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Abstract

Surprisingly, there is a simple key to distinguish and to open up morphospheres in contrast to the semiosphere: symmetric versus asymmetric palindromes. Asymmetric palindromes of the morphosphere are paradox and oxymoric in the understanding of the semiosphere. Only in the context of human madness and its poetic explosions oxymoric palindromes could eventually occur. Morphosphere(s) are opened up by oxymoric palindromes. Morphosphere(s) are the field where asymmetric palindromes get a scientific, mathematical and programmable recognition. — See also: *Palindromic: Calculation Materials* (3_23)

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Morphosphere(s): Asymmetric Palindromes as Keys

The Trompe-l'œils of Semiospheres

Rudolf Kaehr Dr.

Abstract

Surprisingly, there is a simple key to distinguish and to open up morphospheres in contrast to the semiosphere: symmetric versus asymmetric palindromes. Asymmetric palindromes of the morphosphere are paradox and oxymoric in the understanding of the semiosphere. Only in the context of human madness and its poetic explosions oxymoric palindromes could eventually occur. Morphosphere(s) are opened up by oxymoric palindromes. Morphosphere(s) are the field where asymmetric palindromes get a scientific, mathematical and programmable recognition.
http://memristors.memristics.com/Palindromic%20Materials/Palindromic%20Tables.pdf
(Work in progress v. 0.4, Jan. 2013)

1. Strategies towards morphosphere(s)

Á la Annabelle, Glasgow, November 2012

Gold log

O Genie!
Mein Ego tat nur Edles
nie so poesielos.

Gold nutzte jeder
neuen Rede jetzt und
log so leise.

O Pose,
Insel der Untat! O Genie,
mein Ego!

Aus: Herbert Pfeiffer, *Oh Cello voll Echo*. 2. Aufl. Frankfurt am Main 1993, S. 90.
http://www.mathematical-semiotics.com/pdf/Anomaliengrammatik.pdf

Introduction

Palindromes are well known. "*Anna*" is one, "*elle*" is one, and the letter "*b*" is one, too. Palindromes are read symmetrically forwards and backwards. Both readings result in the same word.
All examples are working with palindromes that are, by definition, obviously, symmetric.

It seems to be very strange to postulate the existence of *asymmetric* palindromes.

But who said that we have to stay in the semiotic sphere, the *semiosphere* of semiotically founded science and literature?

A glance on morphogrammatics uncovers the funny result that the composition of "*anna*", "*b*" and "*elle*" to the 'word*' "annabelle*" is a nice example of an asymmetric morphogrammatic palindrome.

It reads 'forwards' and 'backwards' morphogrammatically as the same.

Albeit it is semiotically, i.e. alphabetically an asymmetric word, and therefore not a palindrome at all, it is a palindrome of the morphosphere.

Unfortunately, you cannot directly see "*Annabelle*", you have to elaborate a journey to uncover her royaume, the morphosphere of asymmetry.

How does it work?

```
- ispalindrome(tnf[2,0,0,2,2,0,0,2]);
 val it = true : bool
```

1.1. Asymmetric palindromes as keys to morphosphere(s)

Also I'm not attracted to the concept of *spheres*, except, maybe, that of Johannes Kepler's *Music of Spheres*, I think it would give my work about graphematics some reasonable positioning if it could be understood as a sphere and could then be differentiated clearly from other spheres, especially from the bio-, logo-, noospheres, but also from Yuri Lotman's semiosphere.

> *"The music of the spheres is a palindrome, and the book of astronomy reads the same backward as forward."*
> Norbert Wiener, *Cybernetics: Or, Control and Communication in the Animal and the Machine, p. 31,* March 1965

In this setting, graphematics, as it was introduced in the early '70s, is the developing science of studying the morphosphere.

Graphematics contains the studies of
polycontexturality, polycontextural logic, arithmetics, semiotics and pro-

gramming,
kenogrammatics,
morphogrammatics,
on the different levels of the graphematic system of inscription.

As Lotman introduced his project of a culture-theoretic understanding of systems of sign-praxis as the new thematization of the *semiosphere* in distinguishing it from Vernadsky's *biosphere*, my introduction of the project of *morphosphere(s)* follows Lotman's programmatic text in a complementary and deconstructive move to elucidate some aspects necessary to establish the new sphere of graphematics, the morphosphere. Leaving a sphere for another new one is not done without use/abuse of past concepts and strategies, and a balance between mimicry, plagiarism and tabu breaking creativity.

Surprisingly, or maybe not so surprisingly, the topos of *palindromes*, that is leading Lotman's exposition of the semiosphere, appears as a 'multi-functional' key for the establishing of the concept, strategy and project of morphosphere(s).

Sometimes, deep insights are extremely simple. The key of the distinction between Lotman's *semiosphere* and the proposed *morphosphere(s)* has this simplicity, albeit there is no guarantee that this simplicity is also related to a deep insight. The simple difference between the deep-structure of the semiophere and the deep-structure of the morphosphere is established with the difference of *symmetric* and *asymmetric* palindromes.

"The proof that mirror symmetry can radically change the functionality of the semiotic mechanism, lies in the palindrome.*"* (Y. Lotman)

Palindromes are by definition symmetric. This holds for all occurrences of palindromes in the bio- and the semiosphere.

Asymmetric palindromes are oxymorons.

The idea of asymmetric palindromes is *"utter nonsense"*.

Enantiomorph oppositions are logically and semiotically dual and are leading to tautologies, avoiding the confrontation with paradoxes, parallaxes, and other monstrosities.

Asymmetric palindromes are presenting the deep-structure of the deep-structure of the semiosphere. It unmasks it as a restricted economy of sings in the mode of linearity and binarity; elaborated as enantiomorphism.

Enantiomorphic reflection symmetry
"Thus the set of natural laws (objectivity) and the inverse set of the rules and structures of logic together form an enantiomorphic *system*

of rationality. The two subsets of this system constitute a symmetrical exchange relation which is as simple as our familiar distinction between left and right. This exchange relation is defined by our traditional operator of two-valued negation.

"However, it should never be forgotten that these two empirical aspects of Reality constitute a strict exchange relation of two sets or subsystems of a universal enantiomorphic *structure which is, as such, indifferent to the distinction between subject and object (Cusanus´* coincidentia oppositorum*)."* (Gotthard Gunther)
http://www.thinkartlab.com/pkl/archive/GUNTHER-BOOK/CYBERN1.html

"For a semiotic analysis of the palindrome in cultural terms, the stance of Juri Lotman is preferable, also because his argumentation is more precise. Palindromic symmetry is of an enantiomorphic type, i.e. mirror symmetry where as a matter of fact no part can be superimposed on the other. From this Lotman derives a dialogic conception of the palindrome, where the left and right side are recognized as similar yet different." (Erika Greber)
A Chronotope of Revolution: The Palindrome from the Perspective of Cultural Semiotics
http://www.realchange.org/pal/semiotic.htm

Symmetry and semiosis
"The range of forms of s y m m e t r y and their manifestations is surprisingly wide. The most elementary understanding of symmetry can be found in the empirical truth that symmetrical things, images and phenomena are mutually invariant, i.e. they are similar with respect to certain relations and/or characteristics.

"Such a type of symmetry is called e n a n t i o m o r p h i c or m i r r o r s y m m e t r y." (Peet Lepik)
http://www.eki.ee/km/place/pdf/KP2_10lepik.pdf

The guide to enter the morphosphere(s) are offered therefore by oxymoric palindromes and their semiotic *asymmetry*.

Oxymoric palindromes are hidden to the phenomenological sight. They cannot be seen and brought to evidence. Up to now there is no insight into the existence of asymmetric palindromes in the scientific spheres of semiotics, linguistics, rhetorics and in corresponding attempts in the sciences of the biosphere, especially in microbiology and genetics.

In contrast, semio-linguistic palindromes need to be seen. Without the visuality, or other perceptionalities, palindromes cannot be established.

"Thus, the mechanism of the Russian palindrome lies in the fact that the word is seen. *This then allows it to be read in the reverse order."* (Y. Lotman)

It seems that the complicity of the semiospheric palindromes with Western logocentrism has been observed by Lotman. He confronts his results with the non-logical features of Chinese writing.

> *"A very curious thing occurs: in the Chinese language, where the word hieroglyph seems to hide its* ***morpho-grammatical*** *structure, reading it in the reverse order helps to reveal this hidden construction, displaying the hidden sequential choice of structural elements in a holistic and visible way."* (Y. Lotman)

The hidden cannot be seen, it has to be elaborated, uncovered and unmasked by the work of calculation.

An oxymoric palindrome is therefore not given to phenomenological and semiospheric evidence of cognition.

There is nothing to be seen and to be read backwards then.

Kalevi Kull hints with his paper "*Semiosphere and a dual ecology: Paradoxes of communication* " to the importance of paradoxes for the introduction of Lotman's concept of semiosphere.

> *"In several of his lectures, Juri Lotman liked to begin his talk with a* paradox. *Since semiosphere is a very general notion, a description of it via paradoxes might indeed be helpful. A paradox with what it would be appropriate to start here is the famous paradox of learning — Meno's paradox."*
> http://www.ut.ee/SOSE/sss/kull331.pdf

A new way of seeing things has to be learned and trained. This happens with the support of scriptural calculations.

At first it seems to be important to understand that the concept of *paradoxes* and *antinomies* is a limited construction depending on the Greek concept and understanding of *logos* and *anti-logos*. The study of paradoxes of all kind is having its sophisticated endeavour in the semiosphere.

The structure of perception and cognition in the semiosphere is fundamentally phenomenological.
Despite the dialogical, holistic and intertextual attempts, the modi of perception and evidence in the semiosphere have their foundation in the egology of logocentrism.

There is no surprise that Lotman Jr. continues the work on the semiosphere by referring to the dialogism of *Martin Buber* and *Emmanuel Lévinas* with a disappointing remark against *Martin Heidegger* that was, as a misunderstanding refuted by Heidegger decades ago in respect to misunderstandings in the otherwise ingenious work of *Ludwig Binswanger*.

Binswanger recognized his ‘category mistake’ of Heidegger’s design of Dasein. This insight holds not just for his but also for Martin Buber’s and others, “Ich und Du” metaphysics of Jewish dialogism.

Ludwig Binswanger, *Grundformen und Erkenntnis menschlichen Daseins*, 1942

Mihhail Lotman writes in his paper *“Umwelt and semiosphere”,*

> *"Lévinas shows that there is a mistake in Heidegger’s system: an isolated existence is not possible in ontological, as well as in existential level: for its own existence an existent needs the other.”*
>
> *"Of course, Mikhail Bakhtin’s ideas were always essential for Lotman, but here it would be perhaps more useful to refer to* Martin Buber*, as well as to* Emmanuel Lévinas*, especially, since he was not familiar with their works (particularly with the latter one’s).”* (M. Lotman)

That’s not just, again, a misunderstanding of Heidegger, but much more a decisive strategy that is defending its logocentric complicity. It is not the place to go into this scheme of argumentations. But it should be accepted that Heidegger didn’t aim to develop a system, and his approach wasn’t just ontological or existential as such. Neither that of Levinas.

Semiospheric studies might be deep-structural studies in contrast to semiotic studies but they remain blind to their own deep-structural decisions.

The semiosphere is not touched by grammatological and graphematical considerations and interventions.

In a radical change of interests and strategies, *morphospheric* studies, if they still can be called studies without falling back into logocentric complicity with its concept of dialogical truth and rationality, are accepting the work of deconstruction of the very basic presumption of Western culture: its semiospheric umbrella, or as other prefer to say, its logophonocentric prison.

Palindromes as opposed to the category of glue

The question I would like to repeat is:
"The question is: *Can we still afford to buy the glue?”*
Glue is procrastinating, buffering, consuming time and resources.

What’s about palindromes?
Can we still afford to restrict our life to the semiosphere and its palindromes?
Palindromes are ubiquitous. But this kind of ubiquity is limited by its semiospheric deep-structure.
The category of glue has to be resolved by interaction and interplay.
Provocatively formalized by the saltatories of diamond category theory.

Also palindromes are not as common in the semiosphere, i.e. modern culture, as the ubiquitous term “glue”, they are nevertheless everywhere too. Palindromes are dual to the category of glue but not complementary in the sense of the term. Glue is gluing together what doesn’t fit together per se. Palindromes are bridging gaps that are not accepted as gaps.

http://www.thinkartlab.com/pkl/lola/Category%20Glue/Category%20Glue.pdf

http://www.thinkartlab.com/pkl/lola/Category%20Glue%20II/Category%20Glue%20II.html

Again, there is no special glue to buy in Tartu, Estonia:

> *"Juri Lotman, when describing the assumptions for communication, has described a similar paradox: If two individuals are absolutely different from each other, if they do not have anything in* common, *then meaningful communication between them is impossible."* (Kull)

On the other hand, there seems to be an ubiquitous need for glue:

> *"Most briefly,* semiosphere is the space of diversity.”
> ‘Semiosphere is the world of multiple truths, of multiple worlds’.
> "Without paradox there is no signification.” (Kull)

> *Wilma Clark, Lotman's Semiosphere: A Systems Thinking Approach to Student’s Meaning-making Practices with Digital Texts*
> http://www.academia.edu/548541/2010_PhD_Thesis_-_Lotmans_Semiosphere

1.2. Calculating morphic palindromes

1.2.1. Filtering palindromes

Comparison with the filtered results
Palindromes, in this example, are filtered out from the trito-universe TU, with Tcontexture 6. The length of the words of the example is 6 and the range spans from [1,1,1,1,1,1] to the saturated morphogram [1,2,3,4,5,6].

The symmetric production rule “$S \Longrightarrow a|aSa$“ is not considering the *asymmetric* productions that are morphogrammatically accepted as palindromes, like for example the morphogram [1,2,3,4,1,2] with [1,2,3] $=_{mg}$ [2,1,4], [1,2,3,4,1,2] $=_{mg}$ [2,1,4,3,2,1], and tnf[2,1,4,3,2,1] $=_{mg}$ [1,2,3,4,1,2]. Hence, the *context*-dependence of the morphic production rule is restricted to symmetric productions with restricted context-dependence.

The filter-method is also not producing constructively the set of palindromes but is filtering them out of the produced trito-universe TU of morphograms.

The **calculations** are based on:
System: SML/NJ: http://www.smlnj.org/,
Morphogrammatics: http://www.thinkartlab.com/pkl/SML-sources.NJ/ALL-MG-nov2012.sml
Book Morphogrammatik: http://www.thinkartlab.com/pkl/media/mg-book.pdf

Morphogrammatic palindrome:

```
fun kref ks = tnf(rev ks);
- fun ispalindrome l = (l = kref l);
val ispalindrome = fn : int list -> bool
- ispalindrome [1,1,2,2];
val it = true : bool
```

Symbolic palindrome

```
fun palindrome l = (l = rev l);
- palindrome [1,1,2,2];
val it = false : bool
```

Tests for morphogrammatic palindromes

Examples

```
- ispalindrome [1,2,2,2,3,3,3,4];
val it = true : bool
- ispalindrome [1,2,3,1,4,3];
val it = true : bool
- tnf  [1,2,3,1,4,3];
val it = [1,2,3,1,4,3] : int list
- tnf [3,4,1,3,2,1];
val it = [1,2,3,1,4,3] : int list
- kref [1,2,3,1,4,3];
val it = [1,2,3,1,4,3] : int list
- rev [1,2,3,1,4,3];
val it = [3,4,1,3,2,1] : int list
- tnf(rev [1,2,3,1,4,3]);
val it = [1,2,3,1,4,3] : int list
```

Filtered results of length 6 from TU

```
Tcontexture 6;
```

List.filter palindrome “Tcontexture 6";
- length it;
val it = 180 : int
Results for the 31 morphogrammatic palindromes of length 6 from [1,1,1,1,1,1] to [1,2,3,4,5,6]:

[1,1,1,1,1,1],[1,1,1,2,2,2],[1,1,2,1,2,2],**[1,1,2,2,1,1]**,[1,1,2,2,3,3],[1,1,2,3,1,1],[1,1,2,3,4,4],
[1,2,1,1,2,1],[1,2,1,1,3,1],[1,2,1,2,1,2],[1,2,1,3,2,3],[1,2,1,3,4,3],[1,2,2,1,1,2],**[1,2,2,2,2,1]**,
[1,2,2,2,2,3],[1,2,2,3,3,1],[1,2,2,3,3,4],[1,2,3,1,2,3],[1,2,3,1,4,3],[1,2,3,2,3,1],[1,2,3,2,3,4],
[1,2,3,3,1,2],**[1,2,3,3,2,1]**,[1,2,3,3,2,4],[1,2,3,3,4,1],[1,2,3,3,4,5],[1,2,3,4,1,2],[1,2,3,4,2,1],
[1,2,3,4,2,5],[1,2,3,4,5,1], [1,2,3,4,5,6].

Palindromes(6,6) = 31
Symmetric palindromes(6,6) = 5

Symmetric palindromes of length 6 produced by the *symmetric* production rule “S $\Longrightarrow$ a|aSa“:

$$\begin{pmatrix} a\left(\mathtt{aaSaa}\right)a \\ b\left(\mathtt{aaSaa}\right)b \\ a\left(\mathtt{baSab}\right)a \\ b\left(\mathtt{baSab}\right)b \\ c\left(\mathtt{baSab}\right)c \end{pmatrix} =_{\text{num}} \begin{pmatrix} 1\left(11\,\mathrm{S}11\right)1 \\ 2\left(11\,\mathrm{S}11\right)2 \\ 1\left(21\,\mathrm{S}12\right)1 \\ 2\left(21\,\mathrm{S}12\right)2 \\ 3\left(21\,\mathrm{S}12\right)3 \end{pmatrix} =_{\text{tnf}} \begin{pmatrix} 1\left(11\;S\;11\right)1 \\ 1\left(22\;S\;22\right)1 \\ 1\left(21\;S\;12\right)1 \\ 1\left(12\;S\;21\right)1 \\ 1\left(23\;S\;32\right)1 \end{pmatrix}$$

Symmetric morphogrammatic palindromes of length 6 taken out from TU

val it =
[[1,1,1,1,1,1],[1,1,2,2,1,1],[1,2,1,1,2,1],[1,2,2,2,2,1],[1,2,3,3,2,1]] : int list list
- length it;
val it = 5 : int

Filtered results of length 7 from TU

Symmetric morphogrammatic palindromes of length 7 filtered out from TU 7:

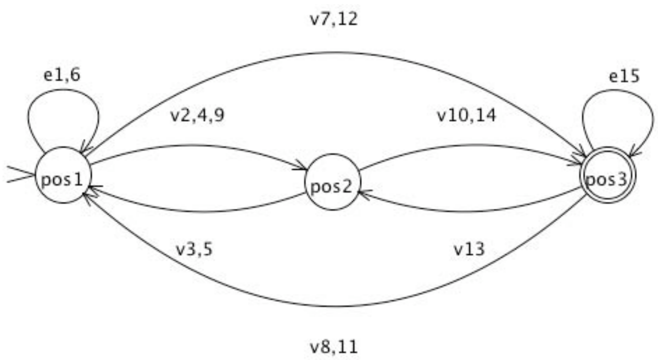
val it =
[[1,1,1,1,1,1,1],[1,1,1,2,1,1,1],[1,1,2,1,2,1,1],[1,1,2,2,2,1,1],
[1,1,2,3,2,1,1],[1,2,1,1,1,2,1],[1,2,1,2,1,2,1],[1,2,1,3,1,2,1],
[1,2,2,1,2,2,1],[1,2,2,2,2,2,1],[1,2,2,3,2,2,1],[1,2,3,1,3,2,1],
[1,2,3,2,3,2,1],[1,2,3,3,3,2,1],[1,2,3,4,3,2,1]] : int list list
- length it;

val it = 15 : int
Symmetric palindromes(7,7) = 15
Palindromes(7,7) = 59

The listed palindromes (symmemtric and asymmetric) are genuine. There is no tnf-reduction to a standard normal form, like for non-genuine palindromes.

Example
Genuine
[1,2,3,4,3,2,1] = tnf[1,2,3,4,3,2,1].
Non-genuine
[2,3,4,5,4,3,2] ≠ tnf[2,3,4,5,4,3,2]
- tnf[2,3,4,5,4,3,2];
val it = [1,2,3,4,3,2,1] : int list

DiagrMorphFMS [1,1,2,2,3,3]



- ENstructure [1,1,2,2,3,3];
val it =
[[],
[(1,2,E)],
[(1,3,N),(2,3,N)],
[(1,4,N),(2,4,N),(3,4,E)],
[(1,5,N),(2,5,N),(3,5,N),(4,5,N)],
[(1,6,N),(2,6,N),(3,6,N),(4,6,N),(5,6,E)]] : (int * int * EN) list list

ENstructure automaton table for MorphoFSM [1,1,2,2,3,3]

MorphoFSA[aabbcc]	pos_1	pos_2	pos_3
pos_1	$e_{1,6}$	$v_{2,4,9}$	$v_{7,12}$
pos_2	$v_{3,5}$	–	$v_{10,14}$
pos_3	$v_{8,11}$	v_{13}	e_{15}

1.2.2. Linguistic interpretations of asymmetric palindromes

Why looking for such sophisticated palindromes like *“Oh Cello voll Echo”* (Pfeiffer) if we have such an intriguing example like the asymmetric palindrome “*Annabelle*"?

Annabelle gets a palindromic interpretation by the *asymmetric* morphogram [1,2,2,1,3,4,5,5,4]:

"anna" : num(anna) = [1,7,7,1]
” b” = [2]
"elle” : num(elle) = [4,5,5,4]
num(annabelle) = [1,7,7,1,2,4,5,5,4]
- tnf[1,7,7,1,2,4,5,5,4];
val it = [1,2,2,1,3,4,5,5,4] : int list
ispalindrome[1,2,2,1,3,4,5,5,4]?
val it = true : bool
- kref[4,5,5,4,3,1,2,2,1];
val it = [1,2,2,1,3,4,5,5,4] : int list

Additionally, the words “*anna*” and “*elle*” of the word “*annabelle*” are morphogrammatically equivalent: [anna] $=_{MG}$ [elle].

ENstructure of “Annabelle”: [1,2,2,1,3,4,5,5,4]
Again, morphograms are not defined over an alphabet but by differentiations. The ENstructure is calculating the differentiation of a morphogram, with N=non-equal and E=equal at the subsystem place (i, j).

- ENstructure [1,2,2,1,3,4,5,5,4] = ENstructure [4,5,5,4,3,1,2,2,1]:

DiagrMorphoFSM [1,2,2,1,3,4,5,5,4]:
ENstructure [1,2,2,1,3,4,5,5,4] ⋃ subsystems 9 ⋃ positions{1,2,3,4,5}
(int * int * EN) list list ⋃ (int * int list) list ⋃ int

Mapping
Diagr: (ENstructure, subsystems, positions) ⟶ DiagrMorphoFSM

ENtable: ENtable ⟶ subsystems
[[],
[1,(1,2,N))],
[3,(1,3,N), 2,(2,3,**E**))],
[6,(1,4,**E**), 5,(2,4,N), 4,(3,4,N)], : pos{1,2}
[10,(1,5,N),9,(2,5,N),8,(3,5,N),7,(4,5,N)], : pos{1,2,3}
[15,(1,6,N),14,(2,6,N),13,(3,6,N),12,(4,6,N),11,(5,6,N)], : pos{1,2,3,4}
[21,(1,7,N),20,(2,7,N),19,(3,7,N),18,(4,7,N),17,(5,7,N),16,(6,7,N)], : pos{1,2,3,4,5}
[28,(1,8,N),27,(2,8,N), 26,(3,8,N),25,(4,8,N),24,(5,8,N),23,(6,8,N),22,(7,8,**E**)], : {1,2,3,4,5}

[38,(1,9,N),37(2,9,N),36(3,9,N),35,(4,9,N),34,(5,9,N),31,(6,9,**E**),30,(7,9,N),29,(8,9

,N)]] : pos{1,2,3,4,5}
   : (int * int * int list * EN) list list list

DiagrTable: (EN, subsystems) ⟶ (pos,pos).

MorphoFSA **[1, 2, 2, 1, 3, 4, 5, 5, 4]**	pos_1	pos_2	pos_3	pos_4	pos_5
pos_1	e6	v1, 4	v7	□	□
pos_2	$v_{3,5,19,24}$	e2	□	□	□
pos_3	v9	v8	□	□	□
pos_4	□	□	□	□	□
pos_5	□	□	□	□	□

Hence, two morphograms are morphogrammatically equivalent iff their ENstructures are equal.

$$\boxed{\left[MG1\right] \equiv_{MG} \left[MG2\right] \Longleftrightarrow \text{ENstructure}\left(MG1\right) = \text{ENstructure}\left(MG2\right)}$$

That is, the trito-normal form *tnf* of the numeric interpretations of the words “*anna*” and “*elle*”, num(*anna*) = [1,7,7,1] and num(*elle*) = [4,5,5,4] are equivalent: tnf[1,7,7,1] = [1,2,2,1] = tnf[4,5,5,4]. But *localized* in the context of the whole word, hence contextualized, they are different.

Other examples

Ottoanna

- ispalindrome [1,2,2,1,3,4,4,3];
val it = true : bool

Odd obamma; Odd o gamma

- ispalindrome [1,2,2,1,3,4,5,5,4];
val it = true : bool

Further linguistic Examples

On a linguistic level there are many aspects to remember that are additional to symmetric palindromes and are defined on a phenotypical level. A list of such phenotypical examples is given in Hugh Fox III’s citations of “*heteropalindromes*":

> *"Heteropalindromes are words which are also words when spelled backwards. Heteropalindromes are also known as semordnilaps, semi-palindromes, half-palindromes, reversgrams, mynoretehs, reversible anagrams, word reversals, or anadromes."*

http://foxhugh.wordpress.com/word-lists/list-of-heteropalindromes/

Some examples are: etna, eve, even, evil, eviler, ewe, eye, faced, fer, fila, fir, fires, fled, flog, flow, fool

Hence, e.g., live/evil or flow/wolf and flog/golf are *semordnilaps*, they have different meanings, read forwards and backwards. Semiotically or alphabetically, they are, composed together: “live-evil”, (symmetric) palindromes but their parts differ in the linguistic meaning of the oriented reading.

1.2.3. Palindromic deep structure of fundamental hebrew names

This exercise is certainly not a linguistic etymological study. Just a hint for curiosity at: 12.12.12 .

Hanukkah

- i it = true : bool

Halakah

- ispalindrome[1,2,3,2,4,2,1];
val it = true : bool

Tanak(h)

- ispalindrome[1,2,3,2,4];
val it = true : bool

S(h)abbat

- ispalindrome[1,2,3,3,2,4];
val it = true : bool

Mezuzah

- ispalindrome [1,2,3,4,3,5,6];
val it = true : bool

Shamash

- ispalindrome [1,2,3,4,3,1,2];
val it = true : bool

Menorah

- ispalindrome [1,2,3,4,5,6,7];
val it = true : bool

Talmud

val it = true : bool
- ispalindrome [1,2,3,4,5,6,7];

Yahweh (Yawe)

- ispalindrome[1,2,3,4,5];
val it = true : bool

V’nasnu

- ispalindrome[1,2,3,4,2,5];

- ispalindrome [1,2,3,4,2,1];
val it = true : bool

V'nasnu: ethically symmetric asymmetric morphic palindrome

"The Torah commands the Jewish people, "V'nasnu … every man shall give [an atonement for his soul] … a half-shekel …."(Exodus 30:12-13). The Vilna Gaon points out that the Hebrew word v'nasnu – "and each man shall give" – is a palindrome. He also points out that the trop, or cantillation marks, on top of the word v'nasnu are kadma v'azla, which means to "be quick and go".

"Thus, says the Vilna Gaon, the Torah expresses the obligation to give charity as a palindrome which can be read equally backwards and forwards - v'nasnu – to remind us to give now, because one day we (or our children) might lose our money and need others to give us. This is also why the trop is kadma v'azla – be quick and go."

http://www.torchweb.org/torah_detail.php?id=48

More at Dan Hoey:
http://www2.vo.lu/homepages/phahn/anagrams/panama.htm

1.2.4. Operations on oxymoric palindromes

Quite obviously there are at a first glance not too many operations possible on asymmetric palindromes that are remaining in the domain of palindromes.
The operation of inversion is part of the definition. General permutations are destroying the definition of palindromes. Partial inversions might be possible.

Is the 'addition'(concatenation) of two palindromes a palindrome?

Detection of palindromes in a morphogram (string)
How many palindromes are detectable in a morphogram? This is a classic topic of "*palindrome detection*".

How many palindromes are contained in the symmetric even palindrome pal = **[1,1,2,2,1,1]**?
sub-pal = {[1,1], [2,2], [1,2], [2,1],[1,2,2,1], [1,1,2,2], [2,2,1,1,], [1,1,1,1]}

Possible cases

$\forall$i,j: i=j , i,j$\in\mathbb{N}$	: [1,1], [2,2]	: [1,1]
$\forall$i,j: i$\neq$j	: [1,2], [2,1]	: [1,2]
$\forall$i,j: $i_1i_2=j_1j_2$, i $\neq$ j,	: [1,1,2,2], [2,2,1,1,]	: [1,1,2,2]
$\forall$i,j,h: $i_1hi_2=j_1hj_2$, h$\neq$i,j	: [1,1,2,3,3], [1,1,2,1,1,]	

Detection of palindromes in a string

http://www.technicalypto.com/2010/02/find-all-possible-palindromes-in-string.html

Coalitions

As a metaphor:

You might lock your door with two small keys, say [1,2,3] and [1,2,3,1], but you have to unlock your door with a single key that is the morphic palindromic addition of the smaller keys.

For example, with *kconcat* [1,2,3][1,2,3,1]; there are 5 composed keys of length 7 available.

- kconcat [1,2,3][1,2,3];

- length(kconcat [1,2,3][1,2,3]);

val it = 34 : int

Morphograms: 34.

Palindromes: 14

val it =
 [[1,2,3,1,2,3],[1,2,3,2,3,1],[1,2,3,3,1,2],**[1,2,3,3,2,1]**,[1,2,3,4,1,2],
  [1,2,3,4,2,1],[1,2,3,1,4,3],[1,2,3,3,4,1],[1,2,3,4,5,1],[1,2,3,2,3,4],
  [1,2,3,3,2,4],[1,2,3,4,2,5],[1,2,3,3,4,5],[1,2,3,4,5,6]] : int list list
- length it;
val it = 14 : int

Symmetric palindromes: 1
val it = [[1,2,3,3,2,1]] : int list list

Test

- ispalindrome [1,2,3,4,5,1];

val it = true : bool

- palindrome [1,2,3,4,5,1];

val it = false : bool

- kconcat [1,2,3][1,2,3,1];

Asymmetric palindromes

val it =
 [[1,2,3,1,2,3,1],**[1,2,3,1,3,2,1]**,[1,2,3,1,4,2,1],[1,2,3,1,3,4,1],
  [1,2,3,1,4,5,1]] : int list list
- length it;
val it = 5 : int

Symmetric palindrome

val it = [[1,2,3,1,3,2,1]] : int list list

- kconcat [1,2,1][1,2,1];

Palindromes: 5

val it =

[[**1,2,1,1,2,1**],[1,2,1,2,1,2],[1,2,1,1,3,1],[1,2,1,3,2,3],[1,2,1,3,4,3]]
: int list list

Symmetric palindrome: 1

val it = [[1,2,1,1,2,1]] : int list list

- kconcat [1,2,3,1][1,2,3,1];

- length(kconcat [1,2,3,1][1,2,3,1]);

val it = 34 : int

Palindromes : 14

List.filter ispalindrome "kconcat[1,2,3,1][1,2,3,1];"

val it =
[[1,2,3,1,1,2,3,1],[**1,2,3,1,1,3,2,1**],[1,2,3,1,2,3,1,2],[1,2,3,1,3,1,2,3],
[1,2,3,1,1,4,2,1],[1,2,3,1,2,4,1,2],[1,2,3,1,1,3,4,1],[1,2,3,1,3,1,4,3],
[1,2,3,1,1,4,5,1],[1,2,3,1,4,2,3,4],[1,2,3,1,4,3,2,4],[1,2,3,1,4,5,2,4],
[1,2,3,1,4,3,5,4],[1,2,3,1,4,5,6,4]] : int list list

- length it;

val it = 14 : int

Symmetric palindrome: 1

val it = [[1,2,3,1,1,3,2,1]] : int list list

Test

- ispalindrome [1,2,3,1,2,4,1,2];

val it = true : bool

- palindrome[1,2,3,1,2,4,1,2];

val it = false : bool

-kconcat [1,2,3,1,4,5,2,4] [1,2,3,1,4,5,2,4];

- length it;

val it = 1546 : int

[1]- List.filter ispalindrome "kconcat [1,2,3,1,4,5,2,4] [1,2,3,1,4,5,2,4]":

val it =
[[1,2,3,1,4,5,2,4,1,2,3,1,4,5,2,4],[1,2,3,1,4,5,2,4,1,2,5,1,4,3,2,4],
[1,2,3,1,4,5,2,4,1,3,5,1,4,2,3,4],[1,2,3,1,4,5,2,4,1,5,2,1,4,3,5,4],
[1,2,3,1,4,5,2,4,2,4,1,2,5,3,4,5],[1,2,3,1,4,5,2,4,2,4,3,2,1,5,4,1],
[1,2,3,1,4,5,2,4,2,4,5,2,1,3,4,1],[1,2,3,1,4,5,2,4,2,4,5,2,3,1,4,3],
[1,2,3,1,4,5,2,4,3,1,5,3,2,4,1,2],[1,2,3,1,4,5,2,4,3,2,1,3,5,4,2,5],
[1,2,3,1,4,5,2,4,3,2,5,3,1,4,2,1],[1,2,3,1,4,5,2,4,3,5,2,3,1,4,5,1],...]]

Symmetric palindrome: 1

val it = [[1,2,3,1,4,5,2,4,4,2,5,4,1,3,2,1]] : int list list

Test

- ispalindrome [1,2,3,1,4,**5,2,4,4,2,6**,4,1,3,2,1];

val it = true : bool

Analysis

Palindromes with symmetric parts, and a non-palindromic "gap" sequence.
[1,2,3,1,4,**5,2,4,4,2,6**,4,1,3,2,1]

- ispalindrome [5,2,4,4,2,6];
val it = false : bool

Cooperations

- kmul [1,2][1,2];
val it = [[1,2,2,1],[1,2,3,1],[1,2,2,3],[1,2,3,4]] : int list list
Palindromes: 4
val it = [[1,2,2,1],[1,2,3,1],[1,2,2,3],[1,2,3,4]] : int list list
Symmetric palindrome: 1
val it = [[1,2,2,1]] : int list list

- kmul [1,2,3][1,2,3]
- length(kmul [1,2,3][1,2,3]);
val it = 588 : int
Morphograms: 588.

Palindromes "Palin(kmul [1,2,3][1,2,3])": 44

val it =
[[1,2,3,2,3,1,3,1,2],[1,2,3,3,1,2,2,3,1],[1,2,3,2,1,4,3,4,1],...]]
: int list list
- length it;
val it = 44 : int

Symmetric palindromes: 0
val it = [] : int list list

- kmul[1,1,2,2][1,2];
Palindromes: 4
val it =
[**[1,1,2,2,2,2,1,1**],[1,1,2,2,3,3,1,1],[1,1,2,2,2,2,3,3],[1,1,2,2,3,3,4,4]]
Symmetric palindrome : 1
val it = [[1,1,2,2,2,2,1,1]]

- kmul[1,1,2,2][1,2,1];
Palindromes: 2
val it = [[1,1,2,2,2,2,1,1,1,1,2,2],[1,1,2,2,3,3,4,4,1,1,2,2]] : int list list
Symmetric palindromes = 0

- kmul [1,1,2,2][1,1,2,2];
Palindromes: 4

val it =
[**[1,1,2,2,1,1,2,2,2,2,1,1,2,2,1,1**],[1,1,2,2,1,1,2,2,3,3,1,1,3,3,1,1],
[1,1,2,2,1,1,2,2,2,2,3,3,2,2,3,3],[1,1,2,2,1,1,2,2,3,3,4,4,3,3,4,4]]
: int list list

Symmetric palindrome: 1
val it = [[1,1,2,2,1,1,2,2,2,2,1,1,2,2,1,1]]

Interesting case of stability. The number of cooperations of 2 palindromes, and their symmetric and asymmetric palindromes are equal for kmul[1,2,1][1,2,3,2,1].

```
- kmul[1,2,1][1,2,3,2,1];
val it =
  [[1,2,1,2,1,2,3,4,3,2,1,2,1,2,1],[1,2,1,3,1,3,2,3,2,3,1,3,1,2,1],
   [1,2,1,3,1,3,2,4,2,3,1,3,1,2,1],[1,2,1,3,1,3,4,3,4,3,1,3,1,2,1],
   [1,2,1,3,1,3,4,5,4,3,1,3,1,2,1],[1,2,1,2,3,2,3,1,3,2,3,2,1,2,1],
   [1,2,1,2,3,2,4,1,4,2,3,2,1,2,1],[1,2,1,2,3,2,3,4,3,2,3,2,1,2,1],
   [1,2,1,2,3,2,4,5,4,2,3,2,1,2,1],[1,2,1,3,4,3,2,1,2,3,4,3,1,2,1],
   [1,2,1,3,4,3,4,1,4,3,4,3,1,2,1],[1,2,1,3,4,3,5,1,5,3,4,3,1,2,1],
   [1,2,1,3,4,3,2,3,2,3,4,3,1,2,1],[1,2,1,3,4,3,2,5,2,3,4,3,1,2,1],
   [1,2,1,3,4,3,4,3,4,3,4,3,1,2,1],[1,2,1,3,4,3,5,3,5,3,4,3,1,2,1],
   [1,2,1,3,4,3,4,5,4,3,4,3,1,2,1],[1,2,1,3,4,3,5,6,5,3,4,3,1,2,1]]
  : int list list
- length it;
val it = 18 : int
length of palindromes: |[1,2,1|x|1,2,3,2,1| = 15
ispalindrome
val it = 18 : int
palindrome
val it = 18 : int
- kmul[1,2,2,1][1,2,3,2,1];
val it =
  [[1,2,2,1,2,1,1,2,3,4,4,3,2,1,1,2,1,2,2,1],
   [1,2,2,1,3,1,1,3,2,3,3,2,3,1,1,3,1,2,2,1],
   [1,2,2,1,3,1,1,3,2,4,4,2,3,1,1,3,1,2,2,1],
   [1,2,2,1,3,1,1,3,4,3,3,4,3,1,1,3,1,2,2,1],
   [1,2,2,1,3,1,1,3,4,5,5,4,3,1,1,3,1,2,2,1],
   [1,2,2,1,2,3,3,2,3,1,1,3,2,3,3,2,1,2,2,1],
   [1,2,2,1,2,3,3,2,4,1,1,4,2,3,3,2,1,2,2,1],
   [1,2,2,1,2,3,3,2,3,4,4,3,2,3,3,2,1,2,2,1],
   [1,2,2,1,2,3,3,2,4,5,5,4,2,3,3,2,1,2,2,1],
   [1,2,2,1,3,4,4,3,2,1,1,2,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,4,1,1,4,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,1,1,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,2,3,3,2,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,2,5,5,2,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,4,3,3,4,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,3,3,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,4,5,5,4,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,6,6,5,3,4,4,3,1,2,2,1]] : int list list
- length it;
val it = 18 : int
length of palindromes: |[1,2,2,1|x|1,2,3,2,1| = 20
```

```
ispalindrome
val it = 18 : int
palindrome
val it = 18 : int
```

"kmul(kmul[1,2,2,1][1,2,3,3,2,1]) [1,2,1]" : 6600

```
val it =
  [[1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,1,1,2,4,3,3,4,6,5,5,6,6,
    5,5,6,4,3,3,4,2,1,1,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,1,1,2,4,5,5,4,6,3,3,6,6,
    3,3,6,4,5,5,4,2,1,1,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,1,1,2,4,6,6,4,3,5,5,3,3,
    5,5,3,4,6,6,4,2,1,1,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,1,1,2,5,3,3,5,6,4,4,6,6,
    4,4,6,5,3,3,5,2,1,1,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,1,1,2,5,6,6,5,3,4,4,3,3,
    4,4,3,5,6,6,5,2,1,1,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,1,1,2,5,6,6,5,4,3,3,4,4,
    3,3,4,5,6,6,5,2,1,1,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,1,1,2,6,3,3,6,4,5,5,4,4,
    5,5,4,6,3,3,6,2,1,1,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,1,1,2,6,5,5,6,3,4,4,3,3,
    4,4,3,6,5,5,6,2,1,1,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,1,1,2,6,5,5,6,4,3,3,4,4,
    3,3,4,6,5,5,6,2,1,1,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1],
   [1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,3,3,2,1,5,5,1,6,4,4,6,6,
    4,4,6,1,5,5,1,2,3,3,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1] ...]]
- length it;
val it = 6600 : int
- ispalindrome
[1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1,2,1,1,2,4,3,3,4,6,5,5,6,6,
   5,5,6,4,3,3,4,2,1,1,2,1,2,2,1,3,4,4,3,5,6,6,5,5,6,6,5,3,4,4,3,1,2,2,1];
val it = true : bool
Length of palindrome: 4x6x3=72
-List.filter ispalindrome : ??
```

Semiotic representations of morphograms of the trito-structure

How many asymmetric palindromes of the morphosphere are presentable in the semiosphere?

1.2.5. Group theory of classical palindromes

This study is not yet involving any mathematical techniques to prove anything.

It is a common misunderstanding to believe that morphogrammatic studies are just simple abstractions from existing mappings.

$\mathfrak{pal}: A_\Gamma \longrightarrow A_\Gamma,\ x \mapsto x \circ \bar{x}$

Hence, a morphogrammatic abstraction is introduced with:

$\mathfrak{pal}/_{morph}: A_\Gamma/_{morph} \longrightarrow A_\Gamma/_{morph},\ x \mapsto x \circ \bar{x},\ x \in morph(x),$

$[\mathfrak{pal}]: [A_\Gamma] \longrightarrow [A_\Gamma],\ x \mapsto x \circ \bar{x},\ x \in morph(x).$

morph(x) might be the EN-abstraction on x.

For $(x \circ \bar{x}) \in pal \Longrightarrow (x \circ \bar{x})_{/morph} \in pal_{/morp}$.

Thus, an abstraction from symmetric palindromes, $(x \circ \bar{x}) \in pal$, keeps the property of symmetry for the abstracted palindrome, $(x \circ \bar{x})_{/morph} \in pal_{/morp}$.

On the other side, there is no way back from an asymmetric morphic palindrome to a (symmetrical) palindrome:

$$(x \circ \bar{x})_{/morph} \in asym\text{-}pal_{/morp} \Longrightarrow (x \circ \bar{x})_{/morph} \notin sym\text{-}pal_{/morp}.$$

From the viewpoint of achieved morphogrammatic palindromes a definition that holds for symmetric as well as for asymmetric morphogrammatic palindromes is given by the analogon to the classical definition but respecting the context rules CR:

$$\boxed{\left(\left[x\right] \circ \left[\bar{x}\right]\right) \in [pal] \text{ iff } [x] =_{morph} [\bar{\bar{x}}] \in CR}$$

Example

```
fun kref ks = tnf(rev ks);
- fun ispalindrome l = (l = kref l);
```

[1,2,3,1,4,5,2,4]: [1,2,3,1] ∘ [4,5,2,4]

```
- tnf[4,5,2,4];
val it = [1,2,3,1] : int list
- tnf[4,2,5,4];
val it = [1,2,3,1] : int list
```

[1,2,3,1,4,5,2,4] ∈ [pal]

Abstraction and subversion strategies

Subversion scheme for palindromes

$$\begin{array}{llcl}
\textit{semiosphere}: & \text{symPALIN} & \longrightarrow & \text{asymPALIN}^{(m,n)} \\
\downarrow & \downarrow & & \uparrow \\
\textit{morphosphere}: & [\text{symPALIN}] & \longrightarrow & [\text{asymPALIN}]
\end{array}$$

A similar strategy had been applied in the process of discovering polycontextural logic. It turned out that the junctional operators of propositional logic are a minority in the new setting where *transjunctions* are overtaking logical functionality.

Subversion scheme for transjunctions

$$\begin{tikzcd}
\textit{logosphere}: \arrow[d, "\text{abstraction}"] & \mathrm{JUNCT}^{(2)} \arrow[r] \arrow[d] & \mathrm{transJUNCT}^{(m,n)} \\
\textit{morphosphere}: & \left[\mathrm{morpoJUNCT}\right] \arrow[r, "\text{transgression}"] & \left[\mathrm{transJUNCT}\right] \arrow[u, "\text{subversion}"']
\end{tikzcd}$$

Graphematics	classic	trans – classic
logosphere	logic, semiotics	polycontexturality
morphosphere	proto – logic	morphogrammatics
transgression	abstraction	subversion

Dorian Deloup, Palindromes and orderings in Artin groups
http://arxiv.org/pdf/math/0410275.pdf

Palindromic Permutations and Generalized Smarandache Palindromic Permutations
T`em´ıt´op´eGb´ol´ah`anJa´ıy´eo.l´a
http://arxiv.org/pdf/math/0607742.pdf

1.3. Interpretations

It seems not to too surprising that coalitions (additions, concatenations)of palindromes are accepting some closure under the category “palindrome”. The list of the addition of palindromes is not empty.

More surprisingly, at least at a first glance, is the fact that the cooperation (multiplication) of palindromes of the same type are realizing palindromes again.

An understanding of the mechanism of morphogrammatic multiplication (cooperation), *kmul*, makes it clear that the preservation of the palindromicity isn’t such a surprise.

The coalitions and cooperation of asymmetric palindromes are resulting in asymmetric palindromes as well as in symmetric palindrome. Thus the coalition and cooperation of asymmetric palindromes has a common set of symmetric palindromes.

As a rule it appears that the cooperation of symmetric palindromes is producing a symmetric result. While a cooperation of a asymmetric morphogram with a palindrome is not producing a palindrome.

kmul [symPalin] [symPalin] $\in$ [symPalin]
kmul [nonPalin] [symPalin] $\notin$ [symPalin]
kmul [symPalin] [nonPalin] $\notin$ [symPalin]

This could open up some insights into the ↕ of *cooperations* and *coalitions* in the context of morphic interpretations of phenomena in the realm of the bio- and semiosphere.

General system theory is based mainly on sets, fuzzy sets and multisets. It could be of interest to develop a new kind of systems theory based on distinctions of morphograms, symmetric and asymmetric palindromes.

Therefore, *systems theory* (of what ever level or color) that is successfully applied to the bio- and semiosphere stops to have a successful application in the morphosphere.

In other words, the “*Anomaliengrammatik*" (Alfred Toth) of palindromes is describing anomalies of the first kind, i.e. symmetric anomalies. Things are getting hopeless if asymmetric anomalies occur at the desk of our scientifically trained controllers.

What’s the result of the journey?
Prima facie always was a fake.

It isn’t possible for a semiotician to decide what kind of object he, she or it is eying. In the eye of a semiotician, the object he/she eyes is unavoidably a *“trompe-l'œil”*. The eyed palindrome is not showing its identity, i.e. its way of coming into existence remains hidden. The palindrome is eyed as a textual object. It is seen through the eyes of a semiotician. A semiotic palindrome as an object is hiding its way of construction that would show its character as belonging to the semio- or to the morphosphere.
This objectification of textual events is not prohibiting semioticians to us palindromes as strategies, and strategic tools.

What is studied is the cultural product, not its modi of becoming a product (construction, creation, elaboration). Obviously, semioticians see it differently.

A semiotic palindrome as a product is always both, a semiotic construction on the base of atomistic concatenation and as the result of a retrograde recursive morphogram.

Because all symmetric palindromes are at a first glance, and without involving them into a constructive play, simultaneously members of both spheres, the semio- and the morphosphere, the semiotic view is blind for this constitutive difference.

As much as palindromes function as a key for semiotic studies, it jumps into the eyes, that the whole endeavour of semiotics is the victim of a sophisticated *trompe-l'œil*.

This insight wasn't unseen by Hermes, the Greek postman, emissionary and messenger, of signs.

Hence, what is eyed is not what is seen. Palindromes cannot be seen. Even the seen palindrome might turn out not to be what jumped into the eye and what had been seen at first.

The phenomena are not given to the eyes of a semiotician, they have to be elaborated by methods not in the reach of the eyes. Invisible to the semiotics of the eyes and the eyes of semiotics.

2. Circularity, autopoiesis and palindromes

2.1. Palindromic cycles and chains

2.1.1. Chiastic palindromic cycles

> *"For Eliot circularity involves progression; it entails a quest that may carry the protagonist back to where he began, but that produces added acumen or insight. Retraction is not the allure.*
> "Sometimes it's necessary to go a long distance out of the way in order to come back a short distance correctly." *Again in this case return to the beginning implies a new beginning."*

The repeated run through a palindrome might elevate the runner into a higher state of consciousness. But coming back from the trip he or she will not be able to mark the difference in the script. The palindrome as such remained stubbornly unchanged the same. With the identity of the first and the last state of the palindromic run there is no escape out of the trap.

The slogan *"Iteration is alteration"* (iteration alters) has a strict formal meaning in the context of retro-grade recursion of morphograms.

Morphogrammatic palindromes, i.e. palindromes of the morphosphere, in contrast to the linguistic-numeric palindromes of the semiosphere, are equipped to mark relevant differences between the *initial* and the *terminal* state of the circular run through the palindrome. The higher conscious experienced by the runner through a iterative circle, his or her delirium, is inscribed into the morphic palindromes. There is no need to loose your head in such trivial situations.

Again, the return from the terminal state “4” to the initial state “1” of the palindrome [1,2,3,2,3,4] is marking the difference from ‘leaving’ and ‘returning’ back from the round-trip. Obviously, [1] is not [4], but the reverse of the morphogram [1,2,3,2,3,4], i.e. morphogram [4,3,2,3,2,1], is morphogrammaticlly equivalent to the morphogrammatic constellation of the start.

Enantiomorphism

> *"The proof that mirror symmetry can radically change the functionality of the semiotic mechanism, lies in the palindrome.”* (Y. Lotman)

Heraklid: *”Der Weg hin und zurueck ist ein und derselbe.”* (B 60/115)
Or: *“Hin, her; einerlei.”*
The old Greek wisdom Heraklit's, stated before the Aristotelian invention of identity philosophy, *“The path up and the path back; the same.”* gets an interpretation beyond onto-logical presumptions of identity.

There are a lot of philosophical speculations about the subversivity of palindromes and their enantiomorph parallel understanding of the structure of time. Time appears as distributed in “space” as parallax dynamics. All that gets some less “exited” interpretations by the applications of the old pre-Aristotelian figure of chiams, χ, and its modern forms as proemial relationship and diamond category theory.

Nevertheless, the stipulated subversion of linguistic palindromes never left its framework of circular identity.

If it is said, *“iteration alters”*, not much is said as such by this slogan about its mechanism and consequences.

With the advent of morphogrammatics and the morphosphere, a whole new field of research is opend up that offers the study of asymmetric palindromes. Their mechanisms and their consequences for future thinking.

Without doubt, some philosophical and scientific concepts have to be reformulated.

A shy start was tried with the ‘paradigmatical’ turn of the movement of the so called Second-order Cybernetics (H. von Foerster) that radicalized the first-order concept of “feed-back” to the conception of observer-dependence and autopoiesis of the thematization of second-order systems theory. Unfortunately, the mathematics and logics necessary for a scientific treatment of the new field of research didn’t follow in step.

The attempts of Gunther didn't have a chance to be accepted and had been sidelined and denied by the hyped "geniality" of G. Spencer Brown's the *Laws of Form*.

Palindromic cycles

- List.filter ispalindrome "Tcontexture 4";
val it =
[[1,1,1,1],[1,1,2,2],[1,2,1,2],[1,2,2,1],[1,2,3,1],[1,2,2,3],[1,2,3,4]]
: int list list

- List.filter palindrome "Tcontexture 4";
val it = [[1,1,1,1],[1,2,2,1]] : int list list

Self-cycles:
asymmetric
[1,2,2,3] $\Longleftrightarrow$ [3,2,2,1]:
[1 $\longrightarrow$ 2 $\longrightarrow$ 2 $\longrightarrow$3]
$\updownarrow$ $\updownarrow$
[1 $\longleftarrow$ 2 $\longleftarrow$ 2 $\longleftarrow$3]

symmetric
[1,2,2,1] $\Longleftrightarrow$ [1,2,2,1]

Cycles, chains:
Cycle(1,2) :[1,1,1,1] $\Longleftrightarrow$[1,1,2,2] $\Longleftrightarrow$ [1,2,1,2] $\Longleftrightarrow$ [1,2,2,1] $\Longleftrightarrow$ [1,1,1,1],
Cycle(1,2,3) :[1,2,3,1] $\Longleftrightarrow$ [1,2,2,3] $\Longleftrightarrow$ [1,2,3,1],
Cycle(1,2,3,4):[1,2,3,4].

Chiastic cycles:
[1,1,1,1] $\Longleftrightarrow$ [1,1,1,1]
$\uparrow$ $\updownarrow$
| [1,1,2,2] $\Longleftrightarrow$ [2,2,1,1]
$\downarrow$ $\updownarrow$
[1,1,1,1] $\Longleftrightarrow$ [1,2,2,1] $\Longleftrightarrow$ [1,2,1,2]

Morphic palindromic cycles are different from self-referential, re-entry or feed-back and auto-logical circles.

Palindromic cycles are forwards/backwards runs (path) with symmetric or asymmetric morphic journeys.
Their modus of iterativity is different from self-referential cycles, they are involved into a detour. This holds specially for strictly asymmetric palindromes.

It is an open question if Heraklit's 'palindromes' are symmetric or asymmetric. Because they have been conceived before the Aristotelian codification of thinking, there are chances to re-discover them as asymmetric palindromic figures of writing (thinking).

Douglas R. Hofstadter, Fluid Concepts And Creative Analogies: Computer

Models Of The Fundamental Mechanisms Of Thought, 1996

2.1.2. Autopoietic cycles

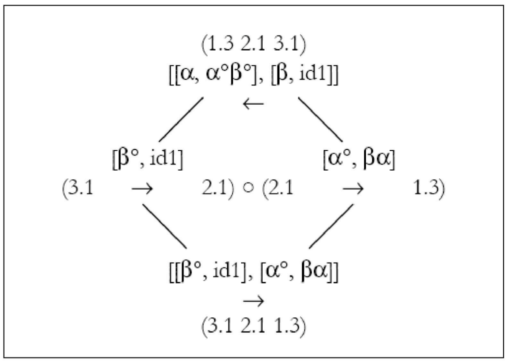
Humberto Maturana's characterization of autopoiesis has a well known circular structure.

> "*An autopoietic machine is a machine organized (defined as a unity) as a network of processes of production (transformation and destruction) of components which: (i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it (the machine) as a concrete unity in space in which they (the components) exist by specifying the topological domain of its realization as such a network.*"
> Maturana, Varela, Autopoiesis and Cognition: the Realization of the Living, 1980, p. 78

2.1.3. Diamond theoretic semiotics

Quite obviously, there is no such a thing as a unified and generally accepted discipline called "semiotics" that would be established by the holistic tendencies of semiospheric research.

Nevertheless, some attempts had been sketched by the semiotician *Alfred Toth* towards a fourfold structuration of antidromic semiotic phenomena.



A further diamond theoretic specification is achieved with the following explanation and diagram.

Semiotic diamond for $(3.1\ \ 2.1\ \ 1.3)$ with

$INV(3.1 \times 2.1 \times 1.3) = (1.3\ \ 2.1 \times 3.1)$: inversion

$diff(2.1_{\omega}) = (1.3)$

$diff(2.1_{\alpha}) = (3.1)$

$(3.1_{\alpha} \to 2.1_{\omega}) \circ (2.1_{\alpha} \to 1.3_{\omega})$: category composition

$$\frac{(3.1_{\alpha} \to 1.3_{\omega}) \mid (2.1\,\omega \longleftarrow 2.1_{\alpha})}{(3.1\ \ 2.1 \times 1.3) \mid (1.3_{2.1}\ 3.1)}$$: acception | rejection / : diamond result

Diamond semiotics

$$
\begin{array}{l}
[\alpha, \alpha^{\circ} \beta^{\circ}] \leftarrow [\beta, \ \mathrm{id}_1] \\
\qquad\quad | \qquad\quad |\ \mathrm{diff} \\
[\beta^{\circ} \rightarrow \mathrm{id}_1] \diamond [\alpha^{\circ} \rightarrow \beta\alpha] \\
\backslash \qquad\qquad\qquad\qquad / \ \mathrm{coinc} \\
[\beta^{\circ} \rightarrow \mathrm{id}_1] \longrightarrow [\alpha^{\circ} \rightarrow \beta\alpha]
\end{array}
$$

Morphic diamond for $(3.1 \ 2.1 \ 1.3)$ with

$\mathrm{COMPL}(3.1 \times 2.1 \times 1.3) = (1.3 \ 2.1 \times 3.1)$: complementarity

$\mathrm{diff}(2.1_{\ \omega}) = (1.3)$

$\mathrm{diff}(2.1_{\ \alpha}) = (3.1)$

$(3.1_{\ \alpha} \rightarrow 2.1_{\ \omega}) \diamond (2.1_{\ \alpha} \rightarrow 1.3_{\ \omega})$: diamond composition

$$\frac{(3.1_{\ \alpha} \rightarrow 1.3_{\ \omega}) \mid (1.3\ \omega \longleftarrow 3.1_{\ \alpha})}{(3.1 \times 2.1 \times 1.3) \mid (1.3_{\ 2.1}\ 3.1)} \quad \begin{array}{l} : \text{acception} \mid \text{rejection} \\ : \text{diamond result} \end{array}$$

Palindromes might be considered as interpretations of diamond categories, consisting of the complementarity of categories and saltatories ('jumpoids’). Considering the antidromicity of their ‘hetero-morphisms’ as asymmetric palindromes.

In this context it might be reasonable to interpret Thot’s version of diamonds (semiotische Diamanten) with the help of symmetric morphogrammatic palindromes.

An application of semiotic palindromes to interpret diamonds would miss the point in the sense of a ‘category mistake’ by confusing the morphosphere with aspects of the semiosphere.
Semiotic palindromes are based on *inversion* and *duality*, morphogrammatic (asymmetric) palindromes are based on *complementarity*.

Alfred Toth, A polycontextural-semiotic model of the emergence of consciousness
http://www.mathematical-semiotics.com/pdf/EmergConsc.pdf
R. Kaehr, Diamond Semiotic Short Studies
http://works.bepress.com/thinkartlab/1/

2.1.4. Semiotics, object-theory and palindromes

Antidromicity, complementarity, ‘inverse-dual relations’ (Palmer) and other retro-grade orientations occur at different places. The semiotician Alfred Toth is on the way to elaborate an *object-theory* that is conceived as complementary to the theory of signs, semiotics, with just such ‘enantiomorph’ properties.

Much less formal are the contemprary attempts towards object-theory staged by the movement of OOO/OOP-speculative (metaphysical) realism (materialism).

Object-theory and morphogrammatics

> *"Streng genommen gibt es auf der Ebene von Keno- und Morphogrammatik sogar überhaupt keine Objekte, da mit der Hypo-Thetik der Proömialrelation zusammen mit der aristotelischen Logik natürlich auch die ontologische und erkenntnistheoretische Dichotomie von Subjekt und Objekt zwar im Rahmen der der Semiose gegenläufigen Kenose unter-trieben wird.*
>
> *"Dennoch spricht einiges dafür, daß man die in Toth (2012a) im Rahmen der Objekttheorie formal begründete Perspektivitätsrelation, in Sonderheit im Zusammenhang mit den in Toth (2012b) eingeführten Systemen mit Rändern, mit Hilfe der polykontexturalen Diamantentheorie in sinnvoller Weise behandeln kann."*
> http://www.mathematical-semiotics.com/pdf/System.%20Persp.%20u.%20kat.%20Diam..pdf

It turns out that morphogrammatics is not rejecting “object-theory” but the attempt of classical semiotics to “catch”, i.e. to thematize ‘objects’ with(in) the conceptual means of semiotics as such. What classical semiotics achieves is a semiotization of objects and not a thematization of objects “as such” (Husserl).

Morphogrammatics ‘conceives’ objects as ‘independent” of ‘subjective’ and ‘objective’ properties. Hence, also independent or neutral to thematizations as involved in ‘perspectives” (Toth).

The paradox that has to be accepted (or paid) by this decision is to reognize subject-object independent ‘structurations’.

http://www.mathematical-semiotics.com/pdf/Systeme%20m.%20Raend.%203-stuf.%20Diam..pdf

How many perspectives have to be involved to inscribe the ‘objectivity’ of an “object"?

An early answer:

> *"Für die polykontexturale Logik bedeutet dieser sukzessive Aufbau der Bescheibung einer Zwei-Seiten-Form (Operator/Operand), daß insgesamt sechs Logiksysteme involviert sind.*

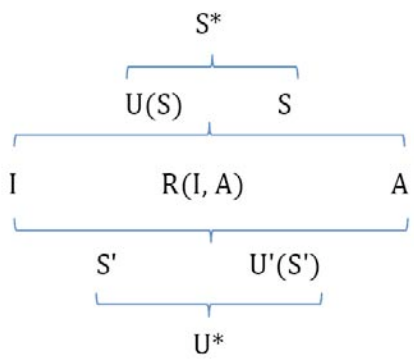
"Im Durchgang durch alle strukturell möglichen 'subjektiven' Beschreibungen des Observers wird das Objekt der Beschreibung ‘objektiv', d.h. observer-invariant 'als solches' bestimmt. Das Objekt ist also nicht bloß eine Konstruktion der Observation, sondern bestimmt selbst wiederum die Struktur der Subjektivität der Observation durch seine Objektivität bzw. Objektionalität.

Der auf diesem Weg gewonnene Begriff der Sache entspricht dem Mechanismus des Begriffs der Sache und wird als solcher in der subjekt-unabhängigen Morphogrammatik inskribiert.

Damit entzieht er sich der logozentrischen Dualität von dekonstruktivistischer Lichtung 'letzter Worte' und dem ironisch-pragmatizistischen Spiel mit ihren Familienähnlichkeiten.” (p. 8)

Proömik und Disseminatorik.
http://www.thinkartlab.com/pkl/media/DISSEM-final.pdf

This ‘early answer’ might correspond, at a first glance, to Toth’s system-theoretic characterisation of an object with system (S), environment (U) and border (R), in relation to inside (I) and outside (A).



http://www.mathematical-semiotics.com/pdf/Systeme%20m.%20Raend.%203-stuf.%20Diam..pdf

Objects as asymmetric palindoms

Symmetry

Toth mentions that the *difference* between the view from the garden to the house-entrance and the view from the house-entrance to the garden is of the same structural disruption as the difference between sign and object.

It looks as if the view from the garden to the house and the view from the house to the garden shows the same, at least from an abstract ‘systemic’ point of view, where the ‘varibles' "[$x^1{}_0$ " and symmetrically "[$x^{n+1}{}_n$]" are inverted by “x".

This corresponds to Toth’s “symmetry law” of sign and object systems.

Asymmetry
I always thought that this difference of signs and objects isn’t symmetric but asymmetric.
Hence, the view from the garden to the house and the view from the house to the garden presents different views of its objects. This view is recognized by Toth’s approach but only for the ‘material’ phenomenological level

How to mediated these ‘discontexturally’ different views, the symmetric and the asymmetric, about the structure of the difference of the ‘enantiomorph’ or ‘antidromic’ perspective together?

A further point has to be considered. The difference has to be inscribed in a text and not be conceived as a difference between a text and an object, inaccessible by a text, thus ‘outside’ of textuality.

Both together: asymmetric palindromes
From an objectional point of view both views are objectively different. What I see from the garden in direction to the house is different from what I see from the house in direction to the garden.

Morphogrammatics is not based on perception (eidos, data) but on inscription (difference, structuration).

There are many ways to tackle formally this parallax scenario.

The morphogrammatic concept of *‘asymmetric palindromes*’ is on offer. Asymmetric palindromes are by definition (morphogrammatically) symmetric and (semiotically) asymmetric at once, hence oxymoric.

On this level, morphic palindromes are not yet involved in complex and simultaneous relations necessary to thematize complex perspectivity involved in Toth’s examples, e.g. *"Rest. Heugümper, Waaggasse 4, 8001 Zürich”*, where the description of the “object” demands for different perspectives and moves of perspective.

While Toth’s abstract ‘system-theoretic’ definition is symmetric and balanced, hence semiotically and formally “palindromic":

$S^* \;=\; [x^1{}_0, [x^2{}_1, [x^3{}_2, [x^4{}_3, [x^5{}_4, [x^6{}_5, \ldots, [x^{n+1}{}_n]\,_n]$
$\times S^* = \; [[x^{n+1}{}_n], \ldots, [x^6{}_5, [x^5{}_4, [x^4{}_3, [x^3{}_2, [x^2{}_1, [x^1{}_0]\,_n]$
S^* sym xS^*
$x(xS^*) = S^*$
an asymmetric palindrome is semiotically asymmetric and morphogrammatically symmetric:

$[S^*] \neq_{sem} rev([S^*])$ and $[S^*] =_{morph} rev([S^*])$.

More correctly:

$$\left[S*/rev\left(S*\right)\right] = \begin{pmatrix} \left[S*\right] \neq_{sem} rev\left(\left[S*\right]\right) \\ \amalg \\ \left[S*\right] =_{morph} rev\left(\left[S*\right]\right) \end{pmatrix},$$

Example

[annabelle] $\neq_{sem}$ rev ([annabelle]) and
[annabelle] $=_{morph}$ rev ([annabelle]).

> *"Die in Toth (2012a) vorgeschlagene Definition eines allgemeinen Systems*
>
> $S^* = [x^1{}_0, [x^2{}_1, [x^3{}_2, [x^4{}_3, [x^5{}_4, [x^6{}_5, \ldots, [x^{n+1}{}_n]\ {}_n]$
> $\times S^* = [[x^{n+1}{}_n], \ldots, [x^6{}_5, [x^5{}_4, [x^4{}_3, [x^3{}_2, [x^2{}_1, [x^1{}_0]\ {}_n]$
>
> *stellt nicht nur eine Selbstabbildung des Systems in der Form seiner Teilsysteme dar, sondern es handelt sich um eine perspektivische Relation, d.h. sie involviert einen Beobachterstandpunkt, von dem aus betrachtet die Differenz zwischen Außen und Innen, Vorn und Hinten, Oben und Unten usw. formal relevant wird.*
>
> *"Die Differenz, die sich daraus ergibt, daß ich entweder vom Garten aus in den Hauseingang schaue oder vom Hauseingang in den Garten, ist systemisch gesehen genau dieselbe wie die Differenz zwischen Diesseits und Jenseits, Subjekt und Objekt oder eben Zeichen und Objekt."*
> *(Toth, 2012)*
>
> http://www.mathematical-semiotics.com/pdf/Perspektive%20vs.%20Kont.grenze.pdf
>
> *A. Toth, Die Theorie gerichteter Objekte als Theorie der Präsentation*
> http://www.mathematical-semiotics.com/pdf/Th.%20ger.%20Obj.%20als%20Praes.-Theorie.pdf

Toth gives a less metaphysical distinction of mutual duality with the pair "systemtheoretische" and "phänomenologische Objektebene":

> *"Man mache sich dabei aber klar, daß diese wechselseitige Dualität der beiden abgeleiteten Funktionen nur auf* systemtheoretischen *Ebene, nicht jedoch auf der* phänomenlogischen *Objektebene gilt, denn hier ist z.B. die Perspektive von einem Hauseingang in den Garten völlig verschieden von der "konversen" Perspektive vom Garten in den Hauseingang."*

http://www.mathematical-semiotics.com/pdf/Neues%20Model-l%20der%20Subjektgenese.pdf

But how is this difference between the *systemtheoretic* and the *phenomenological* approach conceived, formally? And how is it possible to formalize the “phenomenological” asymmetry on the structural level of symmetric systems theory?

Asymmetric palindromes might give an answer. They are formally symmetric (systems theory) and morphogrammatically (object theory) asymmetric:

Palindrome(X) iff krev(krev(X)) = X and kref(X) $=_{MG}$ X
While semiotic reflection (inversion, duality) is: ref(ref(X)) = X and ref(X) ≠ X .

Hence, it seems to be reasonable to connect the ‘material’ *phenomenological* domain with the domain of morphograms, while the ‘*systemtheoretic*’ domain corresponds the ‘formal’ semiotic approach.
http://www.mathematical-semiotics.com/pdf/Bi-Objekte%20systemth.%20Objektth..pdf

2.2. Geno- and phenotype of palindromes in the morphosphere(s)

2.2.1. Morphogrammatics of palindromes

Palindromes in the morphosphere are uncovering the interplay of hidden (latent) and manifest structurations of the co-creation (production) of signification and meaning.

Palindromes are therefore ‘best’ keys to study morphogrammatics. Morphogrammatics as a theory of reflectional transformations is ‘best’ presented with *“Morphogrammatik, 1993”*. This reflectional “Umformungstheorie” (transformation theory) is not directly focused on palindromes but is studying all kinds of symmetric and asymmetric transformations of morphograms and compounds of morphograms.

Binaries in a morphic interplay
latent/manifest,
genotype/phenotype;
unconscious/conscious,
tabular/linear,
morphogrammatic/semiotic,
kenomic/semantic,
asymmetry/symmetry

"Thus, the mechanism of the Russian palindrome lies in the fact that the word is seen. *This then allows it to be read in the reverse order. A*

> *very curious thing occurs: in the Chinese language, where the word hieroglyph seems to hide its* ***morpho-grammatical*** *structure, reading it in the reverse order helps to reveal this hidden construction, displaying the hidden sequential choice of structural elements in a holistic and visible way.*
>
> *That is to say, reading backwards activates the mechanism of different hemispheric consciousness. It is a primary fact of enantiomorphism that the form of the text changes the type of consciousness attributed to it.*
>
> *The palindrome activates the hidden layers of linguistic meaning and represents exceptionally valuable material for experiments dealing with the problems of functional asymmetry of the brain."* (Y. Lotman)

The genotype of palindromes of the morphospere is characterized by the methods of the Stirling turn. The sphere of morphograms is numerically covered by the Stirling numbers of the second kind.

A sequence, like "[1,1,2,3,2,3,4,4]", is perceived as a numerical sequence that is evidentely not representing a *"mirror symmetry"* of itself. Hence, what is perceived, and what is seen, say with the eyes of a semiotician, is definitively not a palindrome. What the semiotician perceives is an ordered sequence of numbers, a list. This holds, obviously, for letters, hieroglyphs, sounds and colors, etc., too.

Hence, this mirroring is not any more simply iterative, repeating and representing the picture in an inverse way but decidecively accretive, changing the original in the process of repetition in an *accretive* instead an *iterative* way that is still preserving, albeit on the morphospheric level, the idea of mirroring (repeatability).

The "*different hemispheric consciousness*" that is activated by the "*reading backwards*" of a linguistic word, a palindrome, is not activating the insight into the possible palindromicity of an asymmetric word, like the example "[1,1,2,3,2,3,4,4]".

The relativization of the value of the linguistic symmetry of palindromes that represent "*exceptionally valuable material for experiments dealing with the problems of functional asymmetry of the brain."* by asymmetric palindromes might not have a hidden support by an asymmetric brain as it is conceived by the results of brain research.

There might be a connection between the semiosphere and the biosphere in respect of the interaction by a backward reading and the brain which is not corresponding to the experiences with the backward 'reading' of asymmetric palindromes.

This gives us further criteria of distinctions: Semiospheric events are connected to corresponding brain activities, morphospheric 'non-events' have to be elaborated scripturally by an "*Anstrengung des Begriffs*" (Hegel) or by 'semanalysis' (Kristeva).

To each morphogram of the morphosphere there are calculable instances of the morphogram in the semiosphere. Such manifestations are results of the latent activity of morphograms of the morphosphere.

Morphograms are inscribed as tabular grids of kenograms, while sign sequences are written in a linear order of atomic signs. Therefore the use of the terms "sequence", "backwards/forwards", etc. are misleading for morphograms. There are *paths* through sign systems, but *journeys* through labyrinthine constellations of kenograms. Linearity of semiotics is not surpassed by the introduction of multi-media, plurality of semiospheres and other multi-dimensional derivatives.

2.2.2. Morphogrammatics of Chinese scripture

"From this, V. M. Alekseev drew the methodologically interesting conclusion: that the palindrome represents the best material for studying the grammar of the Chinese language.
The conclusions are clear:
(1) The palindrome represents the best possible means of illustrating the interrelationship of Chinese syllabic words, without resorting to the artificial lecture-theatre style of displacement and unity exercised by students of Chinese syntax, lacking in skill and talent.
(2) The palindrome represent the best Chinese material for the construction of a theory of Chinese (and perhaps not only Chinese) words and simple sentences. (Alekseev 1951: 102)." (Y. Lotman)

Chinese asymmetric palindromes

It seems to be sufficient enough to have a first glance at the literature of and about Chinese palindromes to see the overwhelming amount and importance of *asymmetric* palindromes in Chinese writing.

That doesn't comes as a surprise at all. The Chinese writing system is highly contextual, non-atomic and based on the act of writing and not on transcribing spoken language. Non-phonetic writing demands for the actions of reading and writing independently of the atomistic linearism of phonological alphabetic languages. Therefore, reading forwards and backwards and more, are immanent features of Chinese writing.

The term "dissymmetry" is often used in literature as lack of perfect symmetry. Hence, the ideal still is symmetry. My emphasis on "asymmetry" and “symmetry” is neutral, and describes properties of written configurations.

In contrast to classical (dis)symmetric palindromes, morphic palindromes are not depending on poetical semiotic signification but are computable configurations in the morphosphere. As a first result of computational studies of morphic palindromes it ‘springs to the eyes’ that asymmetric palindromes are outnumbering symmetric palindromes.

Roger Caillois’ positive notion of dissymmetry

> *'Although, the palindrome structure of the piece announces from the beginning a deliberate form of mirror symmetry, the interior structure, through the obvious inequality between sections indicates a deliberate asymmetric form, generically named as* dissymmetry. *The term was used by* Roger Caillois *in his work* La dissymétrie *to designate a phenomenon complementary to symmetry. He believes that the whole mechanism of universal dynamics is based on the existence of the pair* symmetry - dissymmetry. *Thus, the dissymmetry is presented as a rupture of equilibrium which is not accidental, being carefully prepared by its creator.*
>
> "Even if the principle of dissymmetry is used in order to break the equilibrium, by superposition it can lead to the emergence of other types of symmetry, such as the symmetry through the golden ratio.”
> http://www.wseas.us/e-library/conferences/2012/Iasi/AMTA/AMTA-32.pdf

Examples

Symmetric and dissymmetric Chinese palindromes
"Palindromic poetry (Huiwen 回文诗) was a literary genre in classical Chinese literature. The “*forward* reading” and the “*backward* reading” of such a poem would be *similar* but not exactly the same in meaning. Although called “palindromic”, these poems are often not palindromes in the normal English sense of the word. They do not necessarily have *symmetry* of characters or sound, but merely need to make sense when read in either direction (and would probably be better referred to as Semordnilaps)."

Funny example
“友朋小吃 （you meng xiaochi, a snack bar named You-Peng”
“吃小朋友 （chi xiao pengyou” : “Eat little kids”
http://blog.chinesehour.com/

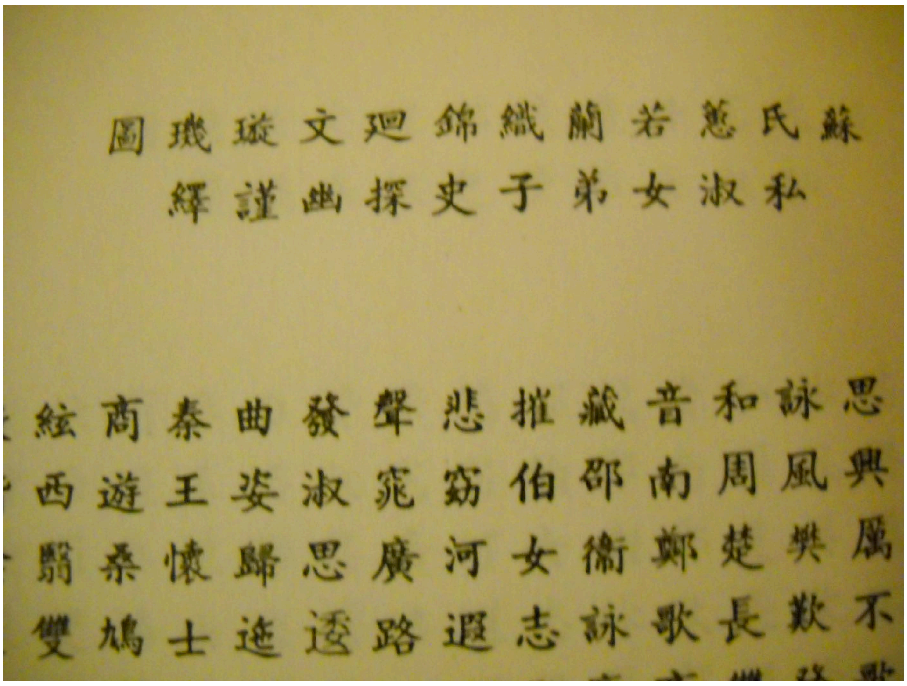
Poetic example
"Forwards:

潮随暗浪雪山倾，远**浦**渔**舟**钓**月明。**
The tide follows the hidden waves, the snow mount bends.
The fish boat near the far island is "fishing" the bright moon.

"And its reversed version:
明月钓**舟**渔**浦**远，倾**山雪浪暗随潮。**
The bright moon hooks the boat, the fishing island is far,
The snow tide coming from the mount follows the tide in secret."

http://www.yellowbridge.com/chinese/palindromes2.php

"Among the various kinds of Chinese poems there is one known as *palindromes*. The verses can also be read in a reverse way. The first palindromic poem recorded in Chinese literature history was the famous *"Revolving, reversible and waving picture"* [xuan" ji zhi jin'" tu"] composed by So Fe, wife of General Tu Tao of the Qin dynasty (207-245 B.C.). It consisted of 841 characters and could be read in various ways: forward, reverse, diagonally, and repeating every other character and then start with the next character."


蘇氏蕙若蘭織錦迴文璇璣圖
私淑女弟子史探幽謹繹

絃商秦曲發聲悲摧藏音和詠思
西遊王姿淑窕窈伯邵南周風興
翳桑懷歸思廣河女衛鄭楚樊厲
雙鳩士迤逶路遐志詠歌長歎不

http://masterchensays.wordpress.com/chinese-palindromes/

A list of symmetric and dissymmetric Chinese palindromes:
http://www.yellowbridge.com/chinese/palindromes.php

Palindromes, symmetric, dissymmetric and asymmetric are ubiquitous in Ancient languages

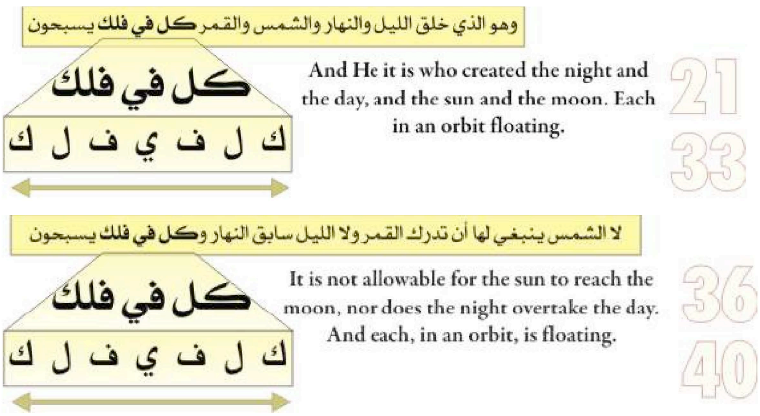
Spoken language based cultures, relegions, literature and their palindromes seems to be generally restricted to symmetric palindromes, reflecting Narcism, Reflection and Symmetry.

European Medieval Palindromes (symmetric and dissymmetric)

"Some palindromes were very complex. As a palindrome of palindromes, the Latin sentence
"Anna tent mappam madidam, multum tenet Otto,"
"Anna *holds a wet flag;* Otto *holds many," is a tour de force, so we have marked its pairs with a bold-italics-underline-gray sequence, starting in the center.*

Although many palindromes match single letters, like the central letters of the Latin word scilicet, "it is obvious," which mirrors c and c, i and i, until it gets to the middle, Anna/Otto *is closer to the Japanese palindrome, which is often made in a syllabary called kana that matches groups of letters, syllable to syllable, probably deriving from ancient China, where characters indicated phrases or sentences, and patterned texts could be easily constructed.''*
http://www.questia.com/library/1G1-313708423/palindromic-structure-in-the-pardoner-s-tale

Quran (symmetric palindromes)



http://www.balikislam.com/profiles/blogs/palindrome-and-syntax-in-the

Oral tradition

"Even in the totally Orthodox history, the Quran was an oral message. Muhammad neither received the text as it was, nor did he write it down himself."

http://dawah.invitetogod.com/videos/palindrome-miracle-in-quran-nouman-ali-khan

Architecture

http://www.sonic.net/~tallen/palmtree/symmetries/appendix.a.symm.htm

Mirroring Caspar-David-Friedrich on a Can

Date: 24 January 2013 17:25:27 GMT

"I only found some very old links in Google ... what happened to cybernetics in Germany ?

Best regards

Holger E, Dunckel

Holger E. Dunckel, For The Love Of God: The Caspar-David-Friedrich-Can!

"The Art of Living ... Life as a Piece of Art - ”

http://jpgmag.com/stories/19042

2.2.3. Culture theoretic citations on palindromes

The structure of temporality of palindromes and anagrammatics

"The idea of the palindrome is closely associated with the material and corporeal aspect of verbal signification. Animal images are used for symbolizing the palindromic processes of regression and circularity: the crab or cancer, and the snake biting its own tail (the gnostic image of Ouroboros).

"Likewise, the mirror metaphor has been applied to palindrome structures. Largely a visual phenomenon, the palindrome epitomizes the spatiality of language and scripture, something indicated already on the metaphorological plane of classical terminology: "running back again" (palindromos), "stepping back" (versus retrogradus) -- a temporal motion in space.

"Allowing for reversibility of the linear discourse, the palindrome represents the very idea of transformation and metamorphosis.

"Palindromic reversion is a device for breaking up the linearity of speech and, by implication, the irreversibility of time. Irreversibility "thematizes itself in the palindrome form by eating itself up" *(a quotation from* Oskar Pastior*, the outstanding contemporary German palindrome poet).*

"Sequentiality and causality of time and space are annihilated in the palindromic motion. Thus, the palindrome can be conceived of as a chronotope *of revolution. ('chrono-topos': time-space)."*

Erika Greber, PALINDROMON - ANAGRAMMATISMOS - REVOLUTIO: The Palindrome from the Perspective of Cultural Semiotics

http://realchange.org/pal/semiotic.htm

Christina Ljungberg, ‘Damn mad’: Palindromic figurations in literary narratives

> *"Palindromes are* chiastic *figurations that arrest the habitual tempo-linear sequence of language and, in so doing, focus attention on the very act of signification. In narrative, they often prove pivotal for the overall structure of the text, going far beyond mere wordplay or verbal virtuosity. Because they can be read both backwards and forwards, palindromes emerge as* multilayered, multidirectional, *and* polytemporal *mappings reflecting the notorious instability of human lives, where the ever shifting present oscillates between the past and the future. In contemporary fiction, such palindromic vacillation becomes an iconic representation of temporal shifting, allowing us to discern the texture of temporality, not as abstractly conceived but as concretely lived and hence as innovatively performing an unstable present.”*
> http://benjamins.com/#catalog/books/ill.5.21lju

All the emphasis made about the *temporality* of palindromes and chiasms is the result of *interpretations*, some hermeneutics and wild semiotic and culture-theoretical speculations. They might find some legitimation in the context of the whole corpus, texts, paintings, graphics, musical compositions, etc. but not at all in the *figure* of the chiasm and its derivation, the semiotic palindrome as such.

It seems that the difference-theoretical thematization, formalization and implementation of chiasms and palindromes by MorphoFSMs gives a much more comprehensive and convincing understanding of its ‘deviant’ logical structure.

2.3. Bio- and semiosphere

2.3.1. From semiotics to the semiosphere

Semiotics

> *"The subject of semiotics is any object, which acts as a means of linguistic description.”* (Kääriku, 1966)

Biosphere

> *"Vernadsky’s biosphere is a cosmic mechanism, which occupies a specific structural place in planetary unity.*
> *More specifically, this idea is expressed in the following formula:*
>
> *"The* biosphere — *consists of a quite definite structure, defining everything, without exception, which falls within it [...]. A thinking being, as he exists in nature, as do all living organisms, as does all living matter,*

is a function of the biosphere*, in its definition of the spatial-temporal.*

Semiosphere

"An analogous approach to semiotic questions is also possible. The semiotic universe may be regarded as the totality of individual texts and isolated languages as they relate to each other. In this case, all structures will look as if they are constructed out of individual bricks. However, it is more useful to establish a contrasting view: all semiotic space may be regarded as a unified *mechanism (if not organism)."* (Vernadsky 1977: 32)

2.3.2. Dialog, interplay and intertextuality

Borders, internal and external observer

"From the aforesaid, it is clear that "non-semiotic" space may actually occur within the space of other semiotics. Thus, from an internal point of view, a given culture can look like the external non-semiotic world, which, from the point of view of the external observer, may establish itself as a semiotic periphery.
Thus enantiomorphism represents the primary "mechanism" of dialogue.
The proof that mirror symmetry can radically change the functionality of the semiotic mechanism, lies in the palindrome.

"The semiosphere is that same semiotic space, outside of which semiosis itself cannot exist.

"The border of semiotic space is the most important functional and structural position, giving substance to its semiotic mechanism. The border is a bilingual mechanism, translating external communications into the internal language of the semiosphere and vice versa.
Thus, only with the help of the boundary is the semiosphere able to establish contact with non-semiotic and extra-semiotic spaces." (Lotman)

Holism

"One of the most important special features of Tartu semiotic school is that simple semiotic systems are not treated as prime elements, from which more complicated systems are formed, but vice versa: elementary semiotic systems are abstractions, simplicity means here simplification. From the viewpoint of semiosis, semiosphere as a whole is the initial unit which is divided into simple subordinate systems. In this respect Tartu semiotics differs in principle from Peirce's semiotics, the centre of which is (single) sign and its qualities; sign in Tartu semiotics

is not something which has been given immediately, but the product of analysis." (M. Lotman)

"Juri Lotman, when describing the assumptions for communication, has described a similar paradox: If two individuals are absolutely different from each other, if they do not have anything in common, then meaningful communication between them is impossible. But if two individuals are absolutely identical, then, also, communication is impossible — actually, it is possible, but they just do not have anything to tell each other. Semiosphere and a dual ecology: Paradoxes of communication."
(Kalevi Kull)
http://www.ut.ee/SOSE/sss/kull331.pdf

"Der Satz vom Grund ist der Grund vom Satz." (Heidegger)

Repeating the gesture of Lotman Jr. about Martin Heidegger's mistake by not understanding the necessity of the interactivity between beings to define Dasein, I have to correct M. Lotman about Peirce. Pierce's semiotics is not focused just on the "(single) sign and its qualities" but, contrary, its basic distinction is the interconnectedness and "*endless recursivity*" of signs. There is no single sign, no sigularity of the concept of signs, but the necessity of recursive relationship. That didn't hinder Peirce to develop an elaborated theory of the "single" sign and its functionalities.

Charles Sanders Peirce

"A Sign does not function as a sign unless it be understood as a sign.[...]
Thus there is a virtual endless series of signs when a sign is understood; and a sign never understood can hardly be said to be a sign."
(Peirce) 6 - v. 1902 - MS 599 - Reason's rules.
http://www.cspeirce.com/menu/library/rsources/76defs/76defs.htm

2.4. From morphogrammatics to morphosphere(s)

Polycontexturality
Morphogrammatics
Kenomics
Stirling turn
Morphospehres

2.4.1. Asymmetric palindromes in the morphosphere

The *pheno*-structure of palindromes is symmetric. That's part of the definition. Like "*anna*", "*b*", and "*elle*" as identitive words of the pheno-structure of the semiosphere. They are simple symmetric linguistic units, i.e. symmetric words. Hence, palindromes as we know them.

The *geno*-structure is overwhelmingly dominated by asymmetric palindromes.

The produced paradox of an asymmetric palindrome is well placed in the realm of the morphosphere where it even emerges as a central “key” of its (own) understanding.

The genotypical ‘word’ “*annabelle*” is composed from pheno-type words “*anna*”, “*b*” and “*elle*”, which are symmetric. But the composition of the parts to the word “*annabelle*” delivers an asymmetric palindrome. This asymmetric word “*annabelle*” is a palindrome on the genotype level of morphogrammatics but not a palindrome on the phenotype level of linguistics and semiotics.

The pheno-words “*anna*”, “*b*” and “*belle*” are therefore involved in a double game. As pheno-types, and in isolation, they are pheno- and genotypes at once. Both aspects are overlapping. In the context of composition to the word “*annabelle*” they are part of an asymmetric genotypic palindrome.

This leads to the insight that the relationality between geno- and phenotypes is not hierarchical but is involved in the interplay of a heterarchic chiasms. This aspect of achiastic interplay is not well recognized in classical theories where the relationship between geno- and phenotypes is generally thougth as a stable hierarchy.

Results

In the morphosphere, asymmetric palindromes are structurally and quantitatively dominant.

Enantiomorph, dual and symmetric palindromes belong to the semiophere. Despite their dialogical and multi-world conception by Yuri Lotman palindromes are based on an atomic and linear sign concept. The identity of the forward and backward reading is tested step-wise, comparing atomic signs after atomic signs. There are no considerations about contexts involved at all.

The morphosphere is a sphere beyond the semiosphere. Like the semiosphere, it has to be distinguished from the noosphere and the biosphere.

Discontexturality: Why not jump?

Mark Studheim said

October 23, 2012 at 13:50

"Unfortunately, Kaehr is sometimes difficult to follow due to his sometimes unordered and abrupt style of writing."

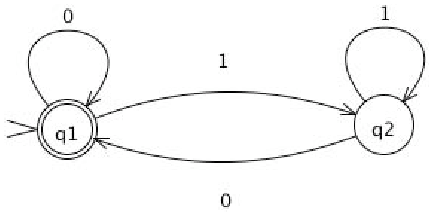
http://speculativenonbuddhism.com/non-x-discussions/

2.4.2. How to read a morphic palindrome?

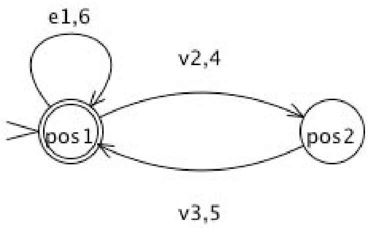
Retrograde recursivity

Comparison of traces of FSA and MorphoFSA

Example1: FSA(1100)



MorphoFSA[aabb]



Reading procedure

FSA (**aabb**)	**MorphoFSA[aabc]**
q_0 : **aabb**	init, pos1 : [**aabb**]
↓	↓
q_0 : **a**abb	e1, pos1 : [**aa**bb]
↓	↓
q_1 : **aa**bb	v2, pos2 : [**a**a**b**b]
↓	↓
q_2 : **aab**b	v3, pos1 : [a**ab**b]
↓	↓
q_2 : **aabb**.	v4, pos2 : [**a**ab**b**]
	↓
	v5, pos1 : [a**a**b**b**]
	↓
	e6, pos1 : [aa**bb**] ⇒ [**aabb**] .

For the MorphoFSM the development is not atomic, symbolic and stepwise, one after the other: (a, aa, aab, aabb). But retrograde recursive as: (**aa**bb, **a**a**b**b, a**ab**b, **a**ab**b**, a**abb,** aa**bb).** The distinction for the 'head' "aa" is not complete with the first differentiation by "e1". This would hold only for "aa" alone, as a single and isolated morphogram. But the differentiation "e1", represented as [aa] is embedded into the whole morphogram [aabb]. Hence the monomorphy [aa] is determined additionally by the distinctions "v2-5" in relation with the 'tail' of the morphogram.

Hence, for [aabb] as [$a_1a_2b_3b_4$], "a_1"is defined by "a_2", "b_3" and "b_4". The same for "a_2"; "a_2" is defined retrogradely by "b_3" and "b_4". This process goes 'forwards' and 'backwards':
e1;$a_1 \rightarrow a_2$, v2;$a_1 \rightarrow b_3$, v3;$b_3 \rightarrow a_2$, v4;$a_1 \rightarrow b_4$, v5;$b_4 \rightarrow a_2$, e6;$b_3 \rightarrow b_4$.

The FSA example is easily extended to the reading/writing actions of Turing machines with its right and left movements from atomic sign to atomic sign.

Linear vs. tabular notation

Semiotic sequence

$$\left(\mathrm{aabb}\right):\left(x\ \boxed{a_1\ \ a_2\ \ b_3\ \ b_4}\ \ x\right)$$

Kenomic constellation

$$\left[\mathrm{aabb}\right]=\begin{pmatrix} \mathrm{e1} & \mathrm{v2} & \mathrm{v4} \\ \mathrm{v3} & \mathrm{v5} & - \\ \mathrm{e6} & - & - \end{pmatrix}$$

$$\begin{tikzcd}
a_1 \arrow[rr, dash, "e1"] \arrow[d, dash, "v4"'] \arrow[drr, dash, "v2"] & & a_2 \arrow[d, dash, "v3"] \arrow[dll, dash, "v5"'] \\
b_4 \arrow[rr, dash, "e6"'] & & b_3
\end{tikzcd}
\qquad
\boxed{\begin{array}{l}
\mathrm{e1}: \mathrm{a}_1 \longrightarrow \mathrm{a}_2 \\
\mathrm{v2}: \mathrm{a}_1 \longrightarrow \mathrm{b}_3 \\
\mathrm{v3}: \mathrm{a}_2 \longrightarrow \mathrm{b}_3 \\
\mathrm{v4}: \mathrm{a}_1 \longrightarrow \mathrm{b}_4 \\
\mathrm{v5}: \mathrm{a}_2 \longrightarrow \mathrm{b}_4 \\
\mathrm{e6}: \mathrm{b}_3 \longrightarrow \mathrm{b}_4
\end{array}}$$

Quite obviously, the reading strategies for a morphic “Turing” machine has to consider the double ‘identification’ of kenoms necessary to read the content of the cells of the ‘*tape*’ according to the E/N-structure of the ‘*words*’, i.e. the morphograms.

Conventional enumeration

The enumeration of the relations in a morphic complexion, morphogram, is conventional. Semiotic enumeration of the elements of the linear string are necessarily linear along the construction of the word.
Complexions are allowing different modi of enumeration the relations between the kenograms of a morphogram.
For practical reasons, the above enumeration is chosen.

Again, this shows the crucial difference of recursive repetition, i.e. *recursion*, and *retrograde* recursivity, i.e. *reflection*.

Identification scheme

tape :

1	2	3	4	5	6
d	*a*	*b*	*a*	*c*	*d*

$\Uparrow$ reading head

$\boxed{\text{ident " a "; 2}}$ **: semiotics**

$$(\alpha) \equiv_{\text{sem}} (\beta)$$
$$\text{iff}$$
$$\forall\, i, j : \left(\text{ident}\left(\alpha_i\right)\right) = \left(\text{ident}\left(\beta_j\right)\right)$$
$$i, j \in \left|\alpha\right| = \left|\beta\right|$$

Differentiation scheme

matrix :

1	2	3	4	5	6
d	*a*	*b*	*a*	*c*	*d*

reading heads $\Uparrow$ $\Uparrow$: *identifications*

$\boxed{\text{ident " a "; 2, " c "; 5}}$

re – reading head $\Uparrow$: *differentiation*

$\boxed{\text{" v "}(2, 5)}$ **: morphics**

$$\left(MG_1\right) \equiv_{\text{morph}} \left(MG_2\right)$$
$$\text{iff}$$
$$\forall\, i, j : \left(\text{diff}\left(MG_{1_i}, MG_{1_j}\right)\right) = \left(\text{diff}\left(MG_{2_i}, MG_{2_j}\right)\right)$$
$$i, j \in \left|MG_1\right| = \left|MG_2\right|$$

Without doubt, things are much more intriguing. The trick shall work nicely for a Beginners Guide.

Semiotics is build by a reflection on signs. Such reflections are first-order cognitions.

Morphogramatics is build on a reflection on semiotics, i.e. a reflection on a reflection on semiotics. They are second-order cognitions. But there is no need to keep and defend the semiotic symmetry in the realm of morphogrammatics.

Therefore, the monomorphy [aa] of the palindrome [aabb] is defined by the whole morphogram and there is no need to *count* and *remember* the number of elements of the 'head' of the palindrome to be able to 'repeat' it as the 'tail'. Those informations are intrinsically included in the procedure of the production of the morphogram, i.e. the palindrome.

In other words, the 'head' [aa] of the palindrome as such and in isolation has no completed and definitely defined existence. Again, in the case of FSAs, the 'head' (aa) in (aabb) is recognized and 'counted' as complete in itself.

As a consequence, it has to be seen that "e1" as the first arrow of the diagram DiagrMorphoFSM(e,v,e0) is retrogradely determined by the whole diagram, and has a different definition if taken separately. The same holds for the last arrow, "e6". This might be more obvious because it occurs at the "end" of the morphogram.

But again, this is misleading. A morphogram is despite its possible stepwise analysis not a string, chain, list or sequence but an inter-related whole, morphé. This fact is faithfully represented by the EN-structure of morphograms that takes into account all the differences between kenogrammes.

Retrogression and anticipation

On the other hand, the 'tail' gets its characterization by the characterization of the 'head' by the definition of the 'head' designed by the 'tail'.

Again, these retrograde recursivity functions, functioning as the '*counter*' and as the '*memory*' necessary for the construction of the palindrome are defining the crucial difference to the classical a-temporal symbolic constructions.

The retrograde movement to characteize the 'head' of a palindrome is involved with a progression 'into' the 'tail' to define by retro-gression the 'head' of the palindrome.

Retrograde recursivity is always involved, simultaneously, into *anticipation*.

In fact, this retrograde functionality is a general property of morphograms and their construction rules.

An application of this surprising fact to automata shows that morphic automata, MorphoFSM, are defined by their immanent temporality based on their retrograde recursive characterization.

Classical finite state automata, and all its further developments, up to Turing machines, are by definition a-temporal. They might have access to a storage function but they don't have an *intrinsic* memory.

As a result, the questions of regularity/nonregularity of formal languages have to be tackled in a very different light.

2.4.3. Morphospheric domains

The function Tcontexture(n) determines the range of the morphospheric domain for the complexity n.

Example

```
- length(Tcontexture 8);
val it = 4140 : int
Tcard 8 = 4140.
```

The list of 4140 morphograms is for technical reasons not printed. There are exactly 4140 different morphograms of the morphospheric domain with complexity 8.

Out of this domain there are exactly 164 palindromes filtered. Out of the list of those (asymmetric) palindromes, exactly 15 symmetric palindromes are found. Hence, the total of *asymmetric* palindromes is 149 (164-15).

Palindromes: asymPalin (8), includs symPalin(8)

```
2 [[1,1,1,1,1,1,1,1],[1,1,1,1,2,2,2,2],[1,1,1,2,1,2,2,2],[1,1,2,1,2,1,2,2],
 [1,1,2,2,1,1,2,2],[1,1,2,2,2,2,1,1],[1,2,1,1,2,2,1,2],[1,2,1,2,1,2,1,2],
 [1,2,1,2,2,1,2,1],[1,2,2,1,1,2,2,1],[1,2,2,1,2,1,1,2],[1,2,2,2,1,1,1,2],
 [1,1,1,2,2,1,1,1],[1,1,2,1,1,2,1,1],[1,2,1,1,1,1,2,1],[1,2,2,2,2,2,2,1],
 [1,1,1,2,2,3,3,3],[1,1,2,3,3,1,2,2],[1,1,2,1,3,2,3,3],[1,1,2,3,1,2,3,3],
 [1,2,1,3,3,2,1,2],[1,2,2,3,3,1,1,2],[1,2,3,1,2,3,1,2],[1,2,3,2,1,3,1,2],
 [1,2,1,1,3,3,2,3],[1,2,1,3,1,3,2,3],[1,2,3,1,3,1,2,3],[1,2,3,3,1,1,2,3],
 [1,2,2,2,3,3,3,1],[1,2,2,3,2,3,3,1],[1,2,3,2,3,2,3,1],[1,2,3,3,2,2,3,1],...]]
- length it;
val it = 164 : int
```

Symmetric palindromes: symPalin(8)

```
val it =
 [[1,1,1,1,1,1,1,1],[1,1,2,2,2,2,1,1],[1,2,1,2,2,1,2,1],[1,2,2,1,1,2,2,1],
  [1,1,1,2,2,1,1,1],[1,1,2,1,1,2,1,1],[1,2,1,1,1,1,2,1],[1,2,2,2,2,2,2,1],
  [1,1,2,3,3,2,1,1],[1,2,1,3,3,1,2,1],[1,2,3,1,1,3,2,1],[1,2,2,3,3,2,2,1],
  [1,2,3,2,2,3,2,1],[1,2,3,3,3,3,2,1],[1,2,3,4,4,3,2,1]] : int list list
- length it;
val it = 15 : int
```

Deutero-structure of palindromes: dnfpalindrome

```
- fun dref ks = dnf(rev ks);
val dref = fn : "a list -> int list
```

```
- fun dnfpalindrome d  = (d  = dref d);
val dnfpalindrome = fn : int list -> bool
- dnfpalindrome [1,2,3,1,1,2,1];
val it = false : bool
- dnfpalindrome [1,1,1,2,3,3,3];
val it = true : bool
List.filter dnfpalindrome "Tcontexture n"
```

- Dcontexture 8;

```
val it =
 [[1,1,1,1,1,1,1,1],[1,1,1,1,2,2,2,2],[1,1,1,1,1,2,2,2],[1,1,1,1,1,1,2,2],
  [1,1,1,1,1,1,1,2],[1,1,1,2,2,2,3,3],[1,1,1,1,2,2,3,3],[1,1,1,1,2,2,2,3],
  [1,1,1,1,1,2,2,3],[1,1,1,1,1,1,2,3],[1,1,2,2,3,3,4,4],[1,1,1,2,2,3,3,4],
  [1,1,1,2,2,2,3,4],[1,1,1,1,2,2,3,4],[1,1,1,1,1,2,3,4],[1,1,2,2,3,3,4,5],
  [1,1,1,2,2,3,4,5],[1,1,1,1,2,3,4,5],[1,1,2,2,3,4,5,6],[1,1,1,2,3,4,5,6],
  [1,1,2,3,4,5,6,7],[1,2,3,4,5,6,7,8]]
- length it;
val it = 22 : int
Dcard 8 = 22
```

Palindromes from Dcontexture 8:

```
ispalindrome
val it =
 [[1,1,1,1,1,1,1,1],[1,1,1,1,2,2,2,2],[1,1,2,2,3,3,4,4],[1,2,3,4,5,6,7,8]]
 : int list list
```

Deutero-palindromes from Tcontexture 8

dnfispalindrome

```
val it =
 [[1,1,1,1,1,1,1,1],[1,1,1,1,2,2,2,2],[1,1,1,2,2,3,3,3],[1,1,2,2,2,2,3,3],
  [1,2,2,2,2,2,2,3],[1,1,2,2,3,3,4,4],[1,1,1,2,3,4,4,4],[1,2,2,2,3,3,3,4],
  [1,1,2,3,3,4,5,5],[1,2,2,3,3,4,4,5],[1,2,3,3,3,3,4,5],[1,1,2,3,4,5,6,6],
  [1,2,2,3,4,5,5,6],[1,2,3,3,4,4,5,6],[1,2,3,4,4,5,6,7],[1,2,3,4,5,6,7,8]]
 : int list list
- length it;
val it = 16 : int
```

Tcontexture 9

Examples

```
  [.....]
  [1,2,3,4,3,5,6,7,8],[1,2,3,4,5,3,6,7,8],[1,2,3,4,5,6,3,7,8],
  [1,2,3,4,5,6,7,3,8],[1,2,3,4,5,6,7,8,3],[1,2,3,4,4,5,6,7,8],
  [1,2,3,4,5,4,6,7,8],[1,2,3,4,5,6,4,7,8],[1,2,3,4,5,6,7,4,8],
  [1,2,3,4,5,6,7,8,4],[1,2,3,4,5,5,6,7,8],[1,2,3,4,5,6,5,7,8],
  [1,2,3,4,5,6,7,5,8],[1,2,3,4,5,6,7,8,5],[1,2,3,4,5,6,6,7,8],
  [1,2,3,4,5,6,7,6,8],[1,2,3,4,5,6,7,8,6],[1,2,3,4,5,6,7,7,8],
  [1,2,3,4,5,6,7,8,7],[1,2,3,4,5,6,7,8,8],[1,2,3,4,5,6,7,8,9]]
 : int list list
```

```
val it = 21147 : int
Tcard 9 = 21147.
```

Examples
Some palindromes:

```
val it =
[...]
  [[1,2,3,3,4,5,5,6,7],[1,2,3,4,5,3,4,6,7],[1,2,3,4,5,4,3,6,7],
   [1,2,3,4,1,5,6,7,1],[1,2,3,4,2,5,6,2,7],[1,2,3,4,3,5,3,6,7],
   [1,2,3,4,4,4,5,6,7],[1,2,3,4,5,6,7,8,1],[1,2,3,4,5,6,7,2,8],
   [1,2,3,4,5,6,3,7,8],[1,2,3,4,5,4,6,7,8],[1,2,3,4,5,6,7,8,9]]
  : int list list
- length it;
val it = 12 : int
```

- Dcontexture 9: 30

```
val it =
  [[1,1,1,1,1,1,1,1,1],[1,1,1,1,1,2,2,2,2],[1,1,1,1,1,1,2,2,2],
   [1,1,1,1,1,1,1,2,2],[1,1,1,1,1,1,1,1,2],[1,1,1,2,2,2,3,3,3],
   [1,1,1,1,2,2,2,3,3],[1,1,1,1,2,2,2,2,3],[1,1,1,1,1,2,2,3,3],
   [1,1,1,1,1,2,2,2,3],[1,1,1,1,1,1,2,2,3],[1,1,1,1,1,1,1,2,3],
   [1,1,1,2,2,3,3,4,4],[1,1,1,2,2,2,3,3,4],[1,1,1,1,2,2,3,3,4],
   [1,1,1,1,2,2,2,3,4],[1,1,1,1,1,2,2,3,4],[1,1,1,1,1,1,2,3,4],
   [1,1,2,2,3,3,4,4,5],[1,1,1,2,2,3,3,4,5],[1,1,1,2,2,2,3,4,5],
   [1,1,1,1,2,2,3,4,5],[1,1,1,1,1,2,3,4,5],[1,1,2,2,3,3,4,5,6],
   [1,1,1,2,2,3,4,5,6],[1,1,1,1,2,3,4,5,6],[1,1,2,2,3,4,5,6,7],
   [1,1,1,2,3,4,5,6,7],[1,1,2,3,4,5,6,7,8],[1,2,3,4,5,6,7,8,9]]
  : int list list
- length it;
val it = 30 : int
```

dnfispalindrome: ”Dcontexture 9"

```
val it = [[1,1,1,1,1,1,1,1,1],[1,1,1,2,2,2,3,3,3],[1,2,3,4,5,6,7,8,9]]
  : int list list
```

dnfispalindrome: ”Dcontexture 10"

```
val it = [[1,1,1,1,1,1,1,1,1,1],[1,1,1,1,1,2,2,2,2,2],[1,1,2,2,3,3,4,4,5,5],
   [1,2,3,4,5,6,7,8,9,10]] : int list list
```

- Pcontexture 9;

```
val it =
  [[1,1,1,1,1,1,1,1,1],[1,1,1,1,1,1,1,1,2],[1,1,1,1,1,1,1,2,3],
   [1,1,1,1,1,1,2,3,4],[1,1,1,1,1,2,3,4,5],[1,1,1,1,2,3,4,5,6],
   [1,1,1,2,3,4,5,6,7],[1,1,2,3,4,5,6,7,8],[1,2,3,4,5,6,7,8,9]]
  : int list list
```

pnfispalindrome:

```
val it = [[1,1,1,1,1,1,1,1,1],[1,2,3,4,5,6,7,8,9]] : int list list
```

Table of the domains and their palindromes

n	Tcontexture Bell numbers	Palindromes	symPal	asymPalin
3	5	3	2	1
4	15	7	2	5
5	52	12	5	7
6	203	31	5	36
7	877	59	15	44
8	4140	164	15	159
9	21147	A002872 ?	A205482 ?	?

Basis morphograms and palindromes of propositional polycontextural logic $\mathbf{Log}^{(2,4)}$

```
- Tcontexture 4;
val it =
  [[1,1,1,1],[1,1,2,2],[1,2,1,2],[1,2,2,1],[1,1,1,2],[1,1,2,1],[1,2,1,1],[1,2,2,2],
  [1,1,2,3],[1,2,1,3],[1,2,3,1],[1,2,2,3],[1,2,3,2],[1,2,3,3],
  [1,2,3,4]] : int list list
- List.filter ispalindrome "Tcontexture 4"
val it =
  [[1,1,1,1],[1,1,2,2],[1,2,1,2],[1,2,2,1],[1,2,3,1],[1,2,2,3],[1,2,3,4]]
  : int list list
- List.filter palindrome "Tcontexture 4"
val it = [[1,1,1,1],[1,2,2,1]] : int list list
```

Obviously, a palindromic morphogram is reflector invariant:
refl[1,2,2,3] $=_{MG}$ [3,2,2,1] $=_{MG}$ [1,2,2,3].
refl[1,2,3,1] $=_{MG}$ [1,3,2,1] $=_{MG}$ [1,2,3,1]

2.4.4. Decidability of palindromes

Human perception is fit to decide if a finite semiotic sequence is a palindrome or not. This is realized by the procedure of step-wise comparison of the atomic elements of the strings and the ability to *memorizes* its results for forward and backward comparison. Human perception is able to decide the property of a string of being a palindrome or not. So are Turing machines. But not machines without memory, like finite state machines (FSM). This holds in the semiosphere, where it has an established elaboration with the *Pumping Lemma*.

How does it work in the morphosphere?
A further crucial difference between the semio- and the morphosphere is established by the way *prolongations* (successions) of inscriptions are defined.

Semiotic inscriptions are sign sequences and their prolongations are defined abstractly, by adding (concatenating) an atomic element to the given sequence in recourse to their pre-given alphabet.

Semiotic concatenation is defined abstractly and history-independent, i.e. without any retro-grade recursivity with the history of the object to be prolongated. A precondition to this manoeuvre is the perceptibility of written signs and sign sequences. *Separation* and *identification* of signs are the paradox procedures of pattern recognition. The paradox of identification and separation is the unsolved circularity and simultataneity of both.

From a strictly formal point of view of the definition of semiotic objects, the deep-structure of the *semiosphere* is profoundly abstract and history-independent.

As exposed at many places, morphograms are coming into existence by retro-grade history-dependence only. There are no morphograms without other morphograms. This holds not just for the inter-relationship between different morphograms as it is the case for sings of the semiosphere but for the very definition of morhograms on any level of morpho-analysis.

A more reflected analysis of Peirce's introduction of signs as it has been shown by the semiotician Alfred Toth discovers a retrograde defined chain of an involvement of unary, binary and ternary relations. This is in contrast to the common idea of an abstract superposition of unary, binary and ternary relations.

Unfortunately, the idea of a relationship as such is kept alive with that approach of a relational definition. Relations are presupposing entities for whom the relations are defined.

Morphograms don't have any elements, and therefore there are also no relations at work.

As a consequence, the question of decidability of morphic palindromes by morphic 'finite state' machines (MorphoFSM) occurs in a different light.

2.4.5. Chaitin's information theory and differentiations of morphograms

"Algorithmic information theory focuses on individual objects rather than on the ensembles and probability distributions considered in Claude Shannon and Norbert Wiener's information theory.

"How many bits does it take to describe how to compute an individual object? In other words, what is the size in bits of the smallest program for calculating it?

"It is easy to see that since general-purpose computers (universal Turing machines) can simulate each other, the choice of computer as yard-

> *stick is not very important and really only corresponds to the choice of origin in a coordinate system.*
>
> *The fundamental concepts of this new information theory are: algorithmic information content, joint information, relative information, mutual information, algorithmic randomness, and algorithmic independence. These are defined roughly as follows." (Chaitin)*

A reasonable approach to connect Chaitin's construction with that of morphogrammatics and morphic finite state machines is a reformulation of the question: *How many* bits *does it take to describe how to compute an individual object?* to the question: *How many* differentiations *does it take to describe how to create (compute) an individual morphic pattern?*

The analogy will work up to the crucial point of the application of Cantor's Diagonal Method. A construction that is highly complicitive with classical logic and its problems with self-referentiality, paradoxes and antinomies.

The analogon to Cantor's strategy in the realm of morphogrammatics uncovers its chimeric hallucination. (cf."Gödel's Games"). works.bepress.com/thinkartlab/26/

A *bit* might be a distinction (G. Spencer-Brown) but a distinction is different from the concept of differentiation (difference, differance).

Hence, it might be speculated that Chaitin's "new Gödel Theorem" doesn't hold (in a classical way) for differentiation machines.

> *"The proof of this closely resembles G. G. Berry's paradox of "the first natural number which cannot be named in less than a billion words," published by Russell at the turn of the century (Russell, 1967). The version of Berry's paradox that will do the trick is "that object having the shortest proof that its algorithmic information content is greater than a billion bits."*
>
> *"More precisely, "that object having the shortest proof within the following formal axiomatic system that its information content is greater than the information content of the formal axiomatic system: . . . ," where the dots are to be filled in with a complete description of the formal axiomatic system in question." (Chaitin)*

At the base of most fundamental meta-theorems in decidability questions of formal languages is prominently Cantor's Diagonal method to encounter.

A morphic caricature of Cantor's Diagonal method

It might be a *caricature* of Cantor's game but the following 'construction' gives a hint towards the direction of morphogrammatic studies of the Diagonal methods and their applications. (cf. "Gödel's Games")

Take a list of morphograms as finitely produced words:

Matrix M

1. [**1**,1,1,1,1, ...,1,1]
2. [1,**1**,1,1,1, ...,1,1]
3. [1,1,**1**,1,1, ...,1,1]
4. [1,1,1,**1**,1, ...,1,1]

...   ...

Diagonalize the occurrences of the kenoms in M:

d = [0,0,0,0,....,0,0].

Obviously **d** is not a member of the matrix M.

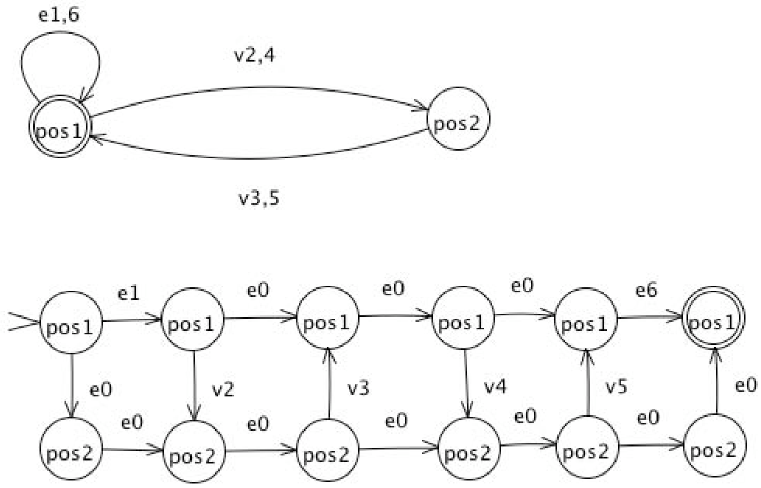
Unfortunately, [0,0,0,0,....,0,0] $=_{MG}$ [1,1,1,1,....,1,1], hence, **d** is a member of **M.** #

Result

Opposite contradiction to Cantor's contradiction.

2.4.6. Morphic finite state machine for the palindrome [aabb]

DiagrMorphoFSM(e,v) and DiagrMorphoFSM(e,v, e0) for [aabb]



Is this supporting the structure if the distinctions v2 to v5 are strong enough to hold the memory of the development together?

In contrast to the classical FSA concept, there is no such *counting* process involved for the morphic machine, where the results have to be mentally *remembered* or stored for Turing machines (computers) and then used for the continuation of the process of the construction of the morphic palindrome.

R. Kaehr, Finite State Machines and Morphogrammatics. Machines on Differences: A Contribution to Saussure-Derrida Machines
http://memristors.memristics.com/MorphoFSM/Finite%20State%20Machines%20and%20Morphogrammatics.html

2.4.7. Bifunctoriality between semio- and morphospheres

How are latent morphic palindromes manifested in the semiosphere?
The number of representations is clearly:

What isn't self-evident is the choice possible between a 'parallel' *mediated* compound of interpretation of the representations and the possibility to understand the 'same' representations as a *set* of possible manifestations of the latend, i.e. genotypical palindrome (morphogram).

[palin] = ((palin) ∐ (palin) ∐ ... ∐ (palin))
[palin] = {(palin), (palin), ..., (palin)}

Symmetric palindromes

$\text{Morph}^{(6,2)}$: $\text{Sem}^{(6,3)}$:

$$\left[1, 1, 2, 2, 1, 1\right] = \begin{pmatrix} \left(1, 1, 2, 2, 1, 1\right) \\ \amalg \\ \left(2, 2, 1, 1, 2, 2\right) \\ \amalg \\ \left(1, 1, 3, 3, 1, 1\right) \\ \amalg \\ \left(3, 3, 1, 1, 3, 3\right) \end{pmatrix}$$

Asymmetric palindromes

$\text{Morph}^{(6,3)}$: $\text{Sem}^{(6,4)}$:

$$\left[1, 1, 2, 2, 3, 3\right] = \begin{pmatrix} (1, 1, 2, 2, 3, 3) \\ \parallel \\ (1, 1, 3, 3, 2, 2) \\ \parallel \\ (2, 2, 1, 1, 3, 3) \\ \parallel \\ (2, 2, 3, 3, 1, 1) \\ \parallel \\ (3, 3, 1, 1, 2, 2) \\ \parallel \\ (3, 3, 2, 2, 1, 1) \\ \parallel \\ (3, 3, 2, 2, 4, 4) \\ \ldots \end{pmatrix}$$

Semanalysis

"***Freud***. *Unlike traditional linguistics,* semanalysis *addresses an element that is beyond, heterogeneous to, language, Freud's other scene. This* other scene*, however, challenges the very possibility of science.* Semanalysis*, in order to avoid the necrophilia of other theories of language, must always question its own presuppositions and uncover, record, and deny its own ideological gestures (Semeiotiké 78-79).*"
www.taalfilosofie.nl/bestanden/hopkins_kristeva.pdf

3. Palindromic cryptography and DNA an analysis

3.1. Cryptography

Applications

You might lock your door with one key, but you will have to unlock it with another key.

"For both poststructuralists and postmodernists, "the world is in all its parts a cryptogram to be constituted and reconstituted through poetic inscription or deciphering."

Symmetric and public cryptograph

"Symmetric key cryptography is also known as shared key cryptography. As the name suggests, it involves 2 people using the same private key

to both encrypt and decrypt information. Public key cryptography, on the other hand, is where 2 different keys are used – a public key for encryption and a private key for decryption.

"Because symmetric *key cryptography uses the same key for both decryption and encryption, it is much faster than public key cryptography, is easier to implement, and generally requires less processing power. A disadvantage of symmetric key cryptography is that the 2 parties sending messages to each other must agree to use the same* private *key before they start transmitting secure information. This may be impossible depending on the circumstances – because the 2 parties who want to communicate with each other through a secure means may be on different sides of the world. And this means that they will need a secure way to tell each other what the private key will be – if there were a secure way to do this, then the cryptography would not have been necessary in the first place in order to create that secure channel."*
http://www.programmerinterview.com/index.php/general-miscellaneous/symmetric-vs-public-key-cryptography/

3.2. Remarks on DNA concepts

Who still beliefs that living matter is beyond the objectivistic principle of identity has to learn the lessons of our geneticists. There is a dangerous poverty of imagination at work that is dominating our health protection.

How simple life is conceived by contemporary scientists is resumed by the quote of Paul Davis:

"There is a second distinctive way in which life handles information processing. The language of genes is digital, consisting of discrete bits, cast in the language of a four-letter alphabet. *By contrast, chemical processes are continuous. Continuous variables can also process information – so-called analogue computers work that way – but less reliably than digital. Whatever chemical system spawned life, it had to feature a transition from analogue to digital."*
http://www.guardian.co.uk/commentisfree/2013/jan/13/secret-life-unveiled-chemistry-lab

The process molecular gene concept
http://www.scielo.br/pdf/gmb/v30n2/a01v30n2.pdf
Francis Crick, Central Dogma of Molecular Biology (1970)
http://www.nature.com/nature/focus/crick/pdf/crick227.pdf
http://www.nature.com/nature/insights/6921.html

Gerald R. Smith, Meeting DNA palindromes head-to-head
'Usually thought of as a linear double helix, DNA can in reality assume many different structures, some of which have profound influences on DNA's biological functions. For example, palindromic DNA sequences, which read the same *in opposite directions (but on* different strands*), can extrude to form a cruciform, with both strands involved, or a hairpin, with only one strand involved(Fig. 1). '*
http://genesdev.cshlp.org/content/22/19/2612.full.html#related-urls
(*cruciform (Holliday junction)*: part of chiasm!)

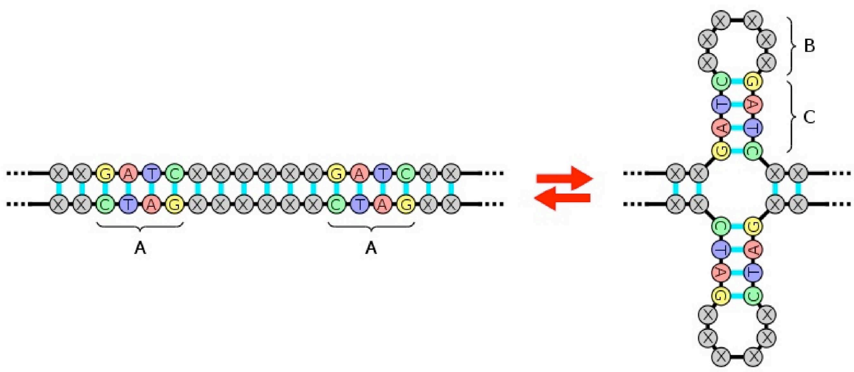
If the concept of "*gene*" is in a critical epistemological struggle what does it imply for the concept of "DNA"?

With the "discovery" of strictly asymmetric palindromes, some modeling of DNA strands might lose their obscurity and might emerge as new discoveries and becoming overwhelmingly standard.

" ... is said to be a palindrome *if it is equal to its reverse complement. For example, the DNA sequence ACCTAGGT is palindromic because its nucleotide-by-nucleotide complement is TGGATCCA, and reversing the order of the nucleotides in the complement gives the original sequence." (WiKi, Palindromic sequence)*

"A DNA locus whose 5'-to-3' sequence is identical on each DNA strand. The sequence is the same when one strand is read left to right and the other strand is read right to left. Recognition sites of many restriction enzymes are palindromic."

http://groups.molbiosci.northwestern.edu/holmgren/Glossary/Definitions/DefP/palindromic_sequence.html



http://en.wikipedia.org/wiki/File:DNA_palindrome.svg

Armita Sheari et al, *A tale of two symmetrical tails:* Structural and functional characteristics of palindromes in proteins

*"It has been previously shown that palindromic sequences are frequently observed in proteins. However, our knowledge about their evolutionary origin and their possible importance is incomplete. "Sator Square contains probably the oldest known palindrome, which shows the Latin sentence "SATOR AREPO TENET OPERA ROTAS". Note that the word "*tenet*" is a palindrome itself.*

Palindrome definition

We define palindrome to be any sequence as XYX^R, in which X, Y and X^R are strings of the 20 standard amino acids, and X^R is the reverse of string X. In this palindrome, X and X^R will be referred to as the palindrome "sides", while Y is the "linker". Length of a sequence S will be shown by |S|.

http://www.biomedcentral.com/1471-2105/9/274

Without any polemics we have to ask where the examples of the category of strictly asymmetric palindromes are to discover in the biosphere?

Stipulation: They are everywhere in living matter. But they are undiscovered or unmasked because of the genuine lack of conceptual, mathematical and logical instruments to discover them.

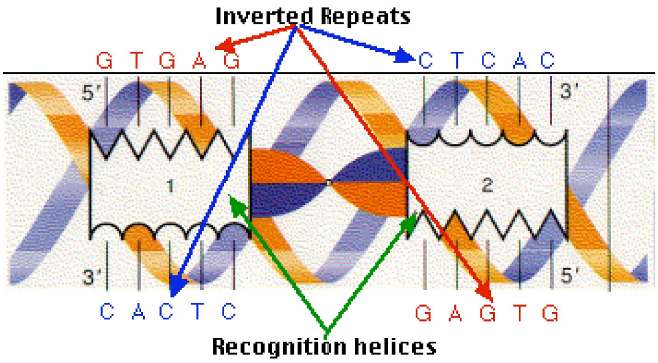
Asymmetry is often considered as *defective*. Maybe, strictly asymmetric palindromes appear in living matter as what is generally recognized by the scientific approach as "*junk*". On the other side, asymmetry is playing an important role in aesthetics, arts and history-depending living systems (structurations, organisms, etc.).

New experiences on the *nanosphere* might give promising hints to reformulate the present research programs (memristive systems, Hammeroff/Penrose).

Junk DNA: Repetitive extragenic palindromic sequences

"For many years, a large part of the extragenic sequence in genomes was thought to be essentially silent and devoid of function, hence the popular term 'junk DNA'. *This paradigm changed considerably over the last two decades, as it has become apparent that these sequences often encode unexpected functions as evidenced by the discovery of microRNAs and their role in gene regulation, and by the identification of a new class of short palindromic repeats, known as Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR), which are critical in prokaryotic immunity."* (Fred Dyda et al, 2012)

http://nar.oxfordjournals.org/content/early/2012/08/09/nar.gks741.fu ll



http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/P/Palindromes.html

"Palindromes are important sequences within nucleic acids. Often they are the site of binding for specific enzymes (e.g., restriction endobucleases) designed to cut the DNA strands at specific locations (i.e., at palindromes)."
http://science.jrank.org/pages/4995/Palindrome.html#ixzz2DWGoqYPR

"Genome engineering requires the ability to insert, delete, substitute *and otherwise manipulate specific genetic sequences within a genome, and has numerous therapeutic and biotechnological applications. The development of effective means for genome modification remains a major goal in gene therapy, agrotechnology, and synthetic biology [...].*

"*A common method for inserting or modifying a DNA sequence involves introducing a transgenic DNA sequence flanked by sequences homologous to the genomic target and selecting or screening for a successful homologous recombination event. Recombination with the transgenic DNA occurs rarely but can be stimulated by a double-stranded break in the genomic DNA at the target site."*

Non-palindromic
"As used herein, the term "non-palindromic" refers to a recognition sequence composed of two unrelated half-sites of a meganuclease. In this case, the non-palindromic sequence need not be palindromic with respect to either the central base pairs or 4 or more base pairs at each of the two half-sites. Non-palindromic DNA sequences are recognized by either di-LAGLIDADG meganucleases, highly degenerate mono-LAGLIDADG meganucleases (e.g., I-Ceul) or by heterodimers of mono-LAGLIDADG meganuclease monomers that recognize non-identical half-sites.

"*In the latter case, a non-palindromic recognition sequence may be referred to as a "hybrid sequence" because the heterodimer of two* *different mono-LAGLIDADG monomers, whether or not they are fused into a single polypeptide, will cleave a recognition sequence comprising one half-site recognized by each monomer. Thus, the heterodimer recognition sequence is a hybrid of the two homodimer recognition sequences."*

http://www.freshpatents.com/-dt20101209ptan20100311817.php

Palindromic closure problem of "cut and past"

It seems that the main structure of the studied sequences is palindromicity. Hence, the question is, how to "cut and paste" parts of the palindromic sequences and at the sam time preserving its palindromicity?

Certainly, there is not much scope left for *"cut-and-paste"* actions for semiotic palindromes to preserve their palindromicity.
The sequence [1,2,2,1,**2,2**,1,2,2,1] might be changed into [1,2,2,1,**2,1**,**2**,1,2,2,1] but a more flexible change, say, to [1,2,2,1,2,2,**3,2,2,3**] will not survive the semiotic-genetical game. Hence, the change by *"cut and paste"* from the sequence [1,2,2,1,**2,2**,1,2,2,1] to the sequence [1,2,2,1,2,2,**3,2,2,3**] with [1,2,2,1] /[3,2,2,3] is destroying the conditions of semiotic-genetical palindromicity. Nevertheless, this action is save in the context of morphic palindromes.

$subst_{[1,2,2,1]/[3,2,2,3]}$: [1,2,2,1,**2,2**,1,2,2,1] $\longrightarrow$ [1,2,2,1,2,2,**3,2,2,3**]: symmetric to asymmetric morphic palindrome.

- ispalindrome [1,2,2,1,2,2,**3,2,2,3**];
val it = true : bool
- palindrome [1,2,2,1,2,2,**3,2,2,3**];
val it = false : bool

3.3. DNA computing with asymmetrical palindromes?

3.3.1. Recalling definitions

Palindromes (basic definitions)

$\omega^{\mathcal{T}}$: reverse image of $\omega \in A^*$

Example: $(ababb)^{\mathcal{T}}$= bbaba

$\omega^{\mathcal{T}} \omega$: even palindrome

$\omega^{\mathcal{T}} v\, \omega$, $v \in A^*$: odd palindrome

$\omega^{\mathcal{T}} v\, \omega$, $v \in A^*$, $|v| \geq 2$: gapped palindrome

ω, $\omega^{\mathcal{T}}$: arms, v: spacer, |v|: gap

Example: aaa**abbab**bbba**babba**bba

"Before the talk I was so **stressed** that ate 3 **desserts** at once."
http://www.slideserve.com/locke/searching-for-gapped-palindromes-

gregory-kucherov-lifl

Palindromes, even or odd, with or without “gaps”, are considered in the DNA computing approach as symmetrical.

This decision is not innocent, behind this decision there is the more fundamental decision for a specific understanding of “identity”.

Substitutions of parts in a chain obey the rules of semiotical and logical identity. This determines the actions of *identification* and *separation*. Therefore, the “same” can not be different. This fits well into the LEGO-approach.

But is living matter LEGO-like? Morphogrammatics takes a different decision. LEGO bricks are changing in their use. A red round brick at on place becomes by substitution at another place a green rectangle brick. But still functions as the “same”, being morphogrammatically the same. Both are morphogrammatically *equivalent* but not equal. They are differently the same. Simply because they are defined not only by themselves but by the *context* of their appearance.

It is probably supposed to be trivial that the substitution rules for palindromes in the classical sense holds unambiguously.

This doesn’t come as a surprise because palindrome systems (languages) are just special kinds of regular or nonregular, formal languages (rewriting systems, calculi, etc.).

3.3.2. Context-dependence of morphic substitutions

Concatenation of words

What concatenation of palindromic words is preserving palindromicity?

Example1:

w1=(abbab)$^{\mathcal{T}}$= babba = w2:
aaa**abbab**bbba**babba**bba
w1 w2

- ispalindrome[1,2,2,1,2,2,1,2,2,1];
val it = true : bool

What are the replacements for w2 that are preserving palindromicity of w1w2'?
The operation of insertion is ruled morphogrammatically by context rules. Hence, not every word that is morphogrammatically equivalent to w2 is fulfilling the context rules of substitution (insertion, replacement).

Wrong replacement

[abbab]$^{\mathcal{T}}$ $=_{MG}$ [babba] $=_{MG}$ [cbccb]:

[aaa**abbab**bbba**cbccb**ba] : [**abbab cbccb**]

[**abbabcbccb**]

- ispalindrome [1,2,2,1,2,3,2,3,3,2];

val it = false : bool

But, $[abbab]^{\mathcal{T}} =_{MG} [babba] =_{MG} [cacca] =_{MG} [abbab] =_{MG} [bcbbc]$

The possible morphogrammatic concatenations of [1,2,2,1] and [2,1,1,2] are calculated by:

```
- kconcat[1,2,2,1,2][2,1,2,2,1];
val it =
  [[1,2,2,1,2,2,1,2,2,1],[1,2,2,1,2,1,2,1,1,2],[1,2,2,1,2,3,1,3,3,1],
   [1,2,2,1,2,1,3,1,1,3],[1,2,2,1,2,3,2,3,3,2],[1,2,2,1,2,2,3,2,2,3],
   [1,2,2,1,2,4,3,4,4,3]] : int list list
```

All possible palindromes of the concatenation are filtered out by:

```
- List.filter ispalindrome
   [[1,2,2,1,2,2,1,2,2,1],[1,2,2,1,2,1,2,1,1,2],[1,2,2,1,2,3,1,3,3,1],
   [1,2,2,1,2,1,3,1,1,3],[1,2,2,1,2,3,2,3,3,2],[1,2,2,1,2,2,3,2,2,3],
   [1,2,2,1,2,4,3,4,4,3]] ;
```

The result is:

```
val it =
  [[1,2,2,1,2,2,1,2,2,1],[1,2,2,1,2,1,2,1,1,2],[1,2,2,1,2,3,1,3,3,1],
   [1,2,2,1,2,2,3,2,2,3]] : int list list
```

Therefore, the morphgogram [abaab] = w1 of the palindrome [abaab babba], with w2 = [babba], is faithfully replaced by the *insertion* of the palindromic words w2' = {[1,2,1,1,2], [3,1,3,3,1], [2,3,2,2,3]}.

Hence, the palindrome has [1,2,1,1,2] has 4 realizations:

$$[1, 2, 1, 1, 2] \Rightarrow \begin{pmatrix} [1, 2, 1, 1, 2] \\ \hline [2, 1, 2, 2, 1] \\ \hline [3, 1, 3, 3, 1] \\ \hline [2, 3, 2, 2, 3] \end{pmatrix}.$$

Thus, the palindrome (w1w2) is stable under the insertion of w2'.

Given a palindrome, [**1,2,2,1,2,2,1,2,2,1**], a replacement (substitution, insertion) of a part of the palindrome has naturally two different functions, it might *augment* or *reduce* the complexity (length, wheight, etc.) of the palindrome under consideration. There is also a change of the *type* of palindromes possible by substitution: an exchange between *symmetric* and *asymmetric* morphic palindromes.

Hence, the morphic palindrome [1,2,2,1,**2,2**,1,2,2,1] becomes by *reduction* [1,2,2,1,2,1,**2,1,1,2**], or by *augmentation* [1,2,2,1,2,2,**3,2,2,3**] and [1,2,2,1,2,3,**1,3,3,1**].
The symmetric palindrome: [1,2,2,1,2,2,**1,2,2,1**] changes by substitutions into an asymmetric palindromes.

An insertion might also augment the length of a palindrome.
One simple technique is to replace the midpoint with a longer palindrome that accepts the context rules of the whole palindrome.

Gaps inside a palindrome might themselves be palindromes or non-palindromes.

Obviously, the opposite procedure, the reduction of the length of palindrome, is possible too.

Example1
[1,**2**,1] ⟶ [1,**2,2**,1] ⟶ [1,**2,1,2**,1] ⟶ [1,**2,3,2**,1], etc.

Example2:

w1=(abba)$^{\mathcal{T}}$= abba = w2:
aaa**abba**bbba**abba**abba aaa**abba**bbba**baab**bba
w1 w2 w1 w3
[1,2,2,1], [1,2,2,1], [1,2,2,1], [2,1,1,2]

(w1w2): (w1w3):
[1,2,2,1,1,2,2,1], [1,2,2,1,2,1,1,2]: ispalindrome: true
symmetric palindrome asymmetric palindrome

Counter example:
w1 = [1,2,2,1] w4 = [2,3,3,2]
w1 $=_{MG}$ w4 $=_{MG}$ w4$\mathcal{T}$
(w1w4): [1,2,2,1,2,3,3,2]
- ispalindrome [1,2,2,1,2,3,3,2];
val it = false : bool

Context-dependence of replacement
ispalindrome[1,2,2,1,3,**4,5,5,4**]:

- ispalindrome[1,2,2,1,3,**4,2,2,4**];
val it = true : bool
- ispalindrome[1,2,2,1,3,**4,3,3,4**];
val it = false : bool
- ispalindrome[1,2,2,1,3,**4,1,1,4**];
val it = false : bool
- ispalindrome[1,2,2,1,3,**4,6,6,4**];
val it = false : bool

```
But:
- tnf[1,2,2,1,3,4,6,6,4];
val it = [1,2,2,1,3,4,5,5,4] : int list
```

Calculation

```
- kconcat [1,2,2,1][1,2,2,1];
val it =
  [[1,2,2,1,1,2,2,1],[1,2,2,1,2,1,1,2],[1,2,2,1,1,3,3,1],[1,2,2,1,3,1,1,3],
  [1,2,2,1,2,3,3,2],[1,2,2,1,3,2,2,3],[1,2,2,1,3,4,4,3]] : int list list
- length(kconcat[1,2,2,1][1,2,2,1]);
val it = 7 : int
- List.filter ispalindrome
  [[1,2,2,1,1,2,2,1],[1,2,2,1,2,1,1,2],[1,2,2,1,1,3,3,1],[1,2,2,1,3,1,1,3],
  [1,2,2,1,2,3,3,2],[1,2,2,1,3,2,2,3],[1,2,2,1,3,4,4,3]] ;
val it =
  [[1,2,2,1,1,2,2,1],[1,2,2,1,2,1,1,2],[1,2,2,1,1,3,3,1],[1,2,2,1,3,2,2,3],
  [1,2,2,1,3,4,4,3]] : int list list
```

```
- kmul[1,2,2,1][1,2,2,1];
val it =
 [[1,2,2,1,2,1,1,2,2,1,1,2,1,2,2,1],[1,2,2,1,3,1,1,3,3,1,1,3,1,2,2,1],
  [1,2,2,1,2,3,3,2,2,3,3,2,1,2,2,1],[1,2,2,1,3,4,4,3,3,4,4,3,1,2,2,1]]
 : int list list
- List.filter ispalindrome
[[1,2,2,1,2,1,1,2,2,1,1,2,1,2,2,1],[1,2,2,1,3,1,1,3,3,1,1,3,1,2,2,1],
  [1,2,2,1,2,3,3,2,2,3,3,2,1,2,2,1],[1,2,2,1,3,4,4,3,3,4,4,3,1,2,2,1]];
val it =
 [[1,2,2,1,2,1,1,2,2,1,1,2,1,2,2,1],[1,2,2,1,3,1,1,3,3,1,1,3,1,2,2,1],
  [1,2,2,1,2,3,3,2,2,3,3,2,1,2,2,1],[1,2,2,1,3,4,4,3,3,4,4,3,1,2,2,1]]
 : int list list
```

Result:

There are just 5 morphic palindromes that are accepting the context-rules of substitution, and only two further possible substitution that are not accepting the context rules for palindromes out of the 7 possible tritograms of kconcat[1,2,2,1][1,2,2,1].

Also the morphograms [2,3,3,2] and [3,1,1,3] are morphogrammatically equivalent as such, they are different at their position in the kenogrammatic chain, without accepting the context conditions to build together with the palindromic morphogram [1,2,2,1] a morphic palindrome. But they are accepting the context conditions for the coalition operation *kconcat[1,2,2,1][1,2,2,1]*. Hence [1,2,2,1,3,1,1,3] is a morphogram but not a palindrome.

Nevertheless, there are 4 additional realizations for the first palindrome, that are symmetric and therefore semiotic as well as morphogrammatic, of asymmetric palindromes possible.

ispalindrome	*not ispalindrome*
[1,2,2,1,1,2,2,1]	[1,2,2,1,2,3,3,2]
[1,2,2,1,2,1,1,2]	[1,2,2,1,3,1,1,3]
[1,2,2,1,1,3,3,1]	
[1,2,2,1,3,2,2,3]	
[1,2,2,1,3,4,4,3].	

Further examples

Different operands:

- kconcat[1,2,1][1,2,2,1];

```
val it =
  [[1,2,1,1,2,2,1],[1,2,1,2,1,1,2],[1,2,1,1,3,3,1],[1,2,1,3,1,1,3],
   [1,2,1,2,3,3,2],[1,2,1,3,2,2,3],[1,2,1,3,4,4,3]] : int list list
- List.filter ispalindrome
   [[1,2,1,1,2,2,1],[1,2,1,2,1,1,2],[1,2,1,1,3,3,1],[1,2,1,3,1,1,3],
   [1,2,1,2,3,3,2],[1,2,1,3,2,2,3],[1,2,1,3,4,4,3]] ;
val it = [] : int list list
```

Same operands

- kconcat[1,2,1][1,2,1];

```
val it =
  [[1,2,1,1,2,1],[1,2,1,2,1,2],[1,2,1,1,3,1],[1,2,1,3,1,3],[1,2,1,2,3,2],
   [1,2,1,3,2,3],[1,2,1,3,4,3]] : int list list
- List.filter ispalindrome
   [[1,2,1,1,2,1],[1,2,1,2,1,2],[1,2,1,1,3,1],[1,2,1,3,1,3],[1,2,1,2,3,2],
   [1,2,1,3,2,3],[1,2,1,3,4,3]] ;
val it =
  [[1,2,1,1,2,1],[1,2,1,2,1,2],[1,2,1,1,3,1],[1,2,1,3,2,3],[1,2,1,3,4,3]]
  : int list list
```

- kconcat[1,2,2,1,3,4,4,3] [1,2,2,1,3,4,4,3]

```
- length(kconcat[[1,2,2,1,3,4,4,3] [1,2,2,1,3,4,4,3]);
val it = 209 : int
```

ispalindrome: 43

```
val it =
  [[1,2,2,1,3,4,4,3,1,2,2,1,3,4,4,3],[1,2,2,1,3,4,4,3,1,4,4,1,3,2,2,3],
   [1,2,2,1,3,4,4,3,2,1,1,2,4,3,3,4],[1,2,2,1,3,4,4,3,2,4,4,2,1,3,3,1],
   [1,2,2,1,3,4,4,3,3,1,1,3,4,2,2,4],[1,2,2,1,3,4,4,3,3,2,2,3,1,4,4,1],
   [1,2,2,1,3,4,4,3,3,4,4,3,1,2,2,1],[1,2,2,1,3,4,4,3,3,4,4,3,2,1,1,2],
   [1,2,2,1,3,4,4,3,4,3,3,4,1,2,2,1],[1,2,2,1,3,4,4,3,4,3,3,4,2,1,1,2],
   [1,2,2,1,3,4,4,3,1,5,5,1,3,2,2,3],[1,2,2,1,3,4,4,3,2,5,5,2,1,3,3,1],
   [1,2,2,1,3,4,4,3,3,5,5,3,1,2,2,1],[1,2,2,1,3,4,4,3,3,5,5,3,2,1,1,2],
   [1,2,2,1,3,4,4,3,5,1,1,5,4,2,2,4],[1,2,2,1,3,4,4,3,5,2,2,5,1,4,4,1],
   [1,2,2,1,3,4,4,3,5,4,4,5,1,2,2,1],[1,2,2,1,3,4,4,3,5,4,4,5,2,1,1,2],
   [1,2,2,1,3,4,4,3,5,6,6,5,1,2,2,1],[1,2,2,1,3,4,4,3,5,6,6,5,2,1,1,2],
```

[1,2,2,1,3,4,4,3,1,4,4,1,3,5,5,3],[1,2,2,1,3,4,4,3,3,1,1,3,4,5,5,4],
[1,2,2,1,3,4,4,3,3,4,4,3,1,5,5,1],[1,2,2,1,3,4,4,3,4,3,3,4,1,5,5,1],
[1,2,2,1,3,4,4,3,1,5,5,1,3,6,6,3],[1,2,2,1,3,4,4,3,3,5,5,3,1,6,6,1],
[1,2,2,1,3,4,4,3,5,1,1,5,4,6,6,4],[1,2,2,1,3,4,4,3,5,4,4,5,1,6,6,1],
[1,2,2,1,3,4,4,3,5,6,6,5,1,7,7,1],[1,2,2,1,3,4,4,3,2,4,4,2,5,3,3,5],
[1,2,2,1,3,4,4,3,3,2,2,3,5,4,4,5],[1,2,2,1,3,4,4,3,3,4,4,3,5,2,2,5],
[1,2,2,1,3,4,4,3,4,3,3,4,5,2,2,5],[1,2,2,1,3,4,4,3,2,5,5,2,6,3,3,6],
[1,2,2,1,3,4,4,3,3,5,5,3,6,2,2,6],[1,2,2,1,3,4,4,3,5,2,2,5,6,4,4,6],
[1,2,2,1,3,4,4,3,5,4,4,5,6,2,2,6],[1,2,2,1,3,4,4,3,5,6,6,5,7,2,2,7],
[1,2,2,1,3,4,4,3,3,4,4,3,5,6,6,5],[1,2,2,1,3,4,4,3,4,3,3,4,5,6,6,5],
[1,2,2,1,3,4,4,3,3,5,5,3,6,7,7,6],[1,2,2,1,3,4,4,3,5,4,4,5,6,7,7,6],
[1,2,2,1,3,4,4,3,5,6,6,5,7,8,8,7]] : int list list

Symmetric palindrome: 1
val it = [[1,2,2,1,3,4,4,3,3,4,4,3,1,2,2,1]] : int list list

3.3.3. Palindromic prolongations

Palindromes from [1] to [1,2,3,4,5,6,7]:

[[**1**],
[1,1],[1,**2**],
[1,1,1],[1,2,1],[1,2,**3**],
[1,1,1,1],[1,1,2,2],[1,2,1,2], [1,2,2,1],[1,2,2,3],[1,2,3,1],[1,2,3,**4**],
[1,1,1,1,1], [1,1,2,1,1],[1,1,2,3,3],[1,2,1,2,1],[1,2,1,3,1],[1,2,2,2,1],[1,2,2,2,3],
[1,2,3,1,2],[1,2,3,2,1],[1,2,3,2,4],[1,2,3,4,1],[1,2,3,4,**5**],
[1,1,1,1,1,1],[1,1,1,2,2,2],[1,1,2,1,2,2],[1,1,2,2,1,1],[1,1,2,2,3,3],[1,1,2,3,1,1],[1,1,2,3,4
,4],
[1,2,1,1,2,1],[1,2,1,1,3,1],[1,2,1,2,1,2],[1,2,1,3,2,3],
[1,2,1,3,4,3],[1,2,2,1,1,2],[1,2,2,2,2,1],
[1,2,2,2,2,3],[1,2,2,3,3,1],[1,2,2,3,3,4],
[1,2,3,1,2,3],[1,2,3,1,4,3],[1,2,3,2,3,1],[1,2,3,2,3,4], [1,2,3,3,1,2],
[1,2,3,3,2,1], [1,2,3,3,2,4],[1,2,3,3,4,1],[1,2,3,3,4,5], [1,2,3,4,1,2],
[1,2,3,4,2,1],[1,2,3,4,2,5],[1,2,3,4,5,1],[1,2,3,4,5,**6**],
[1,1,1,1,1,1,1],
[1,1,1,2,1,1,1],[1,1,1,2,3,3,3],[1,1,2,1,2,1,1],
[1,1,2,1,3,1,1],[1,1,2,2,2,1,1],[1,1,2,2,2,3,3],[1,1,2,3,1,2,2],
[1,1,2,3,2,1,1],[1,1,2,3,2,4,4],[1,1,2,3,4,1,1],[1,1,2,3,4,5,5],
[1,2,1,1,1,2,1],[1,2,1,1,1,3,1],[1,2,1,2,1,2,1],[1,2,1,2,3,2,3],
[1,2,1,3,1,2,1],[1,2,1,3,1,4,1],[1,2,1,3,2,1,2],[1,2,1,3,4,2,4],
[1,2,1,3,4,5,4],[1,2,2,1,2,2,1],[1,2,2,1,3,3,1],[1,2,2,2,2,2,1],
[1,2,2,2,2,2,3],[1,2,2,3,1,1,2],[1,2,2,3,2,2,1],[1,2,2,3,2,2,4],
[1,2,2,3,4,4,1],[1,2,2,3,4,4,5],[1,2,3,1,2,3,1],[1,2,3,1,3,2,1],
[1,2,3,1,3,4,1],[1,2,3,1,4,2,1],[1,2,3,1,4,5,1],[1,2,3,2,1,2,3],
[1,2,3,2,3,2,1],[1,2,3,2,3,2,4],[1,2,3,2,4,2,1],[1,2,3,2,4,2,5],
[1,2,3,3,3,1,2],[1,2,3,3,3,2,1],[1,2,3,3,3,2,4],[1,2,3,3,3,4,1],
[1,2,3,3,3,4,5],[1,2,3,4,1,2,3],[1,2,3,4,1,5,3],[1,2,3,4,2,3,1],
[1,2,3,4,2,3,5],[1,2,3,4,3,1,2],[1,2,3,4,3,2,1],[1,2,3,4,3,2,5],
[1,2,3,4,3,5,1],[1,2,3,4,3,5,6],[1,2,3,4,5,1,2],[1,2,3,4,5,2,1],
[1,2,3,4,5,2,6],[1,2,3,4,5,6,1],[1,2,3,4,5,6,**7**].

Symmetric palindromes from [1] to [1,2,3,4,5,6,7]: 31
[[1],[1,1],
[1,1,1],[1,2,1],
[1,1,1,1],[1,2,2,1],
[1,1,1,1,1],[1,1,2,1,1],[1,2,1,2,1],[1,2,2,2,1],[1,2,3,2,1],
[1,1,1,1,1,1],[1,1,2,2,1,1],[1,2,1,1,2,1],[1,2,2,2,2,1],[1,2,3,3,2,1],
[1,1,1,1,1,1,1],[1,1,1,2,1,1,1],
[1,1,2,1,2,1,1],[1,1,2,2,2,1,1],[1,1,2,3,2,1,1],[1,2,1,1,1,2,1],
[1,2,1,2,1,2,1],[1,2,1,3,1,2,1],[1,2,2,1,2,2,1],[1,2,2,2,2,2,1],

[1,2,2,3,2,2,1],[1,2,3,1,3,2,1],[1,2,3,2,3,2,1],[1,2,3,3,3,2,1],[1,2,3,4,3,2,1]] : int list list

3.3.4. Tabular notation for palindromes

The tabular notation connects to special morphic Latin Squares and quasi groups of all dimensions.

Tabular notation for kmul

tab-kmul $\begin{bmatrix}1 & 2\\ 2 & 1\end{bmatrix}\begin{bmatrix}1 & 2\\ 2 & 1\end{bmatrix}$ =

$$[1,2,2,1,2,1,1,2,2,1,1,2,1,2,2,1] = \left(\begin{array}{c} [1,\ 2,\ 2,\ 1] \\ \hline [2,\ 1,\ 1,\ 2] \\ \hline [2,\ 1,\ 1,\ 2] \\ \hline [1,\ 2,\ 2,\ 1] \end{array}\right),$$

$$[1,2,2,1,3,1,1,3,3,1,1,3,1,2,2,1] = \left(\begin{array}{c} [1,\ 2,\ 2,\ 1] \\ \hline [3,\ 1,\ 1,\ 3] \\ \hline [3,\ 1,\ 1,\ 3] \\ \hline [1,\ 2,\ 2,\ 1] \end{array}\right),$$

$$[1,2,2,1,2,3,3,2,2,3,3,2,1,2,2,1] = \left(\begin{array}{c} [\mathbf{1},\ 2,\ 2,\ \mathbf{1}] \\ \hline [2,\ \mathbf{3},\ \mathbf{3},\ 2] \\ \hline [2,\ \mathbf{3},\ \mathbf{3},\ 2] \\ \hline [\mathbf{1},\ 2,\ 2,\ \mathbf{1}] \end{array}\right),$$

$$[1,2,2,1,3,4,4,3,3,4,4,3,1,2,2,1] = \left(\begin{array}{c} [1,\ 2,\ 2,\ 1] \\ \hline [3,\ 4,\ 4,\ 3] \\ \hline [3,\ 4,\ 4,\ 3] \\ \hline [1,\ 2,\ 2,\ 1] \end{array}\right).$$

Distribution subsystem table

$$\left(\frac{\frac{\frac{[\mathbf{1},\ 2,\ 2,\ \mathbf{1}]}{[2,\ \mathbf{3},\ \mathbf{3},\ 2]}}{[2,\ \mathbf{3},\ \mathbf{3},\ 2]}}{[\mathbf{1},\ 2,\ 2,\ \mathbf{1}]}\right) \begin{pmatrix} (1,2) & (2,3) \\ [1,2,2,1] & - \\ - & [2,3,3,2] \\ - & [2,3,3,3] \\ [1,2,2,1] & - \end{pmatrix}$$

$$\left(\frac{\frac{\frac{[1,\ 2,\ 2,\ 1]}{[3,\ 4,\ 4,\ 3]}}{[3,\ 4,\ 4,\ 3]}}{[1,\ 2,\ 2,\ 1]}\right) = \begin{pmatrix} (1,2) & (3,4) \\ [1,2,2,1] & - \\ - & [3,4,4,3] \\ - & [3,4,4,3] \\ [1,2,2,1] & - \end{pmatrix}$$

Latin squares

Reduced Latin squares of order 1 to 4 are special morphic palindromes.
Latin squares of order 5 are divided into palindromes and non-palindromes.

Order 2

$\text{I.} = \begin{pmatrix} a & b \\ b & a \end{pmatrix}$, $\text{II.} = \begin{pmatrix} b & a \\ a & b \end{pmatrix}$

I. is palindrome, and $\text{I.} =_{MG} \text{II.}$

$-$ ENstructure $[1, 2, 2, 1]$ = ENstructure$[2, 1, 1, 2]$;

val it = true : bool

Order 3

Both squares are asymmetric palindromes, and $\text{I.} \neq_{MG} \text{II.}$

$\text{I.} = \left(\begin{array}{c|c|c} a & b & c \\ \hline b & c & a \\ \hline c & a & b \end{array}\right)$, $\text{II.} = \left(\begin{array}{c|c|c} a & b & c \\ \hline c & a & b \\ \hline b & c & a \end{array}\right)$

I. - ispalindrome [1,2,3,2,3,1,3,1,2];
val it = true : bool
- palindrome [1,2,3,2,3,1,3,1,2];
val it = false : bool
II. - ispalindrome [1,2,3,3,1,2,2,3,1];
val it = true : bool
- palindrome [1,2,3,3,1,2,2,3,1];
val it = false : bool
- ENstructure [1,2,3,2,3,1,3,1,2] = ENstructure [1,2,3,3,1,2,2,3,1];
val it = false : bool

Logical transjunctions

Gotthard Gunther’s famous polycontextural *total transjunction* for 3 values <tr,tr,tr> is a Latin square but not a morphic palindrome:

Transjunction, linear anlysis

$$<\text{tr, tr, tr}> = \left(\begin{array}{c|c|c} 1 & 3 & 2 \\ \hline 3 & 2 & 1 \\ \hline 2 & 1 & 3 \end{array}\right)$$

- ispalindrome [1,3,2,3,2,1,2,1,3];
val it = false : bool

$\text{neg}_2 <\text{tr, tr, tr}> = \left(\begin{array}{c|c|c} 1 & 2 & 3 \\ \hline 2 & 3 & 1 \\ \hline 3 & 1 & 2 \end{array}\right)$ is a Latin square and a morphic palindrome.

$- \text{LL}\left[\left[1,\ 2,\ 3\right],\ \left[2,\ 3,\ 1\right],\ \left[3,\ 1,\ 2\right]\right];$

$\text{val it} = \left[1, 2, 2, 3, 3, 1, 1, 2, 1, 3, 3, 2\right] : \text{int list}$

$-$ ispalindrome it;

val it $=$ false $:$ bool

$\text{LIN}: \left[\left[1,\ 2,\ 3\right], \left[2,\ 3,\ 1\right], \left[3,\ 1,\ 2\right]\right] = \left[1, 2, 3, 2, 3, 1, 3, 1, 2\right]$

$- \text{ispalindrome}\left[1,\ 2,\ 3,\ 2,\ 3,\ 1,\ 3,\ 1,\ 2\right];$

val it $=$ true $:$ bool

Order 4

Symmetric palindromes are I. and IV., and the squares II. and III. are asymmetric palindromes.
Squares I. and VI. are morphogrammatically not equivalent, I. $\neq_{MG}$ IV.

- ENstructure [1,2,3,4,2,1,4,3,3,4,1,2,4,3,2,1] = ENstructure [1,2,3,4,2,4,1,3,3,1,4,2,4,3,2,1];
val it = false : bool

$$\text{I.} = \left(\begin{array}{c|c|c|c} a & b & c & d \\ \hline b & \boldsymbol{a} & \boldsymbol{d} & c \\ \hline c & \boldsymbol{d} & \boldsymbol{a} & b \\ \hline d & c & b & a \end{array}\right), \quad \text{II.} = \left(\begin{array}{c|c|c|c} a & b & c & d \\ \hline b & a & d & c \\ \hline c & d & b & a \\ \hline d & c & a & b \end{array}\right),$$

$$\text{III.} = \left(\begin{array}{c|c|c|c} a & b & c & d \\ \hline b & c & d & a \\ \hline c & d & a & b \\ \hline d & a & b & c \end{array}\right), \quad \text{IV.} = \left(\begin{array}{c|c|c|c} a & b & c & d \\ \hline b & \boldsymbol{d} & \boldsymbol{a} & c \\ \hline c & \boldsymbol{a} & \boldsymbol{d} & b \\ \hline d & c & b & a \end{array}\right)$$

I. - ispalindrome [1,2,3,4,2,1,4,3,3,4,1,2,4,3,2,1];
val it = true : bool
- palindrome [1,2,3,4,2,1,4,3,3,4,1,2,4,3,2,1];
val it = true : bool

II. - ispalindrome [1,2,3,4,2,1,4,3,3,4,2,1,4,3,1,2];
val it = true : bool
- palindrome [1,2,3,4,2,1,4,3,3,4,2,1,4,3,1,2];
val it = false : bool

III. - ispalindrome [1,2,3,4,2,3,4,1,3,4,1,2,4,1,2,3];
val it = true : bool
- palindrome [1,2,3,4,2,3,4,1,3,4,1,2,4,1,2,3];
val it = false : bool

IV. - ispalindrome [1,2,3,4,2,4,1,3,3,1,4,2,4,3,2,1];
val it = true : bool
- palindrome [1,2,3,4,2,4,1,3,3,1,4,2,4,3,2,1];
val it = true : bool

Order 5

Some examples of order 5 latin squares.
- ispalindrome [1,2,3,4,5,2,4,1,5,3,3,5,4,2,1,4,1,5,3,2,5,3,2,1,4];
val it = false : bool
- ispalindrome [1,2,3,4,5,2,1,4,5,3,3,4,5,2,1,4,5,1,3,2,5,3,2,1,4];
val it = false : bool

- ispalindrome[1,2,3,4,5,5,1,2,3,4,4,5,1,2,3,3,4,5,1,2,2,3,4,5,1];
val it = true : bool
- ispalindrome [1,2,3,4,5,2,3,4,5,1,3,4,5,1,2,4,5,1,2,3,5,1,2,3,4];
val it = true : bool

"Latin squares of all orders m>2 can be constructed using modular arithmetic as in this example for m=5.
The entry $S_{i,j}$ in row i column j is given by $S_{i,j}$=i+j (mod 5), where this is defined to be the remainder when the sum i+j is divided by 5."
http://nrich.maths.org/1453

3.3.5. Morphogrammatics of palindromes

Morphogrammatics is a reflectional transformation theory over composed basic morphograms. It is plausible to ask about the palindromic properties of compound structures and their reflectional transformations.
The classical example for morphogrammatics is based on systems with 3 kenograms and a distrubution over 9 places, inherited from the binary frame of 3-valued place-valued logic.
The number of composed morphograms is:

$$\mathrm{Tcard}(n) = \sum_{k=1}^{n} S(n, k).$$

Hence, for n=9, Tcard 9 = 21147 for all values n. Restricted to 3 kenograms the sum is 3281.

$$\sum_{k=1}^{3} S(3^2, k) = 1 + 255 + 3025 = 3281$$

Hence, how many morphogrammatic compounds
of the total of 3281 morphograms are palindromic?

Analysis: palindromes out of 3x3-matrix for m=9
- length(kmul[1,2,3][1,2,3]);
val it = 588 : int
List.filter ispalindrome “kmul[1,2,3][1,2,3}": 44 palindromes
[[1,2,3,2,3,1,3,1,2],[1,2,3,3,1,2,2,3,1],
[1,2,3,2,1,4,3,4,1],
[1,2,3,2,1,4,5,4,1],[1,2,3,2,4,1,3,1,2],[1,2,3,2,4,1,5,1,2],
[1,2,3,4,1,2,3,4,1],[1,2,3,4,1,2,5,4,1],[1,2,3,3,1,4,4,5,1],
[1,2,3,4,3,1,3,5,4],[1,2,3,4,1,5,2,3,1],[1,2,3,4,1,5,3,6,1],
[1,2,3,4,1,5,6,7,1],[1,2,3,4,5,1,2,3,4],[1,2,3,4,5,1,3,6,4],
[1,2,3,4,5,1,6,7,4],[1,2,3,2,3,4,3,4,1],[1,2,3,2,3,4,3,4,5],
[1,2,3,3,4,2,2,3,1],[1,2,3,3,4,2,2,3,5],[1,2,3,4,3,2,3,4,1],
[1,2,3,4,3,2,3,4,5],[1,2,3,2,4,5,3,5,1],[1,2,3,2,4,5,6,5,1],
[1,2,3,2,4,5,3,5,6],[1,2,3,2,4,5,6,5,7],[1,2,3,4,5,2,3,4,1],
[1,2,3,4,5,2,6,4,1],[1,2,3,4,5,2,3,4,6],[1,2,3,4,5,2,6,4,7],
[1,2,3,3,4,5,5,1,2],[1,2,3,3,4,5,5,6,1],[1,2,3,3,4,5,5,6,7],
[1,2,3,4,3,5,3,1,2],[1,2,3,4,3,5,3,6,1],[1,2,3,4,3,5,3,6,7],
[1,2,3,4,5,6,2,3,1],[1,2,3,4,5,6,3,1,2],[1,2,3,4,5,6,7,1,2],
[1,2,3,4,5,6,3,7,1],[1,2,3,4,5,6,7,8,1],[1,2,3,4,5,6,2,3,7],
[1,2,3,4,5,6,3,7,8],[1,2,3,4,5,6,7,8,9]] : int list list

List.filter ispalindrome “kmul[1,2,1][1,2,1]": 4 palindromes
[[1,2,1,2,1,2,1,2,1],[1,2,1,3,1,3,1,2,1],[1,2,1,2,3,2,1,2,1],
[1,2,1,3,4,3,1,2,1]] : int list list

Palindromes: 6
- kmul[1,1,1][1,2,1]:
val it = [[1,1,1,2,2,2,1,1,1]] : int list list
- kmul[1,2,1][1,1,1];
val it = [[1,2,1,1,2,1,1,2,1]] : int list list
- kmul[1,1,1][1,2,3];
val it = [[1,1,1,2,2,2,3,3,3]] : int list list
- kmul[1,2,3][1,1,1];
val it = [[1,2,3,1,2,3,1,2,3]] : int list list

- kmul[1,2,1][1,2,3];
[[1,2,1,3,4,3,2,1,2],[1,2,1,3,4,3,5,6,5]] : int list list
- kmul[1,2,3][1,2,1];
[[1,2,3,3,4,1,1,2,3],[1,2,3,4,5,6,1,2,3]] : int list list

Reflector

Total reflector $Refl_{tot}$ $(MG^{(3)})$ = kref $(MG^{(3)})$
MG1 = [1,2,1,2,3,2,1,2,1] $\in$ sym-pal, $Refl_{tot}$
(MG1) = [1,2,1,2,3,1,2,1] $\in$ sym-pal
MG2 = [1,2,3,2,3,1,3,1,2] $\in$ asym-pal,
$Refl_{tot}$(MG2) = tnf [2,1,3,1,3,2,3,2,1] $\in$ asym-pal

- ispalindrome (tnf(rev[1,2,3,1,2,3,1,2,3]));
val it = true : bool

MG3 = [1,2,1,3,2,3,4,2,4]
- ispalindrome [1,2,1,3,2,3,4,2,4];

```
val it = true : bool
- ispalindrome (tnf(rev[1,2,1,3,2,3,4,2,4]));
val it = true : bool
- rev [1,2,1,3,2,3,4,2,4];
val it = [4,2,4,3,2,3,1,2,1] : int list
- tnf[4,2,4,3,2,3,1,2,1] ;
val it = [1,2,1,3,2,3,4,2,4] : int list
```

Non-palindrome

```
MGa = [1,2,2,1,1,2,2,2,2]
- ispalindrome [1,2,2,1,1,2,2,2,2];
val it = false : bool
- tnf(rev([1,2,2,1,1,2,2,2,2]));
val it = [1,1,1,1,2,2,1,1,2] : int list
MGb = [1,1,1,1,2,2,1,1,2],
```

MGa $\neq_{MG}$ MGb.

Reductions: Dcontexture

```
- Dcontexture 9: 30
val it =
  [[1,1,1,1,1,1,1,1,1],[1,1,1,1,1,2,2,2,2],[1,1,1,1,1,1,2,2,2],
   [1,1,1,1,1,1,1,2,2],[1,1,1,1,1,1,1,1,2],[1,1,1,2,2,2,3,3,3],
   [1,1,1,1,2,2,2,3,3],[1,1,1,1,2,2,2,2,3],[1,1,1,1,1,2,2,3,3],
   [1,1,1,1,1,2,2,2,3],[1,1,1,1,1,1,2,2,3],[1,1,1,1,1,1,1,2,3],
   [1,1,1,2,2,3,3,4,4],[1,1,1,2,2,2,3,3,4],[1,1,1,1,2,2,3,3,4],
   [1,1,1,1,2,2,2,3,4],[1,1,1,1,1,2,2,3,4],[1,1,1,1,1,1,2,3,4],
   [1,1,2,2,3,3,4,4,5],[1,1,1,2,2,3,3,4,5],[1,1,1,2,2,2,3,4,5],
   [1,1,1,1,2,2,3,4,5],[1,1,1,1,1,2,3,4,5],[1,1,2,2,3,3,4,5,6],
   [1,1,1,2,2,3,4,5,6],[1,1,1,1,2,3,4,5,6],[1,1,2,2,3,4,5,6,7],
   [1,1,1,2,3,4,5,6,7],[1,1,2,3,4,5,6,7,8],[1,2,3,4,5,6,7,8,9]]
  : int list list
Palindrome "Dcontexture 9": 3
val it = [[1,1,1,1,1,1,1,1,1],[1,1,1,2,2,2,3,3,3],[1,2,3,4,5,6,7,8,9]]
  : int list list
```

MG-analysis

Morphogrammatics is introduced as a special interpretation of kenogrammatics and its keno-*sequences*. The idea is to decompose arbitrary sequences of length nxn into compounds of 15 basic 2x2-morphograms. Compounds of morphograms are analyzed as strings and as matrices of kenograms. Operators on compounds of morphograms are mainly different reflectors, and a machinery of specific abstractions to deal with the complexity of morphogrammatics. This defines a 'classical' approach to morphogrammatics as it was developed in "Morphogrammatik-1993".

A further concretization of morphogrammatics is introduced with a mapping of kenomic streams onto tabular constellations, i.e. complexions of matrices. This approach shall be elaborated in a next paper.

All applied SML-procedures are from "Morphogrammatik", where they are properly defined.
http://www.thinkartlab.com/pkl/SML-sources.NJ/ALL-MG-nov2012.sml

Example1

$$MK = \left(\begin{array}{c|c|c} 1 & 2 & 1 \\ \hline 3 & 2 & 2 \\ \hline 1 & 3 & 3 \end{array}\right) = [13, 2, 5]$$

$- \textbf{\textit{exmm}}\ [[1, 2, 3, 2], [1, 1, 2, 2], [1, 1, 1, 2]];$

$\text{val it} = \text{true} : \text{bool}$

$- \textbf{\textit{exmm}}[\text{mg } 13, \text{ mg } 2, \text{ mg } 5];$

$\text{val it} = \text{true} : \text{bool}$

$- \textbf{\textit{mknums}}\ [[1, 2, 3, 2], [1, 1, 2, 2], [1, 1, 1, 2]];$

$\text{val it} = [13, 2, 5] : \text{int list}$

$- \textbf{mg}\ 13;$

$\text{val it} = [1, 2, 3, 2] : \text{int list}$

$- \textbf{mg}\ 2;$

$\text{val it} = [1, 1, 2, 2] : \text{int list}$

$- \textbf{mg}\ 5;$

$\text{val it} = [1, 1, 1, 2] : \text{int list}$

$- \textbf{\textit{LL}}[[1, 2, 1], [3, 2, 2], [1, 3, 3]];$

$\text{val it} = [1, 2, 3, 2, 2, 2, 3, 3, 1, 1, 1, 3] : \text{int list}$

$- \textbf{L\_ 1}\ [1, 2, 3, 2, 2, 2, 3, 3, 1, 1, 1, 3];$

$[[1, 2, 1], [3, 2, 2], [1, 3, 3]]$

$- \textbf{\textit{ispalindrome}}[1, 2, 3, 2, 2, 2, 3, 3, 1, 1, 1, 3];$

$\text{val it} = \text{false} : \text{bool}$

FC-types

$- \textbf{FCstructure}[1, 2, 2, 2];$

$\text{val it} = [F, C, F, C, C, F] : \text{fc list},$

$- \textbf{allFCs}\ 3;$

$\text{val it} = [[C, C, C], [C, F, F], [F, F, C], [F, C, F], [F, F, F]] : \text{fc list list},$

$- \textbf{FCtype}[1, 2, 2, 2];$

$\text{val it} = F : \text{fc},$

– **FCtypes** $\left[\left[1,\ 2,\ 3,\ 2\right],\ \left[1,\ 1,\ 2,\ 2\right],\ \left[1,\ 1,\ 1,\ 2\right]\right]$;

val it = $\left[F, F, F\right]$: fc list

– **FCtypes** $\left[\text{mg } 13,\ \text{mg } 2,\ \text{mg } 5\right]$;

val it = $\left[F, F, F\right]$: fc list

– **allFCs** 3;

val it = $\left[\left[C, C, C\right], \left[C, F, F\right], \left[F, F, C\right], \left[F, C, F\right], \left[F, F, F\right]\right]$: fc list list,

Example2

– **exmm** $\left[\left[1,\ 1,\ 1,\ 1\right],\ \left[1,\ 2,\ 2,\ 1\right],\ \left[1,\ 1,\ 1,\ 1\right]\right]$;

val it = true : bool

– **mknums** $\left[\left[1, 1, 1, 1\right], \left[1, 2, 2, 1\right], \left[1, 1, 1, 1\right]\right]$;

val it = $\left[1, 4, 1\right]$: int list

$$\left(\begin{array}{c|c|c} 1 & 1 & 1 \\ \hline 1 & 1 & 2 \\ \hline 1 & 2 & 1 \end{array}\right) = \left[1, 4, 1\right]$$

– **mg** 1;

val it = $\left[1, 1, 1, 1\right]$: int list

– **mg** 4;

val it = $\left[1, 2, 2, 1\right]$: int list

– **LL** $\left[\left[1, 1, 1\right], \left[1, 1, 2\right], \left[1, 2, 1\right]\right]$;

val it = $\left[1, 1, 1, 1, 1, 2, 2, 1, 1, 1, 1, 1\right]$: int list

– **ispalindrome** $\left[1, 1, 1, 1, 1, 2, 2, 1, 1, 1, 1, 1\right]$;

val it = true : bool

Example3

$\left[1, 1, 2, 3, 2, 1, 2, 3, 3\right]$: asymmetric palindrome

$$\left(\begin{array}{c|c|c} 1 & 1 & 2 \\ \hline 2 & 3 & 1 \\ \hline 2 & 3 & 3 \end{array}\right)$$

– **LL** $\left[\left[1,\ 1,\ 2\right],\ \left[2,\ 3,\ 1\right],\ \left[2,\ 3,\ 3\right]\right]$;

val it = $\left[1, 1, 2, 3, 3, 1, 3, 3, 1, 2, 2, 3\right]$: int list

– **palindrome** it;

val it = false : bool

$$- \textbf{mknums}\big[\big[1,\ 1,\ 2,\ 3\big],\ \big[3,\ 1,\ 3,\ 3\big],\ \big[1,\ 2,\ 2,\ 3\big]\big] \quad \left(\begin{array}{c|c|c} 1 & 1 & 2 \\ \hline 2 & 3 & 1 \\ \hline 2 & 3 & 3 \end{array}\right)$$

uncaught exception Findplace, ???

$$- \textbf{mknums}\big[\big[1,\ 1,\ 2,\ 3\big],\ \big[3,\ 1,\ 2,\ 2\big],\ \big[1,\ 3,\ 3,\ 2\big]\big]; \quad \left(\begin{array}{c|c|c} 1 & 1 & 3 \\ \hline 2 & 3 & 1 \\ \hline 3 & 2 & 2 \end{array}\right)$$

General literature

http://en.wikipedia.org/wiki/Small_Latin_squares_and_quasigroups
http://cs.anu.edu.au/~bdm/data/latin.html
http://par.cse.nsysu.edu.tw/~algo/paper/paper11/B1_4.pdf
http://www.csd.uwo.ca/~lila/pdfs/Watson-Crick%20palindromes%20in%20DNA%20-computing.pdf
http://finding-palindromes.blogspot.co.uk/2012/10/the-history-of-finding-palin-dromes.html
http://tigr.fjfi.cvut.cz/cow-workshops/11/PrezentaceFrysava/StepanStarosta.pdf

3.3.6. Context rules for substitution of monomorphies and palindromes

Context rules for substitution CRS

$\forall\, h,\ m_1 \in \mathrm{H}_1,\ m_2 \in \mathrm{H}_2,$

$\mathrm{typ}:\ \big[+-+-+\big]:$

$H_1 =_{MG} \mathrm{H}_2,\ \mathrm{H}_1 \neq_{sem} \mathrm{H}_2,$

$\mathrm{m}_1 =_{MG} \mathrm{m}_2,\ \ \mathrm{m}_1 \neq_{sem} \mathrm{m}_2,\ \mathrm{h} \neq_{sem} \mathrm{m}_1,\ \mathrm{m}_2,$

$\mathrm{sem}(\mathrm{m}_i) \frown \mathrm{sem}(\mathrm{H}_i) = \varnothing,\ \mathrm{i} = 1,\ 2$

$$\boxed{\mathrm{H}_1 =_{MG} \mathrm{H}_2 \Longrightarrow \mathrm{Subst}_{h/m_1}(\mathrm{H}_1) =_{MG} \mathrm{Subst}_{h/m_2}(\mathrm{H}_2)}$$

The substitution examples for monomorphies visualized with tables

Morphograms $MG_1 = \begin{array}{|c|c|} \hline aa & a \\ \hline bb & cc \\ \hline \end{array}$ and $MG_2 = \begin{array}{|c|c|} \hline cc & c \\ \hline bb & dd \\ \hline \end{array}$

MG_1	loc_1 loc_2 loc_3 loc_4
Dec	mg_1 mg_2 mg_1 mg_3
$MG^{1.3}$ MG^{2} MG^{4}	aa – *a* – – bb – – – – – cc

MG_2	loc_1 loc_2 loc_3 loc_4
Dec	mg_1 mg_2 mg_1 mg_3
$MG^{1.3}$ MG^{2} MG^{4}	cc – *c* – – bb – – – – – dd

$$MG_1 =_{MG} MG_2 \Longrightarrow Subst\left(MG_1\right)_{[aa]/[ddd]} =_{MG} Subst\left(MG_2\right)_{[cc]/[eee]}$$

$$Subst\left(MG_1\right)_{[aa]/[ddd]} = \begin{array}{|c|c|}\hline ddd & a \\ \hline bb & c \\ \hline\end{array}, \qquad Subst\left(MG_2\right)_{[cc]/[eee]} = \begin{array}{|c|c|}\hline eee & a \\ \hline bb & c \\ \hline\end{array}$$

$subst(MG_1)$	loc_1 loc_2 loc_3 loc_4
Dec	mg_1 mg_2 mg_1 mg_3
$MG^{1.3}$ MG^{2} MG^{4}	ddd – *a* – – bb – – – – – cc

$subst(MG_2)$	loc_1 loc_2 loc_3 loc_4
Dec	mg_1 mg_2 mg_1 mg_3
$MG^{1.3}$ MG^{2} MG^{4}	eee – *c* – – bb – – – – – dd

This approach of substitution shall be extended from the substitution of *monomorphies*, mg, to the substitution of *palindromes*.

Palindromic decomposition

Instead of a decomposition of a morphogram into its *monomorhies*, a new decompoition rule that is decomposing the morphogram into its *palindromic* parts, left- and right palindromes and midparts, has to be introduced. This demands for a 'palindrome detection procedure'.

The general context-rules of monomorphic substitution/concatenation are preserved in the new context of palindromes.

http://memristors.memristics.com/Machines/Orientation/orientation.html

3.3.7. Arithmetics of morphic palindromes

Emanative prologations

- Tcontexture 4;
val it =
[[1,1,1,1],[1,1,2,2],[1,2,1,2],[**1,2,2,1**],
[1,1,1,2],[1,1,2,1],[1,2,1,1], [1,2,2,2],[1,1,2,3],[1,2,1,3],
[**1,2,3,1**],[**1,2,2,3**],
[1,2,3,2],[1,2,3,3],
[**1,2,3,4**]] : int list list

[[1,1,1,1],
[1,1,2,2] ⟶ [1,2,1,2] ⟶ [1,2,2,1],

[1,2,3,1],
[1,2,2,3],
[1,2,3,4]]

Evolutive prolongations

[1,2] ⟶ [1,2,3] ⟶ [1,2,3,4] ⟶

3.3.8. DNA computing operations

> *"As we shall see, nature manipulates the DNA molecules in a computing manner by using operations of a quite different type: cut and paste, insertion, deletion, etc.*
>
> *"We shall prove that by using such operations, we can build computing models which are equivalent in power with Turing machines.*
>
> *"Thus, the computability theories can be reconstructed in this framework." (Paun et al, p. 6)*

The operations "*cut*", "*paste*" and "*insertion*" are formally similar to the operations of "*substitution*" and "*concatenation*", i.e. the basic operations of formal languages. Therefore, there is no surprise that the 'new' formal language for DNA calculations is Turing-complete, too.

The exercises in the previous chapters are making clear that those basic operations occur in a different light if applied to morphogrammatics where context-dependence, based on retrograde recursivity, is defining the morphosphere.

Substitution and concatenation in morphogrammatic scripture are strictly context-depending. The term "*context-dependence*" is connected with the concept of morphograms and has clearly to be distinguished from similar terms in the theory of formal languages.

A morphogrammatic approach to DNA research and DNA computing would have at first to consider the morphic character of its "units" as kenograms. Hence, a "complementarity", i.e. duality of bases A and T and C and G of two single strands has to be replaced by the morphic distinction of complexions of strands and their 'complementarity'.

Motoo Kimura's Duality: "Two for One"

As in other theories, duality is also used as an economic strategy for reducing the efforts to describe the observed phenomena. Again, it's Herrlich's category-theoretic principle of *"Two for one"*, an established illusion.

Genetics is cleverly applying the duality principle to reduce the costs of observation. Because of the duality of A and T and C and G, *"one is justified in following the evolutionary development of one strand and ignoring* *the other strand"* (Kimura's DNA Substitution Model).

> *"For example, if one strand contains the block -ACCGT- of bases, then the other strand contains the complementary block -TGGCA- of bases."* http://www.genetics.ucla.edu/courses/hg236b/Lange_Chapter_PopGenetics.pdf

As long as duality is established, this is the way it is.

A morphogenetic approach has to take into consideration that dualities are not always having the nice property of identity-theoretical symmetry. It even turns out that most morphic 'dualities' are in fact asymmetric dualities, like asymmetric palindromes.

Therefore, some more work has to be done than *dualization* and *reversion* to understand living matter.

There is no guarantee that the "dual" strand behaves symmetrically.

That's where asymmetric morphic palindromes enter the game.

Also *"Genotypes may not be observable"* they may be calculable by elaboration. *"By definition, what is observable is person's phenotype."* (ibd.)

With the morphic abstraction, not just the asymmetric phenomena are introduced additionally and are therefore *augmenting* the structural complexity of the domain but the abstraction is also *reducing* the quantitative aspect of the domain, and, without surprise, the dual economy of *"Two for One"* is still holding for the symmetric cases.

Again,
"For example, the sequence ACCTAGGT is palindromic because its complement is TGGATCCA, which is equal to the original sequence in reverse complement." (WiKi, Palindrome)

ACCTAGGT = [1,2,2,3,1,4,4,3],
TGGATCCA = [3,4,4,1,3,2,2,1]

```
- ENstructure  [1,2,2,3,1,4,4,3] = ENstructure [3,4,4,1,3,2,2,1];
val it = true : bool
```

```
- ispalindrome[1,2,2,3,1,4,4,3,3,4,4,1,3,2,2,1]; (asymmetric)
val it = true : bool
- palindrome[1,2,2,3,1,4,4,3,3,4,4,1,3,2,2,1];    (symmetric)
val it = true : bool
```

What's about the *symmetric* palindrome: [1,2,3,4,4,3,2,1] = ACTGGTCA ?
And the asymmetric palindromes?

Example
[1,2,1,3,3,1,4,1] = ACATTAGA?

Symmetric palindrome (7,4)
val it = [[1,2,3,4,3,2,1]] : int list list

Hence, the chain "*ACCTAGGTTGGATCCA*" is a symmetric palindrome that is conceived, because of the identity of its elements, A,C,T and G, as a semiotic palindrome. Therefore, "*ACCTAGGTTGGATCCA*" manifests itself, according to a morphogrammatic understanding, as a palindrome that is hiding its latent geno-structure. Geno- and pheno-structure of "*ACCTAGGTTGGATCCA*" are coinciding.

Palindromes (7,4)
[[1,1,2,3,2,4,4],[1,2,1,3,4,2,4],[1,2,2,3,4,4,1],[1,2,3,4,1,2,3],
[1,2,3,4,2,3,1],[1,2,3,4,3,1,2],[**1,2,3,4,3,2,1**],[1,2,3,1,4,2,1],
[1,2,3,1,3,4,1],[1,2,3,2,4,2,1],[1,2,3,3,3,4,1],[1,2,3,2,3,2,4],
[1,2,3,3,3,2,4],[1,1,2,3,4,1,1],[1,2,1,3,1,4,1],[1,2,2,3,2,2,4]]

Palindromes (8,4)
[1,1,2,2,3,3,4,4],[1,1,2,3,2,3,4,4],
[1,1,2,3,3,2,4,4],[1,2,1,2,3,4,3,4],[1,2,1,3,2,4,3,4],[1,2,1,3,3,4,2,4],
[1,2,2,1,3,4,4,3],[1,2,2,3,1,4,4,3],[1,2,2,3,3,4,4,1],[1,2,3,1,4,2,3,4],
[1,2,3,1,4,3,2,4],[1,2,3,2,4,1,4,3],[1,2,3,2,4,3,4,1],[1,2,3,3,4,4,1,2],
[1,2,3,3,4,4,2,1],[1,2,3,4,1,2,3,4],[1,2,3,4,1,3,2,4],[1,2,3,4,2,1,4,3],
[1,2,3,4,2,3,4,1],[1,2,3,4,3,4,1,2],[1,2,3,4,3,4,2,1],[1,2,3,4,4,1,2,3],
[1,2,3,4,4,2,3,1],[1,2,3,4,4,3,1,2],[**1,2,3,4,4,3,2,1**],[1,1,1,2,3,4,4,4],
[1,1,2,3,4,1,2,2],[1,1,2,1,3,4,3,3],[1,1,2,3,1,4,3,3],[1,2,1,3,4,2,1,2],
[1,2,2,3,4,1,1,2],[1,2,3,1,2,4,1,2],[1,2,3,2,1,4,1,2],[1,2,1,1,3,3,4,3],
[1,2,1,3,1,3,4,3],[1,2,3,1,3,1,4,3],[1,2,3,3,1,1,4,3],[1,2,2,2,3,3,3,4],
[1,2,2,3,2,3,3,4],[1,2,3,2,3,2,3,4],[1,2,3,3,2,2,3,4],[1,1,2,3,4,2,1,1],
[1,1,2,3,3,4,1,1],[1,2,1,3,4,1,2,1],[1,2,3,1,1,4,2,1],[1,2,1,3,3,1,4,1],
[1,2,3,1,1,3,4,1],[1,2,2,3,4,2,2,1],[1,2,3,2,2,4,2,1],[1,2,3,3,3,3,4,1],
[1,2,2,3,3,2,2,4],[1,2,3,2,2,3,2,4],[1,2,3,3,3,3,2,4]

Literature

Importance of palindromes:

Abundant gene conversion between arms of palindromes in human and ape Y chromosomes
http://www.nature.com/nature/journal/v423/n6942/full/nature01723.html

A Sticker Based Model for DNA Computation
http://www.cs.nyu.edu/~roweis/papers/stickers.pdf

DNA Computing
http://users.ics.aalto.fi/sseki/files/dnafoundall.pdf

http://pdf.aminer.org/000/313/871/dna_computing_model_of_the_integer_linear_programming_problem_based.pdf

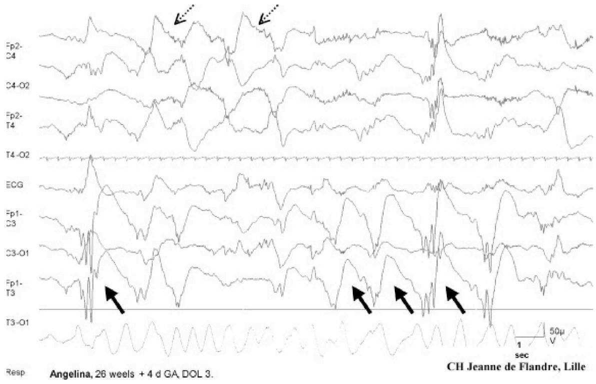
DNA palindrome finder

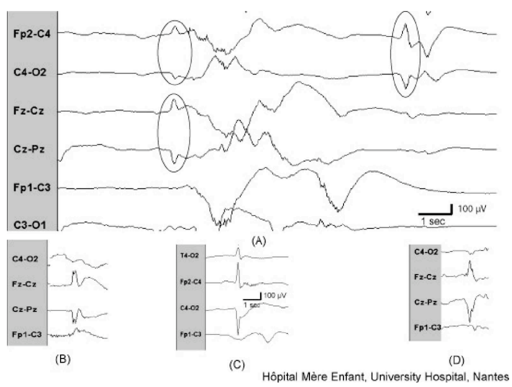
http://www.alagu-molbio.net/palin.html

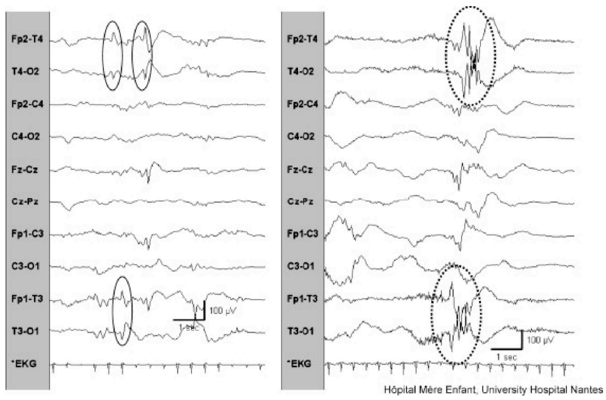
3.4. Pattern recognition in EEG analysis

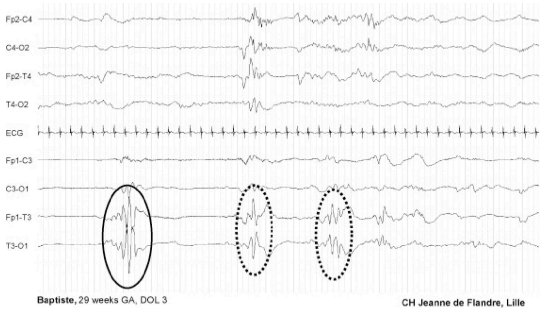
Also patterns in EEG analysis are based on a different kind of data, the structure of the data distributions are distinctive enough to be mapped on symbolic and on morphogrammatic patterns.

With that, the same strategies to uncover hidden patterns in the EEG dynamics are opened up again.









http://www.sciencedirect.com/science/article/pii/S0987705307001426

Notes

Elaborated examples are accessible at:

http://memristors.memristics.com/Palindromic%20Materials/Palindromic%20Tables.pdf

[1] - List.filter ispalindrome “kconcat [1,2,3,1,4,5,2,4] [1,2,3,1,4,5,2,4]":
val it = [[1,2,3,1,4,5,2,4,1,2,3,1,4,5,2,4],[1,2,3,1,4,5,2,4,1,2,5,1,4,3,2,4], ...]]
- length it;
val it = 142 : int

[2] **palindromes: asymPalin(8), includs symPalin(8): 164**
val it = [[1,1,1,1,1,1,1,1],[1,1,1,1,2,2,2,2],[1,1,1,2,1,2,2,2],[1,1,2,1,2,1,2,2], ...]]

Palindromes (9,2): 16
[[1,1,1,1,1,1,1,1,1],[1,1,2,2,1,2,2,1,1],[1,2,1,2,1,2,1,2,1],
[1,2,2,1,1,1,2,2,1],[1,2,2,1,2,1,2,2,1],[1,2,1,2,2,2,1,2,1],
[1,1,2,2,2,2,2,1,1],[1,1,1,2,2,2,1,1,1],[1,1,2,1,2,1,2,1,1],
[1,2,1,1,2,1,1,2,1],[1,2,2,2,1,2,2,2,1],[1,1,1,2,1,2,1,1,1],
[1,1,2,1,1,1,2,1,1],[1,2,1,1,1,1,1,2,1],[1,2,2,2,2,2,2,2,1],
[1,1,1,1,2,1,1,1,1]] : int list list

Palindromes (9, 3): 65
[[1,1,1,2,2,2,3,3,3],[1,1,2,1,2,3,2,3,3],[1,1,2,3,2,1,2,3,3],
[1,1,2,3,3,3,1,2,2],[1,2,1,1,2,3,3,2,3],[1,2,1,3,2,1,3,2,3],
[1,2,1,3,3,3,2,1,2],[1,2,2,2,1,3,3,3,1],[1,2,2,3,1,2,3,3,1],
[1,2,2,3,3,3,1,1,2],[1,2,3,1,2,3,1,2,3],[1,2,3,1,3,2,3,1,2],
[1,2,3,2,1,3,2,3,1],[1,2,3,2,3,1,3,1,2],[1,2,3,3,1,2,2,3,1],
[1,2,3,3,2,1,1,2,3],[1,1,2,3,2,3,2,1,1],[1,1,2,3,3,3,2,1,1],
[1,2,1,3,2,3,1,2,1],[1,2,3,1,2,1,3,2,1],[1,2,1,3,3,3,1,2,1],
[1,2,3,1,3,1,3,2,1],[1,2,2,3,1,3,2,2,1],[1,2,3,2,1,2,3,2,1],
[1,2,3,3,1,3,3,2,1],[1,2,2,3,3,3,2,2,1],[1,2,3,2,3,2,3,2,1],
[1,2,3,3,2,3,3,2,1],[1,1,1,1,2,3,3,3,3],[1,1,1,2,3,1,2,2,2],
[1,1,2,1,3,2,1,2,2],[1,1,2,2,3,1,1,2,2],[1,1,2,2,3,2,2,1,1],
[1,2,1,1,3,2,2,1,2],[1,2,1,2,3,1,2,1,2],[1,2,1,2,3,2,1,2,1],
[1,2,2,1,3,1,2,2,1],[1,2,2,1,3,2,1,1,2],[1,2,2,2,3,1,1,1,2],

```
  [1,1,2,2,1,3,3,1,1],[1,1,2,3,1,2,3,1,1],[1,1,2,3,1,3,2,1,1],
  [1,2,1,2,1,3,1,3,1],[1,2,1,3,1,2,1,3,1],[1,2,1,3,1,3,1,2,1],
  [1,2,2,1,1,1,3,3,1],[1,2,3,1,1,1,2,3,1],[1,2,3,1,1,1,3,2,1],
  [1,2,2,1,2,3,2,2,3],[1,2,2,3,2,1,2,2,3],[1,2,2,3,2,3,2,2,1],
  [1,2,1,2,2,2,3,2,3],[1,2,3,2,2,2,1,2,3],[1,2,3,2,2,2,3,2,1],
  [1,1,2,2,2,2,2,3,3],[1,2,3,3,3,3,3,1,2],[1,2,3,3,3,3,3,2,1],
  [1,1,1,2,3,2,1,1,1],[1,1,2,1,3,1,2,1,1],[1,2,1,1,3,1,1,2,1],
  [1,2,2,2,3,2,2,2,1],[1,1,1,2,1,3,1,1,1],[1,1,2,1,1,1,3,1,1],
  [1,2,1,1,1,1,1,3,1],[1,2,2,2,2,2,2,2,3]] : int list list
```

Symmetric palindromes (9, 3): 25

```
[[1,1,2,3,2,3,2,1,1],[1,1,2,3,3,3,2,1,1],[1,2,1,3,2,3,1,2,1],
  [1,2,3,1,2,1,3,2,1],[1,2,1,3,3,3,1,2,1],[1,2,3,1,3,1,3,2,1],
  [1,2,2,3,1,3,2,2,1],[1,2,3,2,1,2,3,2,1],[1,2,3,3,1,3,3,2,1],
  [1,2,2,3,3,3,2,2,1],[1,2,3,2,3,2,3,2,1],[1,2,3,3,2,3,3,2,1],
  [1,1,2,2,3,2,2,1,1],[1,2,1,2,3,2,1,2,1],[1,2,2,1,3,1,2,2,1],
  [1,1,2,3,1,3,2,1,1],[1,2,1,3,1,3,1,2,1],[1,2,3,1,1,1,3,2,1],
  [1,2,2,3,2,3,2,2,1],[1,2,3,2,2,2,3,2,1],[1,2,3,3,3,3,3,2,1],
  [1,1,1,2,3,2,1,1,1],[1,1,2,1,3,1,2,1,1],[1,2,1,1,3,1,1,2,1],
  [1,2,2,2,3,2,2,2,1]]
```

2