Qualitative action

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}}) \\ (\{0\}, \{2\}_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{2\}, \{0\}_{\{3\}, \{2\}}) \\ (\{1\}, \{0\}_{\{3\}, \{1\}, \{0\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \\ (\{0\}, \{2\}_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg Y > (\{2\}, \{0\}_{\{3\}, \{2\}}) \\ (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \end{array}$$

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{0\}, \{2\}_{\{2\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}}) \\ (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\}_{\{2\}, \{3\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{2\}, \{0\}_{\{3\}, \{2\}}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\}_{\{2\}, \{3\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{2\}, \{0\}_{\{3\}, \{2\}}) \gg Y > (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{2\}, \{0\}_{\{3\}, \{2\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times \\ (\{0\}, \{2\}_{\{2\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{2\}, \{0\}_{\{3\}, \{2\}}) \\ (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg Y > (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \end{array}$$

Medial action

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \gg Y > (\{0\}, \{2\}_{\{2\}, \{3\}}) \times \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \gg Y > (\{0\}, \{2\}_{\{2\}, \{3\}}) \times \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{2\}, \{0\}_{\{3\}, \{2\}}) \gg Y > (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{2\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{0\}, \{2\}_{\{2\}, \{3\}}) \times \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \end{array} \quad \begin{array}{c} (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{2\}, \{0\}_{\{3\}, \{2\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{2\}, \{1\}_{\{2\}, \{1\}}) \end{array}$$

$$\begin{array}{c} (\{2\}, \{0\}_{\{2\}, \{3\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{0\}, \{2\}_{\{2\}, \{3\}}) \times \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \end{array} \quad \begin{array}{c} (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{2\}, \{0\}_{\{3\}, \{2\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \end{array}$$

$$\begin{array}{ccc} (\{ \mid \}, \{ 2 \mid \}_{\{1\}, \{2\}}) & & (\{ \mid \}, \{ 1 \mid \}_{\{3\}, \{1\}, \{0\}}) \\ (\{2 \mid \}, \{ 0 \mid \}_{\{2\}, \{3\}}) \gg \succ (\{0 \mid \}, \{ 2 \mid \}_{\{2\}, \{3\}}) & \times & (\{2 \mid \}, \{ 0 \mid \}_{\{3\}, \{2\}}) \gg \succ (\{0 \mid \}, \{ 2 \mid \}_{\{3\}, \{2\}}) \\ (\{1 \mid \}, \{ 1 \mid \}_{\{0\}, \{1\}, \{3\}}) & & (\{2 \mid \}, \{ 1 \mid \}_{\{2\}, \{1\}}) \end{array}$$

$$(\{2\}.\{0| \}_{(2),(3)}) \gg \text{Y} > (\{0| \}.2| \}_{(2),(3)}) \quad \times \quad (\{2\}.\{0| \}_{(3),(2)}) \gg \text{Y} > (\{0| \}.2| \}_{(3),(2)})$$

$$(\{| \}.2| \}_{(1),(2)}) \qquad \qquad \qquad (\{| \}.1| \}_{(3),(1),(0)})$$

Objective action

$$\begin{aligned} & \left(\{2\}, \{0\} \right)_{\{2\}, \{3\}} \quad \left(\{2\}, \{0\} \right)_{\{3\}, \{2\}} \\ \Rightarrow \quad & \left(\{1\}, \{2\} \right)_{\{1\}, \{2\}} \quad \times \quad \left(\{1\}, \{1\} \right)_{\{3\}, \{1\}, \{0\}} \\ & \left(\{0\}, \{2\} \right)_{\{2\}, \{3\}} \quad \left(\{0\}, \{2\} \right)_{\{3\}, \{2\}} \end{aligned}$$

$$\text{...} \quad (\{1\}, \{2\}, \{1\}, \{2\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \quad \times \quad (\{1\}, \{1\}, \{3\}, \{1\}, \{0\}) \gg Y > (\{2\}, \{1\}, \{2\}, \{1\}, \{1\})$$

$$\text{...} \quad (\{0\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \quad \times \quad (\{1\}, \{1\}, \{3\}, \{1\}, \{0\}) \gg Y > (\{2\}, \{0\}, \{3\}, \{2\}, \{1\}) \\ (\{2\}, \{0\}, \{2\}, \{3\})$$

$$\text{...} \quad (\{2\}, \{0\})_{(2), (3)}) \\ (\{0\}, \{2\})_{(2), (3)}) \gg Y > (\{1\}, \{1\})_{(0), (1), (3)}) \quad \times \quad (\{2\}, \{1\})_{(2), (1)}) \\ (\{1\}, \{1\})_{(3), (1), (0)}) \gg Y > (\{2\}, \{0\})_{(3), (2)}) \\ (\{1\}, \{2\})_{(1), (2)}) \quad (\{0\}, \{2\})_{(3), (2)})$$

$$\begin{aligned} & \left(\{1\}, \{2\}_{\{1\}, \{2\}} \right) \\ & (\{2\}, \{0\}_{\{2\}, \{3\}}) \gg \gamma > (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \quad \times \quad (\{2\}, \{0\}_{\{3\}, \{2\}}) \\ & \left(\{0\}, \{2\}_{\{2\}, \{3\}} \right) \qquad \qquad \qquad (\{2\}, \{1\}_{\{2\}, \{1\}}) \end{aligned}$$

$$\text{...} \quad (\{2\mid\},\{\{0\mid\}_{(2)},\{1\mid\}_{(2)}\}) \times (\{1\mid\},\{\{1\mid\}_{(1)},\{2\mid\}_{(1)}\}) \quad \text{...}$$

Interpretative action

$$(\{1\}, \{1\}, \{01\}, \{1\}, \{31\}) \gg Y > (\{2\}, \{0\}, \{21\}, \{31\}) \quad \times \quad (\{0\}, \{2\}, \{31\}, \{21\}) \gg Y > (\{2\}, \{1\}, \{21\}, \{11\})$$

$$(\{0\}, \{21\}, \{21\}, \{31\})$$

$$\frac{(\{0\}, \{2\}, \{3\})}{(\{1\}, \{2\}, \{3\})} \gg \gamma > \frac{(\{2\}, \{0\}, \{3\})}{(\{1\}, \{3\}, \{2\})} \quad \times \quad \frac{(\{1\}, \{1\}, \{3\}, \{1\}, \{0\})}{(\{2\}, \{1\}, \{3\}, \{2\}, \{1\})}$$

$$(\{0\}, \{2\}_{\{2\}, \{3\}}) \gg \gamma > (\{2\}, \{0\}_{\{2\}, \{3\}}) \quad \times \quad (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg \gamma > (\{2\}, \{0\}_{\{3\}, \{2\}})$$

$$(\{0\}, \{2\})_{(2), (3)}) \gg \vee > (\{2\}, \{0\})_{(2), (3)}) \quad \times \quad (\{0\}, \{2\})_{(3), (2)}) \gg \vee > (\{2\}, \{0\})_{(3), (2)}) \\ (\{\mid\}, \{2\})_{(1), (2)})$$

$$\frac{(\{1\}, \{2\}, \{3\})}{(\{1\}, \{2\}, \{3\})} \gg Y > (\{2\}, \{0\}, \{3\}) \times \frac{(\{2\}, \{0\}, \{3\})}{(\{0\}, \{2\}, \{3\})} \gg Y > (\{1\}, \{1\}, \{0\})$$

$$(\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}}) \quad \times \quad (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}})$$

10. Pre-semiotic dual system

$\{ \{ 2 \} , \{ 0 \} \} \{ 2 \} \{ 3 \} \{ 1 \} \{ 2 \} \{ 1 \} \{ 3 \} \{ 0 \} \{ 2 \} \{ 2 \} \{ 3 \} \{ 1 \} \{ 2 \} \{ 1 \} \{ 2 \} \times \{ 2 \} \{ 1 \} \{ 2 \} \{ 3 \} \{ 2 \} \{ 0 \} \{ 3 \} \{ 2 \} \{ 2 \} \{ 1 \} \{ 3 \} \{ 1 \} \{ 0 \} \{ 2 \} \{ 3 \} \{ 2 \}$

Qualitative action

$$(\{0\}, \{2\}, \{2\})_{(2), (3)}) \gg \gamma > (\{1\}, \{2\}, \{1\}, \{2\}) \quad \times \quad (\{2\}, \{1\}, \{2\})_{(2), (1)}) \gg \gamma > (\{2\}, \{0\}, \{3\}, \{2\}) \\ (\{1\}, \{2\}, \{1\}, \{3\}) \qquad \qquad \qquad (\{0\}, \{2\}, \{3\}, \{2\})$$

$$(\{0\}, \{2\})_{(2), (3), (1)} \gg \gamma > (\{1\}, \{2\})_{(1), (2), (1)} \quad \times \quad (\{2\}, \{\cdot\})_{(2), (1), (1)} \gg \gamma > (\{2\}, \{0\})_{(3), (2), (1)} \\ (\{2\}, \{0\})_{(2), (3), (1)}$$

$$(\{1\}.\{2\}.\{1\}_{\{1\}\cup\{3\}}) \gg \gamma > (\{1\}.\{2\}.\{1\}_{\{2\}}) \quad \times \quad (\{2\}.\{1\}.\{1\}_{\{2\}\cup\{1\}}) \gg \gamma > (\{2\}.\{1\}.\{3\}_{\{2\}\cup\{1\}}) \\ (\{0\}.\{2\}.\{2\}_{\{2\}\cup\{3\}}) \qquad \qquad \qquad (\{0\}.\{2\}.\{3\}_{\{3\}\cup\{2\}})$$

$$(\{1\}.\{2\}.\{1\}.\{3\}) \gg \gamma > (\{1\}.\{2\}.\{1\}.\{2\}) \quad \times \quad (\{2\}.\{1\}.\{2\}.\{1\}) \gg \gamma > (\{2\}.\{1\}.\{3\}.\{1\}) \\ (\{2\}.\{0\}.\{2\}.\{3\})$$

$$(\{2\}, \{0\}, \{0\}_{(2)}, \{3\}) \gg \gamma > (\{1\}, \{2\}, \{1\}, \{2\}) \quad \times \quad (\{2\}, \{1\}, \{1\}_{(2)}, \{1\}) \gg \gamma > (\{0\}, \{2\}, \{3\}, \{2\}) \\ (\{1\}, \{2\}, \{1\}, \{3\}) \qquad \qquad \qquad (\{2\}, \{0\}, \{3\}, \{2\})$$

$$(\{1\}, \{1\})_{\{0\}, \{1\}, \{3\}}) \\ (\{2\}, \{0\})_{\{2\}, \{3\}}) \gg Y > (\{1\}, \{2\})_{\{1\}, \{2\}}) \quad \times \quad (\{2\}, \{1\})_{\{2\}, \{1\}}) \gg Y > (\{0\}, \{2\})_{\{3\}, \{2\}}) \\ (\{0\}, \{2\})_{\{2\}, \{3\}}) \qquad \qquad \qquad (\{1\}, \{1\})_{\{3\}, \{1\}, \{0\}})$$

Medial action

$$(\{ \{ \} \cdot \{ 2 \} \}_{\{ 1 \}, \{ 2 \}, \{ 3 \}}) \gg \gamma > (\{ 0 \} \cdot \{ 2 \})_{\{ 2 \}, \{ 3 \}} \quad \times \quad (\{ 2 \} \cdot \{ 0 \})_{\{ 3 \}, \{ 2 \}, \{ 1 \}} \\ (\{ 1 \} \cdot \{ 2 \})_{\{ 1 \}, \{ 3 \}, \{ 2 \}} \qquad \qquad \qquad (\{ 2 \} \cdot \{ 1 \})_{\{ 3 \}, \{ 1 \}} \\ (\{ 0 \} \cdot \{ 2 \})_{\{ 3 \}, \{ 2 \}, \{ 1 \}}$$

$$(\{1\};\{2\};\{3\}) \gg y > (\{0\};\{2\};\{3\}) \times (\{2\};\{0\};\{3\}) \gg y > (\{2\};\{1\};\{2\})$$

$$\frac{(\{1\}, \{2\}_{\{1\}, \{3\}}) \gg \gamma > (\{0\}, \{2\}_{\{2\}, \{3\}})}{\{2\}, \{0\}_{\{2\}, \{3\}}} \times \frac{(\{0\}, \{2\}_{\{3\}, \{2\}})}{(\{2\}, \{1\}_{\{3\}, \{1\}})}$$

$$\begin{array}{c} (\{2\}, \{0\}, \{2\}, \{3\}) \\ (\{1\}, \{2\}, \{1\}, \{3\}) \gg Y > (\{0\}, \{2\}, \{2\}, \{3\}) \times \\ (\{1\}, \{2\}, \{3\}, \{2\}) \end{array} \quad \begin{array}{c} (\{2\}, \{1\}, \{2\}, \{1\}) \\ (\{2\}, \{0\}, \{3\}, \{2\}) \gg Y > (\{2\}, \{1\}, \{3\}, \{1\}) \\ (\{0\}, \{2\}, \{3\}, \{2\}) \end{array}$$

$$\begin{array}{c} (\{ \} \cdot \{ 2 \} \cdot \{ 1 \} \cdot \{ 2 \}) \\ (\{ 2 \} \cdot \{ 0 \} \cdot \{ 2 \} \cdot \{ 3 \}) \gg Y > (\{ 0 \} \cdot \{ 2 \} \cdot \{ 2 \} \cdot \{ 3 \}) \times \\ (\{ 1 \} \cdot \{ 2 \} \cdot \{ 1 \} \cdot \{ 3 \}) \end{array} \quad \begin{array}{c} (\{ 2 \} \cdot \{ 1 \} \cdot \{ 3 \} \cdot \{ 1 \}) \\ (\{ 2 \} \cdot \{ 0 \} \cdot \{ 3 \} \cdot \{ 2 \}) \gg Y > (\{ 0 \} \cdot \{ 2 \} \cdot \{ 3 \} \cdot \{ 2 \}) \\ (\{ 2 \} \cdot \{ 1 \} \cdot \{ 2 \} \cdot \{ 1 \}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{3\}}) \\ (\{2\}, \{0\}_{\{2\}, \{3\}}) \gg Y > (\{0\}, \{2\}_{\{2\}, \{3\}}) \times \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \end{array} \quad \begin{array}{c} (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{2\}, \{0\}_{\{3\}, \{2\}}) \gg Y > (\{0\}, \{2\}_{\{3\}, \{2\}}) \\ (\{2\}, \{1\}_{\{3\}, \{1\}}) \end{array}$$

Objectal action

$$\begin{array}{c} (\{2\}, \{0\}, \{2\}, \{3\}) \\ (\{1\}, \{2\}, \{1\}, \{2\}) \gg \vee \triangleright (\{1\}, \{2\}, \{1\}, \{3\}) \times \\ (\{0\}, \{2\}, \{2\}, \{3\}) \end{array} \quad \begin{array}{c} (\{2\}, \{0\}, \{3\}, \{2\}) \\ (\{2\}, \{1\}, \{3\}, \{1\}) \gg \vee \triangleright (\{2\}, \{1\}, \{2\}, \{1\}) \\ (\{0\}, \{2\}, \{3\}, \{2\}) \end{array}$$

$$\left(\{ \{ 0 \} , \{ 2 \} \}_{\{ 2 \}, \{ 3 \}} \right) \gg Y > \left(\{ 1 \} , \{ 2 \} \}_{\{ 1 \}, \{ 3 \}} \right) \times \left(\{ 2 \} , \{ 1 \} \}_{\{ 3 \}, \{ 1 \}} \right) \gg Y > \left(\{ 2 \} , \{ 1 \} \}_{\{ 2 \}, \{ 1 \}} \right) \\ \left(\{ 2 \} , \{ 0 \} \}_{\{ 2 \}, \{ 3 \}} \right) \qquad \qquad \qquad \left(\{ 2 \} , \{ 0 \} \}_{\{ 3 \}, \{ 2 \}} \right)$$

$$(\{0\}, \{2\})_{(2), (3)}) \gg \gamma > (\{1\}, \{2\})_{(1), (3)}) \times (\{2\}, \{1\})_{(3), (1)}) \gg \gamma > (\{2\}, \{0\})_{(3), (2)})$$

$$(\{2\}, \{0\})_{(2), (3)})$$

$$\begin{array}{c} ((2\mid\!.\!\{0\mid\!.\!\{2\!\mid\!\{3\!\mid\!\}) \\ (\{0\mid\!.\!\{2\!\mid\!\{3\!\mid\!\}) \gg \text{Y} \triangleright (\{1\mid\!.\!\{2\!\mid\!\{3\!\mid\!\}) \times \\ (\{1\mid\!.\!\{2\!\mid\!\{3\!\mid\!\}) \end{array} \quad \begin{array}{c} ((2\mid\!.\!\{1\mid\!.\!\{3\!\mid\!\{1\!\mid\!\}) \\ ((2\mid\!.\!\{1\mid\!.\!\{3\!\mid\!\{1\!\mid\!\}) \gg \text{Y} \triangleright ((2\mid\!.\!\{0\mid\!.\!\{3\!\mid\!\{2\!\mid\!\}) \\ (\{0\mid\!.\!\{2\!\mid\!\{3\!\mid\!\{2\!\mid\!\}) \end{array}$$

$$(\{2\}, \{0\}_{\{2\}, \{3\}}) \gg \text{Y} > (\{1\}, \{2\}_{\{1\}, \{3\}}) \times (\{2\}, \{1\}_{\{3\}, \{1\}}) \quad (\{2\}, \{0\}_{\{3\}, \{2\}}) \\ (\{0\}, \{2\}_{\{2\}, \{3\}}) \qquad \qquad \qquad (\{2\}, \{1\}_{\{3\}, \{2\}}) \qquad \qquad \qquad (\{2\}, \{1\}_{\{2\}, \{1\}})$$

$$\begin{array}{c} (\{0\}, \{2\})_{\{2\}, \{3\}} \\ (\{2\}, \{0\})_{\{2\}, \{3\}} \gg \gamma > (\{1\}, \{2\})_{\{1\}, \{3\}} \times \\ (\{1\}, \{2\})_{\{1\}, \{2\}} \end{array} \quad \begin{array}{c} (\{2\}, \{1\})_{\{2\}, \{1\}} \\ (\{2\}, \{1\})_{\{3\}, \{1\}} \gg \gamma > (\{0\}, \{2\})_{\{2\}, \{3\}} \\ (\{2\}, \{0\})_{\{3\}, \{2\}} \end{array}$$

Interpretative action

$$(\{1\}, \{2\}, \{1\}, \{3\}) \gg \vee > (\{2\}, \{0\}, \{2\}, \{3\}) \times (\{0\}, \{2\}, \{3\}, \{2\}) \gg \vee > (\{2\}, \{1\}, \{2\}, \{1\})$$

$$(\{ \{ 0 \} \}, \{ 2 \})_{\{ 2 \}, \{ 3 \}}) \gg y > (\{ 2 \}, \{ 0 \})_{\{ 2 \}, \{ 3 \}} \times (\{ 0 \}, \{ 2 \})_{\{ 3 \}, \{ 2 \}}) \gg y > (\{ 2 \}, \{ 1 \})_{\{ 2 \}, \{ 1 \}} \\ (\{ 1 \}, \{ 2 \})_{\{ 1 \}, \{ 3 \}}) \qquad \qquad \qquad (\{ 2 \}, \{ 1 \})_{\{ 3 \}, \{ 1 \}} \\ (\{ 2 \}, \{ 0 \})_{\{ 3 \}, \{ 2 \}})$$

$$\begin{array}{c} (\{| \},\{2| \}_{\{1\}},\{2\}) \\ (\{0| \},\{2| \}_{\{2\}},\{3\}) \gg \text{Y} > (\{2| \},\{0| \}_{\{2\}},\{3\}) \times \\ (\{1| \},\{2| \}_{\{1\}},\{3\}) \end{array} \quad \begin{array}{c} (\{2| \},\{1| \}_{\{3\}},\{1\}) \\ (\{0| \},\{2| \}_{\{3\}},\{2\}) \gg \text{Y} > (\{2| \},\{0| \}_{\{3\}},\{2\}) \\ (\{2| \},\{1| \}_{\{2\}},\{1\}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{3\}}) \\ (\{0\}, \{2\}_{\{2\}, \{3\}}) \gg Y > (\{2\}, \{0\}_{\{2\}, \{3\}}) \times \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \end{array} \quad \begin{array}{c} (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{0\}, \{2\}_{\{3\}, \{2\}}) \gg Y > (\{2\}, \{0\}_{\{3\}, \{2\}}) \\ (\{2\}, \{1\}_{\{3\}, \{1\}}) \end{array}$$

$$\begin{array}{c} (\{\mid\},\{2\},\{1\},\{2\}) \\ (\{1\},\{2\},\{1\},\{3\}) \gg Y > (\{2\},\{0\},\{2\},\{3\}) \times \\ (\{0\},\{2\},\{1\},\{3\}) \end{array} \quad \begin{array}{c} (\{2\},\{0\},\{3\},\{2\}) \\ (\{0\},\{2\},\{3\},\{2\}) \gg Y > (\{2\},\{1\},\{3\},\{1\}) \\ (\{2\},\{1\},\{2\},\{1\}) \end{array}$$

$$(\{0\}, \{2\}, \{1\}) \quad (\{2\}, \{1\}, \{2\}) \\ (\{1\}, \{2\}, \{3\}) \gg \succ (\{2\}, \{0\}, \{3\}) \times (\{0\}, \{2\}, \{3\}) \gg \succ (\{2\}, \{1\}, \{3\}) \\ (\{1\}, \{2\}, \{1\}) \quad (\{2\}, \{0\}, \{2\})$$

11. Pre-semiotic dual system

Qualitative action

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg \gamma > (\{1\}, \{1\}_{\{0\}, \{1\}}) \quad \times \quad (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \qquad \qquad \qquad (\{1\}, \{2\}_{\{3\}, \{1\}})$$

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg \gamma > (\{1\}, \{1\}_{\{0\}, \{1\}}) \quad \times \quad (\{1\}, \{1\}_{\{1\}, \{0\}}) \gg \gamma > (\{1\}, \{0\}_{\{3\}, \{0\}})$$

$$(\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{1\}, \{1\}_{\{0\}, \{1\}}) \quad \times \quad \begin{matrix} (\{1\}, \{0\}_{\{3\}, \{0\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}}) \\ (\{1\}, \{2\}_{\{3\}, \{1\}, \{0\}}) \end{matrix}$$

$$(\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \gg \gamma > (\{1\}.\{1\}_{\{0\},\{1\}}) \quad \times \quad (\{1\}.\{2\}_{\{3\},\{1\}}) \\ (\{2\}.\{1\}_{\{3\},\{1\},\{3\}}) \qquad \qquad \qquad (\{1\}.\{1\}_{\{1\},\{0\}}) \gg \gamma > (\{1\}.\{1\}_{\{3\},\{1\},\{0\}}) \\ (\{1\}.\{0\}_{\{3\},\{1\},\{0\}})$$

$$(\{2\}, \{1\}_{\{1\}, \{3\}}) \gg \gamma > (\{1\}, \{1\}_{\{1\}, \{1\}}) \quad \times \quad (\{1\}, \{1\}_{\{1\}, \{1\}}) \gg \gamma > (\{1\}, \{2\}_{\{3\}, \{1\}})$$

$$(\{2\}, \{1\}_{\{1\}, \{3\}}) \gg \vee > (\{1\}, \{1\}_{\{0\}, \{1\}}) \quad \times \quad (\{1\}, \{0\}_{\{3\}, \{0\}}) \\ (\{0\}, \{1\}_{\{1\}, \{2\}, \{3\}}) \quad > (\{1\}, \{2\}_{\{3\}, \{1\}})$$

Medial action

$$(\{\{1\}\}, \{1\}) \gg Y > (\{\{1\}\}, \{1\}) \quad \times \quad (\{\{1\}\}, \{1\})$$

$$(\{1\}, \{1\}, \{1\}, \{1\}) \gg Y > (\{0\}, \{1\}, \{1\}, \{3\}) \quad \times \quad (\{1\}, \{2\}, \{3\}, \{1\})$$

$$\left(\{1\}, \{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}\right) \gg \gamma > \left(\{0\}, \{1\}, \{1\}_{\{0\}, \{3\}}\right) \times \left(\{1\}, \{2\}, \{1\}_{\{3\}, \{1\}, \{1\}}\right)$$

$$\left(\{1\}\cdot\{1\}\cdot\{1\}\right) \gg \gamma \left(\{0\}\cdot\{1\}\cdot\{0\}\right) \times \left(\{1\}\cdot\{0\}\cdot\{3\}\right) \gg \gamma \left(\{1\}\cdot\{1\}\cdot\{3\}\right)$$

$$\begin{array}{ccc} (\{ \mid \}, \{ 1 \mid \}_{\{ 0 \mid \}, \{ 1 \mid \}}) & & (\{ 1 \mid \}, \{ 1 \mid \}_{\{ 3 \mid \}, \{ 1 \mid \}, \{ 0 \mid \}}) \\ (\{ 2 \mid \}, \{ 1 \mid \}_{\{ 1 \mid \}, \{ 3 \mid \}}) \gg \text{ } Y \text{ } > (\{ 0 \mid \}, \{ 1 \mid \}_{\{ 0 \mid \}, \{ 3 \mid \}}) & \times & (\{ 1 \mid \}, \{ 0 \mid \}_{\{ 3 \mid \}, \{ 0 \mid \}}) \gg \text{ } Y \text{ } > (\{ 1 \mid \}, \{ 2 \mid \}_{\{ 3 \mid \}, \{ 1 \mid \}}) \\ (\{ 1 \mid \}, \{ 1 \mid \}_{\{ 0 \mid \}, \{ 1 \mid \}, \{ 3 \mid \}}) & & (\{ 1 \mid \}, \{ \mid \}_{\{ 1 \mid \}, \{ 0 \mid \}}) \end{array}$$

$$(\{2\}.\{1\}.\{1\}_{\{1\},\{3\}}) \gg \text{Y} > (\{0\}.\{1\}.\{0\}_{\{3\}}) \quad \times \quad \begin{matrix} (\{1\}.\{\text{ }\}.\{1\}_{\{1\},\{0\}}) \\ (\{1\}.\{0\}.\{1\}_{\{3\},\{0\}}) \end{matrix}$$

Objectal action

$$(\{1\}, \{1\}_{\{0\}, \{1\}}) \gg Y > (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \times (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \gg Y > (\{1\}, \{1\}_{\{1\}, \{0\}})$$

$$(\{0\}, \{1\}, \{0\}, \{3\}) \quad (\{1\}, \{2\}, \{3\}, \{1\}) \\ (\{1\}, \{1\}, \{0\}, \{1\}) \gg Y > (\{1\}, \{1\}, \{0\}, \{1\}, \{3\}, \{1\}, \{3\}) \times (\{1\}, \{1\}, \{3\}, \{1\}, \{0\}) \gg Y > (\{1\}, \{1\}, \{1\}, \{0\}) \\ (\{2\}, \{3\}, \{1\}, \{1\}, \{3\}) \quad (\{1\}, \{0\}, \{3\}, \{0\})$$

$$\begin{array}{c} (\{\mid\}, \{1\}_{\{0\}, \{1\}, \{1\}}) \\ (\{0\}, \{1\}_{\{0\}, \{3\}, \{1\}}) \gg \vee > (\{\mid\}, \{1\}_{\{0\}, \{1\}, \{3\}, \{1\}}) \end{array} \times \begin{array}{c} (\{\mid\}, \{2\}_{\{3\}, \{1\}, \{1\}}) \\ (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}, \{1\}}) \gg \vee > (\{\mid\}, \{0\}_{\{3\}, \{0\}, \{1\}}) \\ (\{2\}, \{1\}_{\{1\}, \{3\}, \{1\}}) \\ (\{1\}, \{1\}_{\{1\}, \{0\}, \{1\}}) \end{array}$$

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg \gamma > (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \times (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \gg \gamma > (\{1\}, \{0\}_{\{3\}, \{0\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}}) \qquad \qquad \qquad (\{1\}, \{2\}_{\{3\}, \{1\}})$$

$$(\{2\}, \{1\}_{(1), (3)}) \gg \gamma > (\{1\}, \{1\}_{(0), (1), (3)}) \times (\{1\}, \{1\}_{(3), (1), (0)}) \gg \gamma > (\{1\}, \{2\}_{(3), (1)})$$

$$(\{0\}, \{1\}_{(0), (1), (3)}) \qquad \qquad \qquad (\{1\}, \{1\}_{(1), (0)})$$

$$(\{0\}, \{1\}, \{0, 1, 3\}) \quad (\{1\}, \{0\}, \{1, 0, 1\}) \\ (\{2\}, \{1\}, \{1, 3, 0\}) \gg Y > (\{1\}, \{1\}, \{0, 1, 3\}) \times (\{1\}, \{1\}, \{3, 1, 0, 1\}) \gg Y > (\{1\}, \{2\}, \{3, 1, 0, 1\}) \\ (\{1\}, \{1\}, \{0, 1, 1\}) \quad (\{1\}, \{0\}, \{3, 1, 0, 1\})$$

Interpretative action

$$(\{1\}, \{1\}, \{0\}, \{1, 3\}) \gg \gamma > (\{2\}, \{1\}, \{1\}, \{3\}) \quad \times \quad (\{1\}, \{0\}, \{3\}, \{0\}) \\ (\{0\}, \{1\}, \{1\}, \{0\}, \{3\})$$

$$(\{\{0\}\}, \{\{1\}\}_{\{0\}}, \{\{3\}\}) \gg Y > (\{\{2\}\}, \{\{1\}\}_{\{1\}}, \{\{3\}\}) \quad \times \quad (\{\{1\}\}, \{\{2\}\}_{\{3\}}, \{\{1\}\}_{\{0\}}) \\ (\{\{1\}\}, \{\{1\}\}_{\{0\}}, \{\{1\}\}_{\{3\}}) \qquad \qquad \qquad (\{\{1\}\}, \{\{2\}\}_{\{3\}}, \{\{1\}\}_{\{1\}}) \gg Y > (\{\{1\}\}, \{\{1\}\}_{\{1\}}, \{\{0\}\}) \\ (\{\{1\}\}, \{\{0\}\}_{\{3\}}, \{\{1\}\}_{\{0\}})$$

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg Y > (\{2\}, \{1\}_{\{1\}, \{3\}}) \quad \times \quad (\{1\}, \{2\}_{\{3\}, \{1\}}) \gg Y > (\{1\}, \{0\}_{\{3\}, \{0\}})$$

$$(\{0\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{2\}, \{1\}_{\{1\}, \{3\}}) \quad \times \quad (\{1\}, \{2\}_{\{3\}, \{1\}}) \gg Y > (\{1\}, \{0\}_{\{3\}, \{0\}})$$

$$(\{1\}, \{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{2\}, \{1\}, \{1\}_{\{1\}, \{3\}}) \times (\{1\}, \{0\}, \{1\}_{\{3\}, \{0\}}) \\ (\{0\}, \{1\}, \{1\}_{\{0\}, \{1\}, \{2\}}) \qquad \qquad \qquad (\{1\}, \{2\}, \{1\}_{\{3\}, \{1\}}) \gg Y > (\{1\}, \{1\}, \{1\}_{\{3\}, \{1\}, \{0\}})$$

$$(\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{2\}, \{1\}_{\{1\}, \{3\}}) \times (\{1\}, \{2\}_{\{3\}, \{1\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}})$$

12. Pre-semiotic dual system

$\{ \{ 2 \} , \{ 3 \} , \{ 1 \} , \{ 3 \} \}_{(1)} , \{ 3 \} \{ 1 \} , \{ 1 \} , \{ 0 \} , \{ 1 \} , \{ 3 \} , \{ 1 \} , \{ 0 \} , \{ 1 \} , \{ 1 \} , \{ 0 \} , \{ 1 \} , \{ 3 \} \{ 1 \} , \{ 2 \} , \{ 1 \} , \{ 1 \} , \{ 2 \} \} \times$
 $\{ \{ 2 \} , \{ 3 \} , \{ 2 \} , \{ 1 \} , \{ 1 \} , \{ 1 \} , \{ 0 \} , \{ 1 \} , \{ 3 \} , \{ 1 \} , \{ 0 \} , \{ 1 \} , \{ 1 \} , \{ 3 \} , \{ 1 \} , \{ 1 \} , \{ 0 \} , \{ 1 \} , \{ 3 \} , \{ 1 \} , \{ 1 \} , \{ 2 \} , \{ 1 \} , \{ 3 \} , \{ 1 \} , \{ 1 \} \}$

Qualitative action

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg \vee > (\{1\}, \{2\}_{\{1\}, \{2\}}) \quad \times \quad (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg \vee > (\{1\}, \{0\}_{\{3\}, \{0\}}) \\ (\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \qquad \qquad \qquad (\{1\}, \{2\}_{\{3\}, \{1\}})$$

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg \gamma > (\{1\}, \{2\}_{\{1\}, \{2\}}) \quad \times \quad (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg \gamma > (\{1\}, \{0\}_{\{3\}, \{0\}})$$

$$(\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg \gamma > (\{1\}, \{2\}_{\{1\}, \{2\}}) \quad \times \quad (\{1\}, \{0\}_{\{3\}, \{0\}})$$

$$(\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \quad \times \quad (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg Y > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}})$$

$$(\{0\}, \{1\}_{\{0\}, \{3\}}) \gg \text{Y} > (\{1\}, \{2\}_{\{1\}, \{2\}}) \quad \times \quad (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{2\}, \{1\}_{\{1\}, \{3\}}) \gg \text{Y} > (\{2\}, \{1\}_{\{2\}, \{1\}}) \quad \times \quad (\{1\}, \{0\}_{\{3\}, \{1\}, \{0\}})$$

$$(\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg \gamma > (\{1\}, \{2\}_{\{1\}, \{2\}}) \quad \times \quad (\{1\}, \{0\}_{\{3\}, \{0\}}) \\ (\{2\}, \{1\}_{\{1\}, \{3\}}) \gg \gamma > (\{1\}, \{2\}_{\{3\}, \{1\}}) \quad \text{if } \{1\} \cup \{1\}_{\{3\}, \{1\}, \{2\}} = \emptyset$$

Medial action

$$(\{1\}, \{1\}) \gg \gamma > (\{0\}, \{1\}) \times (\{1\}, \{0\}) \gg \gamma > (\{2\}, \{1\})$$

$$(\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \\ (\{1\}, \{2\}, \{1\}, \{2\}, \{1\}) \gg Y > (\{0\}, \{1\}, \{1\}, \{0\}, \{3\}) \quad \times \quad (\{1\}, \{2\}, \{3\}, \{1\}, \{1\}) \\ (\{2\}, \{3\}, \{1\}, \{3\}, \{1\}, \{1\})$$

$$(\{1\}, \{2\}, \{3\}) \gg Y > (\{0\}, \{1\}, \{0\}, \{3\}) \times (\{1\}, \{0\}, \{3\}, \{0\}) \gg Y > (\{1\}, \{1\}, \{1\}, \{3\}, \{1\}, \{0\})$$

$$\frac{(\{2\}, \{1\}, \{1\}, \{3\}))}{(\{1\}, \{1\}, \{0\}, \{1\}, \{3\}, \{1\})} \gg \gamma > (\{0\}, \{1\}, \{1\}, \{0\}, \{3\})) \times \frac{(\{2\}, \{1\}, \{1\}, \{2\}))}{(\{1\}, \{0\}, \{3\}, \{0\}, \{1\})} \gg \gamma > (\{1\}, \{1\}, \{1\}, \{3\}, \{1\}, \{0\}, \{1\})}$$

$$\begin{array}{ccc}
\frac{(\{1\}, \{2\})_{(1), (2)}}{(\{2\}, \{1\})_{(1), (3)}} \gg Y > (\{0\}, \{1\})_{(0), (3)} & \times & \frac{(\{1\}, \{1\})_{(3), (1), (0)}}{(\{2\}, \{1\})_{(2), (1)}} \\
& & (\{1\}, \{0\})_{(3), (0), (1)} \\
\downarrow & & \downarrow \\
\frac{(\{1\}, \{1\})_{(0), (1), (3)}}{(\{2\}, \{1\})_{(1), (3)}} \gg Y > (\{0\}, \{1\})_{(0), (3)} & \times & \frac{(\{2\}, \{1\})_{(2), (1)}}{(\{1\}, \{0\})_{(3), (0), (1)}} \\
& & (\{1\}, \{1\})_{(3), (1), (0)}
\end{array}$$

Objectal action

$$\begin{array}{ccc}
\frac{(\{2\}, \{1\})_{(1), (3)}}{(\{1\}, \{2\})_{(1), (2)}} \gg Y > (\{1\}, \{1\})_{(0), (3)} & \times & \frac{(\{1\}, \{0\})_{(3), (0), (1)}}{(\{1\}, \{1\})_{(3), (1), (0)}} \gg Y > (\{2\}, \{1\})_{(2), (1)} \\
& & (\{1\}, \{2\})_{(3), (1)} \\
\downarrow & & \downarrow \\
\frac{(\{0\}, \{1\})_{(0), (3)}}{(\{1\}, \{2\})_{(1), (2)}} \gg Y > (\{1\}, \{1\})_{(0), (3)} & \times & \frac{(\{1\}, \{2\})_{(3), (1)}}{(\{1\}, \{1\})_{(3), (1), (0)}} \gg Y > (\{2\}, \{1\})_{(2), (1)} \\
& & (\{1\}, \{0\})_{(3), (0), (1)} \\
\downarrow & & \downarrow \\
\frac{(\{1\}, \{2\})_{(1), (2)}}{(\{0\}, \{1\})_{(0), (3)}} \gg Y > (\{1\}, \{1\})_{(0), (3)} & \times & \frac{(\{1\}, \{2\})_{(3), (1)}}{(\{1\}, \{1\})_{(3), (1), (0)}} \gg Y > (\{1\}, \{0\})_{(3), (0), (1)} \\
& & (\{2\}, \{1\})_{(2), (1)} \\
\downarrow & & \downarrow \\
\frac{(\{2\}, \{1\})_{(1), (3)}}{(\{0\}, \{1\})_{(0), (3)}} \gg Y > (\{1\}, \{1\})_{(0), (3)} & \times & \frac{(\{2\}, \{1\})_{(2), (1)}}{(\{1\}, \{1\})_{(3), (1), (0)}} \gg Y > (\{1\}, \{0\})_{(3), (0), (1)} \\
& & (\{1\}, \{2\})_{(3), (1)} \\
\downarrow & & \downarrow \\
\frac{(\{2\}, \{1\})_{(1), (3)}}{(\{2\}, \{1\})_{(1), (3)}} \gg Y > (\{0\}, \{1\})_{(0), (3)} & \times & \frac{(\{1\}, \{0\})_{(3), (0), (1)}}{(\{1\}, \{1\})_{(3), (1), (0)}} \gg Y > (\{1\}, \{2\})_{(3), (1)} \\
& & (\{2\}, \{1\})_{(2), (1)} \\
\downarrow & & \downarrow \\
\frac{(\{0\}, \{1\})_{(0), (3)}}{(\{2\}, \{1\})_{(1), (3)}} \gg Y > (\{1\}, \{1\})_{(0), (3)} & \times & \frac{(\{2\}, \{1\})_{(2), (1)}}{(\{1\}, \{0\})_{(3), (0), (1)}} \gg Y > (\{1\}, \{2\})_{(3), (1)} \\
& & (\{1\}, \{0\})_{(3), (0), (1)}
\end{array}$$

Interpretative action

$$\begin{array}{ccc}
\frac{(\{1\}, \{1\})_{(0), (1), (3)}}{(\{1\}, \{2\})_{(1), (2)}} \gg Y > (\{2\}, \{1\})_{(1), (3)} & \times & \frac{(\{1\}, \{0\})_{(3), (0), (1)}}{(\{1\}, \{2\})_{(3), (1)}} \gg Y > (\{2\}, \{1\})_{(2), (1)} \\
& & (\{1\}, \{1\})_{(3), (1), (0)} \\
\frac{(\{0\}, \{1\})_{(0), (3)}}{(\{1\}, \{2\})_{(1), (2)}} \gg Y > (\{2\}, \{1\})_{(1), (3)} & \times & \frac{(\{1\}, \{1\})_{(3), (1), (0)}}{(\{1\}, \{2\})_{(3), (1)}} \gg Y > (\{2\}, \{1\})_{(2), (1)} \\
& & (\{1\}, \{0\})_{(3), (0), (1)} \\
\frac{(\{1\}, \{2\})_{(1), (2)}}{(\{0\}, \{1\})_{(0), (3)}} \gg Y > (\{2\}, \{1\})_{(1), (3)} & \times & \frac{(\{1\}, \{1\})_{(3), (1), (0)}}{(\{1\}, \{2\})_{(3), (1)}} \gg Y > (\{1\}, \{0\})_{(3), (0), (1)} \\
& & (\{2\}, \{1\})_{(2), (1)} \\
\frac{(\{1\}, \{1\})_{(0), (1), (3)}}{(\{0\}, \{1\})_{(0), (3)}} \gg Y > (\{2\}, \{1\})_{(1), (3)} & \times & \frac{(\{2\}, \{1\})_{(2), (1)}}{(\{1\}, \{1\})_{(3), (1), (0)}} \gg Y > (\{1\}, \{0\})_{(3), (0), (1)} \\
& & (\{2\}, \{1\})_{(2), (1)} \\
\frac{(\{1\}, \{2\})_{(1), (2)}}{(\{1\}, \{2\})_{(1), (2)}} \gg Y > (\{1\}, \{1\})_{(0), (3)} & \times & \frac{(\{2\}, \{1\})_{(2), (1)}}{(\{1\}, \{1\})_{(3), (1), (0)}} \gg Y > (\{1\}, \{0\})_{(3), (0), (1)} \\
& & (\{1\}, \{1\})_{(3), (1), (0)}
\end{array}$$

$$(\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg \vee \succ (\{2\}, \{1\}_{\{1\}, \{3\}}) \quad \times \quad (\{1\}, \{2\}_{\{3\}, \{1\}}) \gg \vee \succ (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}}) \\ (\{0\}, \{1\}_{\{0\}, \{3\}}) \qquad \qquad \qquad (\{2\}, \{1\}_{\{2\}, \{1\}})$$

$$(\{1\}.\{1\}.\{1\}_{\{0\},\{1\},\{3\}}) \gg \text{Y} > (\{2\}.\{1\}.\{1\},\{3\}) \quad \times \quad (\{2\}.\{\cdot\}.\{1\}_{\{2\},\{1\}}) \\ (\{\cdot\}.\{2\}.\{1\},\{2\})) \qquad \qquad \qquad (\{1\}.\{2\}.\{3\}_{\{3\},\{1\}}) \gg \text{Y} > (\{1\}.\{1\}.\{3\},\{1\},\{0\}) \\ (\{1\}.\{0\}.\{3\},\{0\}))$$

13. Pre-semiotic system

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{{2 | }},{1 | }),(3 | ) {1 | },{1 | }{0 | },{1 | },(3 | ) {0 | },{2 | }),(2 | ),(3 | ) {1 | },{2 | }),(1 | ),(2 | )} ×
{{2 | }},{1 | }),(2 | ),(1 | ) {2 | },{0 | }),(3 | ),(2 | ) {1 | },{1 | }),(3 | ),(1 | ),{0 | } {1 | },{2 | }),(3 | ),(1 | )

```

Qualitative action

$$(\{0\}, \{2\}_{(2)}, \{3\}) \gg \gamma > (\{1\}, \{2\}_{(1)}, \{2\}) \quad \times \quad (\{2\}, \{1\}_{(2)}, \{1\}) \gg \gamma > (\{2\}, \{0\}_{(3)}, \{2\}) \\ (\{1\}, \{1\}_{(0)}, \{1\}, \{3\}) \quad \quad \quad (\{1\}, \{2\}_{(3)}, \{1\})$$

$$(\{0\}, \{2\}_{\{2\}, \{3\}}) \gg \gamma > (\{1\}, \{2\}_{\{1\}, \{2\}}) \quad \times \quad (\{2\}, \{\mid\}_{\{2\}, \{1\}}) \gg \gamma > (\{2\}, \{0\}_{\{3\}, \{2\}}) \\ (\{2\}, \{1\}_{\{1\}, \{3\}}) \quad \quad \quad (\{1\}, \{2\}_{\{3\}, \{1\}}) \quad \quad \quad (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}})$$

$$(\{1\} \cdot \{1\}_{\{0\}, \{1\}, \{3\}}) \gg \vee > (\{1\} \cdot \{2\}_{\{1\}, \{2\}}) \quad \times \quad (\{2\} \cdot \{0\}_{\{3\}, \{2\}}) \\ (\{0\} \cdot \{2\}_{\{2\}, \{3\}}) \qquad \qquad \qquad (\{2\} \cdot \{1\}_{\{3\}, \{1\}})$$

$$(\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg \gamma > (\{1\}, \{2\}_{\{1\}, \{2\}}) \times (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg \gamma > (\{1\}, \{1\}_{\{3\}, \{1\}, \{0\}})$$

$$(\{0\}, \{2\}, \{2\}, \{3\}) \quad \times \quad (\{1\}, \{1\}, \{3\}, \{1\}, \{0\}) \\ (\{2\}, \{1\}, \{1\}, \{3\}) \gg \succ > (\{1\}, \{2\}, \{1\}, \{2\}) \quad \times \quad (\{2\}, \{1\}, \{1\}, \{1\}) \gg \succ > (\{1\}, \{2\}, \{3\}, \{1\}) \\ (\{1\}, \{1\}, \{1\}, \{1\}, \{3\}) \quad (\{2\}, \{0\}, \{1\}, \{3\}, \{2\})$$

$$(\{2\}, \{1\}_{\{1\}, \{3\}}) \gg Y > (\{1\}, \{2\}_{\{1\}, \{2\}}) \quad \times \quad (\{2\}, \{1\}_{\{2\}, \{1\}}) \gg Y > (\{1\}, \{2\}_{\{3\}, \{1\}})$$

Medial action

$$(\{1\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{2\}, \{3\}) \times (\{1\}, \{2\}, \{3\})$$

$$(\{1\}, \{1\}_{\{0\}}, \{1\}_{\{3\}}) \quad \times \quad (\{1\}, \{2\}_{\{3\}}, \{1\}) \\ (\{1\}, \{2\}_{\{1\}}, \{2\}_{\{0\}}) \gg Y > (\{0\}, \{2\}_{\{2\}}, \{3\}) \quad \times \quad (\{2\}, \{0\}, \{3\}_{\{2\}}) \gg Y > (\{2\}, \{1\}, \{2\}_{\{1\}}) \\ (\{2\}, \{1\}_{\{1\}}, \{3\}_{\{0\}})$$

$$(\{1\}.\{1\}.\{0\}.\{1\}.\{3\}.\{1\}) \gg Y > (\{0\}.\{2\}.\{2\}.\{3\}.) \times (\{2\}.\{0\}.\{3\}.\{2\}.\{1\}) \gg Y > (\{1\}.\{1\}.\{1\}.\{3\}.\{1\}.\{0\}.)$$

$$(\{1\}, \{1\}_{\{0\}, \{1\}, \{3\}}) \gg Y > (\{0\}, \{2\}_{\{2\}, \{3\}}) \times (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}, \{1\}})$$

$$\begin{array}{ccc} (\{ \mid \}, \{ 2 \mid \}_{\{1\}, \{2\}}) & & (\{ 1 \mid \}, \{ 1 \mid \}_{\{3\}, \{1\}, \{0\}}) \\ (\{2 \mid \}, \{ 1 \mid \}_{\{1\}, \{3\}}) \gg \succ (\{0 \mid \}, \{ 2 \mid \}_{\{2\}, \{3\}}) & \times & (\{2 \mid \}, \{ 0 \mid \}_{\{3\}, \{2\}}) \gg \succ (\{1 \mid \}, \{ 2 \mid \}_{\{3\}, \{1\}}) \\ (\{1 \mid \}, \{ 1 \mid \}_{\{0\}, \{1\}, \{3\}}) & & (\{2 \mid \}, \{ 1 \mid \}_{\{2\}, \{1\}}) \end{array}$$

$$(\{2\}, \{1\}, \{1\}_{\{1\}}, \{1\}_{\{3\}}) \gg \vee > (\{0\}, \{2\}, \{2\}, \{3\}) \quad \times \quad (\{2\}, \{0\}, \{3\}_{\{2\}}, \{1\}) \gg \vee > (\{1\}, \{2\}, \{3\}, \{1\})$$

$$(\{1\}, \{2\}, \{1\}_{\{1\}}, \{2\})$$

Objectal action

$$(\{1\}, \{2\}, \{1\}, \{0\}, \{1\}, \{3\}) \gg \gamma > (\{1\}, \{2\}, \{1\}, \{0\}, \{1\}, \{3\}) \times (\{1\}, \{2\}, \{1\}, \{3\}, \{1\}, \{0\}) \gg \gamma > (\{1\}, \{2\}, \{1\}, \{3\}, \{2\}, \{1\})$$

$$(\{ \{ 0 \} \}, \{ 2 \}, \{ 2 \}, \{ 3 \}, \{ 1 \}) \gg \gamma > (\{ 1 \}, \{ 1 \}, \{ 0 \}, \{ 1 \}, \{ 3 \}, \{ 1 \}) \times (\{ 1 \}, \{ 1 \}, \{ 1 \}, \{ 3 \}, \{ 1 \}, \{ 0 \}, \{ 1 \}) \gg \gamma > (\{ 2 \}, \{ 1 \}, \{ 1 \}, \{ 2 \}, \{ 1 \}),$$

$$(\{ 2 \}, \{ 1 \}, \{ 1 \}, \{ 3 \}, \{ 1 \}) \qquad \qquad \qquad (\{ 2 \}, \{ 0 \}, \{ 1 \}, \{ 3 \}, \{ 2 \}, \{ 1 \})$$

$$(\{0\}, \{2\}_{(2)}, \{1\}_{(3), (2)}) \gg \vee > (\{1\}, \{1\}_{(0)}, \{1\}_{(3)}) \times (\{1\}, \{1\}_{(3), (1), (0)}) \gg \vee > (\{2\}, \{0\}_{(3)}, \{2\})$$

$$(\{2\}, \{1\}, \{3\}) \quad (\{2\}, \{1\}, \{2\}) \\ (\{0\}, \{2\}, \{3\}) \gg \gamma > (\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \quad \times \quad (\{1\}, \{1\}, \{3\}, \{1\}, \{0\}) \gg \gamma > (\{2\}, \{0\}, \{3\}, \{2\}) \\ (\{1\}, \{2\}, \{1\}) \quad (\{1\}, \{2\}, \{3\})$$

$$\begin{array}{c} (\{\mid\},\{2\},\{1\},\{3\}) \\ (\{2\},\{1\},\{1\},\{3\}) \gg \gamma > (\{\mid\},\{1\},\{0\},\{1\},\{3\}) \times (\{\mid\},\{1\},\{3\},\{1\},\{0\}) \\ (\{0\},\{2\},\{3\}) \end{array} \quad \begin{array}{c} (\{2\},\{0\},\{1\},\{3\},\{2\}) \\ (\{2\},\{1\},\{1\},\{2\},\{1\}) \end{array}$$

$$\begin{aligned} & (\{0\}, \{2\})_{(2), (3)}) \\ (\{2\}, \{1\})_{(1), (3)}) & \gg \gamma > (\{1\}, \{1\})_{(0), (1), (3)}) \quad \times \quad (\{1\}, \{1\})_{(3), (1), (0)}) \\ (\{1\}, \{2\})_{(1), (2), (1)}) & \end{aligned}$$

Interpretative action

$$(\{1\}, \{1\}, \{0\}, \{1\}, \{3\}) \gg \gamma > (\{2\}, \{1\}, \{3\}) \times (\{1\}, \{2\}, \{0\}, \{3\}, \{2\})$$

$$(\{1\}, \{2\}, \{3\}) \gg (\{1\}, \{2\}, \{3\}) \times (\{1\}, \{2\}, \{3\})$$

$$(\{0\}, \{2\}_{(2), (3)}) \gg Y > (\{2\}, \{1\}_{(1), (3)}) \quad \times \quad (\{1\}, \{1\}_{(3), (1)}) \gg Y > (\{2\}, \{0\}_{(3), (2)})$$

$$(\{0\}, \{2\}_{\{2\}, \{3\}}) \gg Y > (\{2\}, \{1\}_{\{1\}, \{3\}}) \quad \times \quad (\{1\}, \{2\}_{\{3\}, \{1\}}) \gg Y > (\{2\}, \{0\}_{\{3\}, \{2\}})$$

$$(\{1\}, \{2\}, \{3\}) \gg \gamma > (\{2\}, \{1\}, \{3\}) \times (\{2\}, \{0\}, \{3\}) \gg \gamma > (\{1\}, \{1\}, \{0\}, \{3\})$$

$$\begin{array}{c} (\{0\}, \{2\})_{(2), (3)} \\ (\{1\}, \{1\})_{(0), (1), (3)} \gg Y > (\{2\}, \{1\})_{(1), (3)} \times \\ (\{1\}, \{2\})_{(1), (2)} \end{array} \quad \begin{array}{c} (\{2\}, \{1\})_{(2), (1)} \\ (\{1\}, \{2\})_{(3), (1)} \gg Y > (\{1\}, \{1\})_{(3), (1), (0)} \\ (\{2\}, \{0\})_{(3), (2)} \end{array}$$

14. Pre-semiotic dual system

$$\begin{array}{c} (\{2\}, \{1\})_{(1), (3)} \{1\}, \{2\})_{(1), (3)} \{0\}, \{2\})_{(2), (3)} \{1\}, \{2\})_{(1), (2)} \times \\ (\{2\}, \{1\})_{(2), (1)} \{2\}, \{0\})_{(3), (2)} \{2\}, \{1\})_{(3), (1)} \{1\}, \{2\})_{(3), (1)} \end{array}$$

Qualitative action

$$\begin{array}{c} (\{2\}, \{1\})_{(1), (3)} \\ (\{0\}, \{2\})_{(2), (3)} \gg Y > (\{1\}, \{2\})_{(1), (2)} \times \\ (\{1\}, \{2\})_{(1), (3)} \end{array} \quad \begin{array}{c} (\{2\}, \{1\})_{(3), (1)} \\ (\{2\}, \{1\})_{(2), (1)} \gg Y > (\{2\}, \{0\})_{(3), (2)} \\ (\{1\}, \{2\})_{(3), (1)} \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\})_{(1), (3)} \\ (\{0\}, \{2\})_{(2), (3)} \gg Y > (\{1\}, \{2\})_{(1), (2)} \times \\ (\{2\}, \{1\})_{(1), (3)} \end{array} \quad \begin{array}{c} (\{1\}, \{2\})_{(3), (1)} \\ (\{2\}, \{1\})_{(2), (1)} \gg Y > (\{2\}, \{0\})_{(3), (2)} \\ (\{2\}, \{1\})_{(3), (1)} \end{array}$$

$$\begin{array}{c} (\{2\}, \{1\})_{(1), (3)} \\ (\{1\}, \{2\})_{(1), (3)} \gg Y > (\{1\}, \{2\})_{(1), (2)} \times \\ (\{0\}, \{2\})_{(2), (3)} \end{array} \quad \begin{array}{c} (\{2\}, \{0\})_{(3), (2)} \\ (\{2\}, \{1\})_{(2), (1)} \gg Y > (\{2\}, \{1\})_{(3), (1)} \\ (\{1\}, \{2\})_{(3), (1)} \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\})_{(2), (3)} \\ (\{1\}, \{2\})_{(1), (3)} \gg Y > (\{1\}, \{2\})_{(1), (2)} \times \\ (\{2\}, \{1\})_{(1), (3)} \end{array} \quad \begin{array}{c} (\{1\}, \{2\})_{(3), (1)} \\ (\{2\}, \{1\})_{(2), (1)} \gg Y > (\{1\}, \{2\})_{(1), (3)} \\ (\{2\}, \{0\})_{(3), (2)} \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\})_{(2), (3)} \\ (\{2\}, \{1\})_{(1), (3)} \gg Y > (\{1\}, \{2\})_{(1), (2)} \times \\ (\{1\}, \{2\})_{(1), (3)} \end{array} \quad \begin{array}{c} (\{2\}, \{1\})_{(3), (1)} \\ (\{2\}, \{1\})_{(2), (1)} \gg Y > (\{1\}, \{2\})_{(3), (1)} \\ (\{2\}, \{0\})_{(3), (2)} \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\})_{(1), (3)} \\ (\{2\}, \{1\})_{(1), (3)} \gg Y > (\{1\}, \{2\})_{(1), (2)} \times \\ (\{0\}, \{2\})_{(2), (3)} \end{array} \quad \begin{array}{c} (\{2\}, \{0\})_{(3), (2)} \\ (\{2\}, \{1\})_{(2), (1)} \gg Y > (\{1\}, \{2\})_{(3), (1)} \\ (\{2\}, \{1\})_{(3), (1)} \end{array}$$

Medial action

$$\begin{array}{c} (\{2\}, \{1\})_{(1), (3)} \\ (\{1\}, \{2\})_{(1), (2)} \gg Y > (\{0\}, \{2\})_{(2), (3)} \times \\ (\{1\}, \{2\})_{(1), (3)} \end{array} \quad \begin{array}{c} (\{2\}, \{1\})_{(3), (1)} \\ (\{2\}, \{0\})_{(3), (2)} \gg Y > (\{2\}, \{1\})_{(2), (1)} \\ (\{1\}, \{2\})_{(3), (1)} \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\})_{(1), (3)} \\ (\{1\}, \{2\})_{(1), (2)} \gg Y > (\{0\}, \{2\})_{(2), (3)} \times \\ (\{2\}, \{1\})_{(1), (3)} \end{array} \quad \begin{array}{c} (\{1\}, \{2\})_{(3), (1)} \\ (\{2\}, \{0\})_{(3), (2)} \gg Y > (\{2\}, \{1\})_{(2), (1)} \\ (\{2\}, \{1\})_{(3), (1)} \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\})_{(1), (2)} \\ (\{1\}, \{2\})_{(1), (3)} \gg Y > \{0\}, \{2\}_{(2), (3)} \times \\ (\{2\}, \{1\})_{(1), (3)} \end{array} \quad \begin{array}{c} (\{1\}, \{2\})_{(3), (1)} \\ (\{2\}, \{0\})_{(3), (2)} \gg Y > (\{2\}, \{1\})_{(3), (1)} \\ (\{2\}, \{1\})_{(2), (1)} \end{array}$$

$$\begin{array}{c} (\{2\}, \{1\})_{(1), (3)} \\ (\{1\}, \{2\})_{(1), (3)} \gg Y > (\{0\}, \{2\})_{(2), (3)} \times \\ (\{1\}, \{2\})_{(1), (2)} \end{array} \quad \begin{array}{c} (\{2\}, \{1\})_{(2), (1)} \\ (\{2\}, \{0\})_{(3), (2)} \gg Y > (\{2\}, \{1\})_{(3), (1)} \\ (\{1\}, \{2\})_{(3), (1)} \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{2\}}) \\ (\{2\}, \{1\}_{\{1\}, \{3\}}) \gg \text{Y} > (\{0\}, \{2\}_{\{2\}, \{3\}}) \times (\{2\}, \{0\}_{\{3\}, \{2\}}) \gg \text{Y} > (\{1\}, \{2\}_{\{3\}, \{1\}}) \\ (\{1\}, \{2\}_{\{1\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{3\}}) \\ (\{2\}, \{1\}_{\{1\}, \{3\}}) \gg \text{Y} > (\{0\}, \{2\}_{\{2\}, \{3\}}) \times (\{2\}, \{1\}_{\{2\}, \{1\}}) \end{array}$$

Objectal action

$$\begin{array}{c} (\{2\}, \{1\}_{\{1\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \gg \text{Y} > (\{1\}, \{2\}_{\{1\}, \{3\}}) \times (\{2\}, \{0\}_{\{3\}, \{2\}}) \gg \text{Y} > (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{0\}, \{2\}_{\{2\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\}_{\{2\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \gg \text{Y} > (\{1\}, \{2\}_{\{1\}, \{3\}}) \times (\{2\}, \{1\}_{\{1\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{2\}}) \\ (\{0\}, \{2\}_{\{2\}, \{3\}}) \gg \text{Y} > (\{1\}, \{2\}_{\{1\}, \{3\}}) \times (\{2\}, \{1\}_{\{1\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{2\}, \{1\}_{\{1\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \gg \text{Y} > (\{1\}, \{2\}_{\{1\}, \{3\}}) \times (\{2\}, \{0\}_{\{3\}, \{2\}}) \gg \text{Y} > (\{2\}, \{0\}_{\{3\}, \{2\}}) \\ (\{1\}, \{2\}_{\{1\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{2\}}) \\ (\{2\}, \{1\}_{\{1\}, \{3\}}) \gg \text{Y} > (\{1\}, \{2\}_{\{1\}, \{3\}}) \times (\{0\}, \{2\}_{\{2\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\}_{\{2\}, \{3\}}) \\ (\{2\}, \{1\}_{\{1\}, \{3\}}) \gg \text{Y} > (\{1\}, \{2\}_{\{1\}, \{3\}}) \times (\{1\}, \{2\}_{\{1\}, \{2\}}) \end{array}$$

Interpretative action

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \gg \text{Y} > (\{2\}, \{1\}_{\{1\}, \{3\}}) \times (\{2\}, \{0\}_{\{3\}, \{2\}}) \gg \text{Y} > (\{2\}, \{1\}_{\{2\}, \{1\}}) \\ (\{0\}, \{2\}_{\{2\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\}_{\{2\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{2\}}) \gg \text{Y} > (\{2\}, \{1\}_{\{1\}, \{3\}}) \times (\{1\}, \{2\}_{\{1\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{2\}}) \\ (\{0\}, \{2\}_{\{2\}, \{3\}}) \gg \text{Y} > (\{2\}, \{1\}_{\{1\}, \{3\}}) \times (\{1\}, \{2\}_{\{1\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{3\}}) \gg \text{Y} > (\{2\}, \{1\}_{\{1\}, \{3\}}) \times (\{0\}, \{2\}_{\{2\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{\{1\}, \{3\}}) \\ (\{1\}, \{2\}_{\{1\}, \{3\}}) \gg \text{Y} > (\{2\}, \{1\}_{\{1\}, \{3\}}) \times (\{0\}, \{2\}_{\{2\}, \{3\}}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\}_{(2), (3)}) \\ (\{1\}, \{2\}_{(1), (3)}) \gg Y > (\{2\}, \{1\}_{(1), (3)}) \\ (\{1\}, \{2\}_{(1), (2)}) \end{array} \times \begin{array}{c} (\{2\}, \{1\}_{(2), (1)}) \\ (\{1\}, \{2\}_{(3), (1)}) \gg Y > (\{2\}, \{1\}_{(3), (1)}) \\ (\{2\}, \{0\}_{(3), (2)}) \end{array}$$

15. Pre-semiotic dual system

$$\begin{array}{c} (\{2\}, \{2\}_{(1), (2), (3)}) \{1\}, \{2\}_{(1), (3)} \{0\}, \{2\}_{(2), (3)} \{1\}, \{2\}_{(1), (2)} \\ (\{2\}, \{1\}_{(2), (1)}) \{2\}, \{0\}_{(3), (2)} \{2\}, \{1\}_{(3), (1)} \{2\}, \{2\}_{(3), (2), (1)} \end{array}$$

Qualitative action

$$\begin{array}{c} (\{2\}, \{2\}_{(1), (2), (3)}) \\ (\{0\}, \{2\}_{(2), (3)}) \gg Y > (\{1\}, \{2\}_{(1), (2)}) \\ (\{1\}, \{2\}_{(1), (3)}) \end{array} \times \begin{array}{c} (\{2\}, \{1\}_{(3), (1)}) \\ (\{2\}, \{1\}_{(2), (1)}) \gg Y > (\{2\}, \{0\}_{(3), (2)}) \\ (\{2\}, \{1\}_{(3), (1)}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{(1), (3)}) \\ (\{0\}, \{2\}_{(2), (3)}) \gg Y > (\{1\}, \{2\}_{(1), (2)}) \\ (\{2\}, \{2\}_{(1), (2), (3)}) \end{array} \times \begin{array}{c} (\{2\}, \{2\}_{(3), (2), (1)}) \\ (\{2\}, \{1\}_{(2), (1)}) \gg Y > (\{2\}, \{0\}_{(3), (2)}) \\ (\{2\}, \{1\}_{(3), (1)}) \end{array}$$

$$\begin{array}{c} (\{2\}, \{2\}_{(1), (2), (3)}) \\ (\{1\}, \{2\}_{(1), (3)}) \gg Y > (\{1\}, \{2\}_{(1), (2)}) \\ (\{0\}, \{2\}_{(2), (3)}) \end{array} \times \begin{array}{c} (\{2\}, \{0\}_{(3), (2)}) \\ (\{2\}, \{1\}_{(2), (1)}) \gg Y > (\{2\}, \{1\}_{(3), (1)}) \\ (\{2\}, \{2\}_{(3), (2), (1)}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\}_{(2), (3)}) \\ (\{1\}, \{2\}_{(1), (3)}) \gg Y > (\{1\}, \{2\}_{(1), (2)}) \\ (\{2\}, \{2\}_{(1), (2), (3)}) \end{array} \times \begin{array}{c} (\{2\}, \{2\}_{(3), (2), (1)}) \\ (\{2\}, \{1\}_{(2), (1)}) \gg Y > (\{2\}, \{1\}_{(3), (1)}) \\ (\{2\}, \{0\}_{(3), (2)}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\}_{(2), (3)}) \\ (\{2\}, \{2\}_{(1), (3)}) \gg Y > (\{1\}, \{2\}_{(1), (2)}) \\ (\{1\}, \{2\}_{(1), (3)}) \end{array} \times \begin{array}{c} (\{2\}, \{1\}_{(3), (1)}) \\ (\{2\}, \{1\}_{(2), (1)}) \gg Y > (\{2\}, \{2\}_{(3), (2), (1)}) \\ (\{2\}, \{0\}_{(3), (2)}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{(1), (3)}) \\ (\{2\}, \{2\}_{(1), (3)}) \gg Y > (\{0\}, \{2\}_{(2), (3)}) \\ (\{0\}, \{2\}_{(2), (3)}) \end{array} \times \begin{array}{c} (\{2\}, \{0\}_{(3), (2)}) \\ (\{2\}, \{1\}_{(2), (1)}) \gg Y > (\{2\}, \{2\}_{(3), (2), (1)}) \\ (\{2\}, \{1\}_{(3), (1)}) \end{array}$$

Medial action

$$\begin{array}{c} (\{2\}, \{2\}_{(1), (2), (3)}) \\ (\{1\}, \{2\}_{(1), (2)}) \gg Y > (\{0\}, \{2\}_{(2), (3)}) \\ (\{1\}, \{2\}_{(1), (3)}) \end{array} \times \begin{array}{c} (\{2\}, \{1\}_{(3), (1)}) \\ (\{2\}, \{0\}_{(3), (2)}) \gg Y > (\{2\}, \{1\}_{(2), (1)}) \\ (\{2\}, \{2\}_{(3), (2), (1)}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{(1), (3)}) \\ (\{1\}, \{2\}_{(1), (2)}) \gg Y > (\{0\}, \{2\}_{(2), (3)}) \\ (\{2\}, \{1\}_{(1), (3)}) \end{array} \times \begin{array}{c} (\{1\}, \{2\}_{(3), (1)}) \\ (\{2\}, \{0\}_{(3), (2)}) \gg Y > (\{2\}, \{1\}_{(2), (1)}) \\ (\{2\}, \{1\}_{(3), (1)}) \end{array}$$

$$\begin{array}{c} (\{1\}, \{2\}_{(1), (2)}) \\ (\{1\}, \{2\}_{(1), (3)}) \gg Y > (\{0\}, \{2\}_{(2), (3)}) \\ (\{2\}, \{1\}_{(1), (3)}) \end{array} \times \begin{array}{c} (\{1\}, \{2\}_{(3), (1)}) \\ (\{2\}, \{0\}_{(3), (2)}) \gg Y > (\{2\}, \{1\}_{(3), (1)}) \\ (\{2\}, \{1\}_{(2), (1)}) \end{array}$$

$$\begin{array}{c} (\{2\}, \{2\}_{(1), (2), (3)}) \\ (\{1\}, \{2\}_{(1), (3)}) \gg Y > (\{0\}, \{2\}_{(2), (3)}) \\ (\{1\}, \{2\}_{(1), (2)}) \end{array} \times \begin{array}{c} (\{2\}, \{1\}_{(2), (1)}) \\ (\{2\}, \{0\}_{(3), (2)}) \gg Y > (\{2\}, \{1\}_{(3), (1)}) \\ (\{2\}, \{2\}_{(3), (2), (1)}) \end{array}$$

$$\frac{(\{ \} \cdot \{ 2 \} \cdot \{ 1 \} \cdot \{ 2 \})}{(\{ 2 \} \cdot \{ 2 \} \cdot \{ 1 \} \cdot \{ 3 \} \cdot \{ 1 \})} \gg Y > (\{ 0 \} \cdot \{ 2 \} \cdot \{ 2 \} \cdot \{ 3 \}) \quad \times \quad \frac{(\{ 2 \} \cdot \{ 1 \} \cdot \{ 3 \} \cdot \{ 1 \})}{(\{ 2 \} \cdot \{ 0 \} \cdot \{ 3 \} \cdot \{ 2 \} \cdot \{ 1 \})} \\ \frac{(\{ 1 \} \cdot \{ 2 \} \cdot \{ 1 \} \cdot \{ 3 \})}{(\{ 2 \} \cdot \{ 2 \} \cdot \{ 1 \} \cdot \{ 3 \})}$$

$$(\{2\}, \{2\}_{(1), (2), (3)}) \gg Y > (\{0\}, \{2\}_{(2), (3)}) \quad \times \quad \begin{matrix} (\{2\}, \{1\}_{(2), (1)}) \\ (\{2\}, \{1\}_{(3), (2), (1)}) \end{matrix}$$

Objectal action

$$(\{1\}, \{2\}, \{1\}, \{2\}, \{3\}) \gg Y > (\{1\}, \{2\}, \{1\}, \{3\}) \quad \times \quad (\{2\}, \{0\}, \{3\}, \{2\})$$

$$(\{ \{ \} \}, \{ 2 \}, \{ 2 \}, \{ 3 \}) \gg \gamma > (\{ 1 \}, \{ 2 \}, \{ 1 \}, \{ 3 \}) \times (\{ 2 \}, \{ 2 \}, \{ 3 \}, \{ 2 \}, \{ 1 \})$$

$$(\{ 2 \}, \{ 2 \}, \{ 1 \}, \{ 3 \}, \{ 2 \}) \gg \gamma > (\{ 2 \}, \{ 1 \}, \{ 2 \}, \{ 1 \})$$

$$(\{ 2 \}, \{ 0 \}, \{ 3 \}, \{ 2 \}, \{ 1 \})$$

$$(\{0\}, \{2 | \}_{(2), (3)}) \gg \vee > (\{1\}, \{2 | \}_{(1), (3)}) \quad \times \quad (\{2 | \}, \{1 | \}_{(3), (1)}) \gg \vee > (\{2 | \}, \{0 | \}_{(3), (2)}) \\ (\{2 | \}, \{2 | \}_{(1), (2), (3)}) \qquad \qquad \qquad (\{2 | \}, \{1 | \}_{(2), (1)})$$

$$(\{0\}, \{2\}, \{2\}, \{1\}, \{3\}, \{2\}, \{1\}, \{3\}) \\ (\{1\}, \{2\}, \{3\}, \{1\}, \{0\}, \{2\}, \{1\}, \{3\}) \\ (\{1\}, \{2\}, \{3\}, \{1\}, \{0\}, \{2\}, \{1\}, \{3\})$$

$$\frac{(\{1\}, \{2\}_{\{1\}, \{2\}})}{(\{2\}, \{2\}_{\{1\}, \{2\}, \{3\}})} \gg \gamma > (\{1\}, \{2\}_{\{1\}, \{3\}}) \times \frac{(\{2\}, \{0\}_{\{3\}, \{2\}})}{(\{0\}, \{2\}_{\{2\}, \{3\}})}$$

$$(\{2\} \cdot \{2\} \cdot \{1\} \cdot \{2\} \cdot \{3\}) \gg \gamma > (\{1\} \cdot \{2\} \cdot \{1\} \cdot \{3\}) \times \frac{(\{2\} \cdot \{1\} \cdot \{2\} \cdot \{3\})}{(\{2\} \cdot \{0\} \cdot \{3\} \cdot \{2\} \cdot \{1\})}$$

Interpretative action

$$(\{1\};\{2\}_{\{1\};\{3\}}) \gg \gamma > (\{2\};\{2\}_{\{1\};\{2\};\{3\}}) \times (\{2\};\{2\}_{\{3\};\{2\};\{1\}}) \gg \gamma > (\{2\};\{1\}_{\{2\};\{1\}})$$

$$(\{ \{ 0 \} \}, \{ \{ 2 \} \}_{\{ 2 \}}, \{ \{ 3 \} \}) \quad (\{ \{ 2 \} \}, \{ \{ 1 \} \}_{\{ 3 \}}, \{ \{ 1 \} \}) \\ (\{ \{ \} \}, \{ \{ 2 \} \}_{\{ 1 \}}, \{ \{ 2 \} \}) \gg Y > (\{ \{ 2 \} \}, \{ \{ 2 \} \}_{\{ 1 \}}), \{ \{ 3 \} \}_{\{ 2 \}}, \{ \{ 3 \} \}) \times (\{ \{ 2 \} \}, \{ \{ 2 \} \}_{\{ 3 \}}), \{ \{ 2 \} \}_{\{ 1 \}}, \{ \{ 1 \} \}) \gg Y > (\{ \{ 2 \} \}, \{ \{ 1 \} \}_{\{ 2 \}}), \{ \{ 1 \} \}_{\{ 3 \}}) \\ (\{ \{ 1 \} \}, \{ \{ 2 \} \}_{\{ 1 \}}, \{ \{ 3 \} \}) \quad (\{ \{ 2 \} \}, \{ \{ 1 \} \}_{\{ 0 \}}), \{ \{ 3 \} \}_{\{ 1, 2 \}})$$

$$(\{0\}, \{2\}, \{3\}) \gg Y > (\{2\}, \{2\}, \{1\}, \{2\}, \{3\}) \times (\{2\}, \{2\}, \{3\}, \{2\}, \{1\}) \gg Y > (\{2\}, \{0\}, \{3\}, \{2\}, \{1\})$$

$$(\{0\}, \{2\}_{\{2\}, \{3\}}) \gg \gamma > (\{2\}, \{2\}_{\{1\}, \{2\}, \{3\}}) \times (\{2\}, \{2\}_{\{3\}, \{2\}, \{1\}}) \gg \gamma > (\{2\}, \{0\}_{\{3\}, \{2\}})$$

$$\begin{array}{c} (\{1\}, \{2\}, \{1\}, \{2\}) \\ (\{1\}, \{2\}, \{1\}, \{3\}) \gg Y > (\{2\}, \{2\}, \{1\}, \{2\}, \{3\}) \quad \times \quad (\{2\}, \{2\}, \{3\}, \{2\}, \{1\}) \gg Y > (\{2\}, \{1\}, \{3\}, \{1\}) \\ (\{0\}, \{2\}, \{2\}, \{3\}) \end{array}$$

$$\begin{array}{c} (\{0\}, \{2\}, \{3\}) \\ (\{1\}, \{2\}, \{1\}, \{3\}) \gg Y > (\{2\}, \{2\}, \{1\}, \{2\}, \{3\}) \quad \times \quad (\{2\}, \{2\}, \{3\}, \{2\}, \{1\}) \gg Y > (\{2\}, \{1\}, \{3\}, \{1\}) \\ (\{1\}, \{2\}, \{1\}, \{2\}) \end{array}$$

Therefore, we have given all possible words of the vocabulary of a 4-contextural 4-adic negative language in semiotic form. This is the semiotic world according to Günther we had to build by opening the curtain and enter the semiotic meontics, the reign of volition and semiotic action. It represents and presents, at the same time, the night, meontics, logical negativity, the reign of thinking, the Nothing, the empire of the Devil/Hell, but, being based on a handlungstheoretische Semiotik, it is also the complete organon for such amazing products of the spirit like the terminators and related polycontextural machines whose alleged technical “brain” is not any longer depending on that of its constructor.

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