The *Metalepticon*: a Computational Approach to Metalepsis

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I. Introduction

The technical term 'metalepsis' may not be well known outside narratology and narrative theory: the phenomenon denoted by it certainly is. Metalepses abound in representational art and often are the hallmark of particularly innovative works. Hence, when Gérard Genette introduced the term into the narratological debate in his *Discours du récit* the little more than two pages devoted to the topic surveyed an impressive range of literary works and authors: Cortazar, Vergil, Diderot, Sterne, Balzac, Proust, Pirandello, Genet, Robbe-Grillet. Indeed, Genette traced this literary ancistry way back to Plato's *Theaitetos*,[1] thus combining his narratological definition of metalepsis with an (albeit sketchy) account of the phenomenon's proliferation throughout the history of Western thought and literature.[2]

However, it is crucial to note that Genette's narratological definition is in principle a functional rather than a historical, phenomenological or ontological one. Genettian narratology (as narratological theories in general) conceptualizes narrative as a symbolic system consisting of three representational and discursive layers that are organized in a hierarchical fashion. In this symbolic system mediations and shifts between *histoire*, *récit* and *discours* (or vice versa) are essentially the prerogative of the highest level narrator and will therefore normally be effected by interventions that originate on the systematic level of discourse. This 'top-down' approach comes natural to us as it is simply a necessity of representational logic. Against this normative background metalepsis amounts to an unorthodox and altogether aporetic technique of manipulating representational layers in that it postulates the obverse to be possible: in a metalepsis the represented begins to take control of the act of representation.

Radical as this effect may seem from a theoretical point of view it has long been conventionalized and integrated into the body of representational techniques deemed acceptable in our cultural context, as with other unorthodox or non-isomorphic representational schemata, such as analepses and prolepses. Indeed, metalepses have been 'naturalized' to such an extent that ordinary readers or spectators will hardly begin to entertain theoretical deliberations on the integrity of representational logic when faced with a metaleptic narrative, even though they might of course be puzzled or confused by it. Narratologists still tend to focus primarily on literary narratives, a preoccupation that proves particularly misguided in the case of metalepsis: long before Cortazar's often referred to *Continuity of Parks* of 1967 and right to the present day mainstream Broadway productions and Hollywood movies have entertained millions of spectators with highly metaleptic narratives, ranging from Olsen and Johnson's 1941 movie *Hellzapoppin'* [3]– a slapstick comedy about the making of a movie after a Broadway production which is not just full of internal metalepses, but also has an added extra-fictional metaleptic twist in that there had *in reality* been a very successful Broadway production of the same title three years before–to the highly acclaimed current musical hit *The Producers* by Mel Brooks (also preceded by a movie of the same title in 1968). In the latter we watch Max Bialystock and Leo Blum, two down-and-out Broadway producers as they consciously attempt to produce a sure-fire flop by putting on stage a pro-Nazi musical-within-the-musical. Yet contrary to Bialystock's and Blum's expectations the musical, offensively titled *Springtime for Hitler*, proves to be a huge success, prompting Max Bialystock to burst out in song in Scene 5, Act 2: "Where did we go right?" The answer to the question is immediately found: Bialystock realizes that on Broadway, the Hitler apology (which includes a formidably choreographed SS-ballet taking the absurd to its utter and chilling extreme, as well as a Hitler played by a drag queen) simply *had* to succeed given the fact that the majoritiy of the audience would normally be Jewish and therefore interpret the narrative as a satire rather than take it seriously.[4] Bialystock's observation is of course meant to be applied to the fictional audience in as much as to the real, suggesting tongue-in-cheek that the success which Mel Brook's witty musical enjoys in reality (having received the highest number of Tony awards ever) is owed to the same reason as that of his unsuccessfully unsuccessful character Bialystock–and so the metalepsis extends from the play-within-the-play right into our own domain of existence. Indeed, *The Producers* is a case in point for the performing arts' capability to involve the public in real-world affecting metaleptic constructs and ironic self-reflections that can easily surpass the impact of those fashioned in high brow literary narratives.

Our list of examples taken from popular mainstream entertainment culture could easily be extended. A particularly intriguing metaleptic achievement as contemporary Hollywood productions go is director Spike Jonze's and scriptwriter Charlie Kaufman's recent *Adaptation* (2002) in which the real life Charlie Kaufman, acclaimed author of Jonze's previous movie *Being John Malkovitch*, inserts himself into his own story. Not only does the real John Malkovitch reappear in the new movie *as* the real John Malkovitch; to make matters even more complicated Charlie Kaufman finds himself accompanied by a fictitious twin brother named Donald. Donald will eventually succeed as Charlie's aesthetic alter ego and highjack his brother's faltering project, the script adaptation (sic!) of a novel that significantly lacks narrative substance and thus appears to be untellable as a movie. Following the advice of (real-world) scriptwriter guru Robert McKee to the letter, Donald turns Charlie's script into one about *making* the script itself, and its genre from an arty psychological movie about 'an author in search of a script' into a traditional shoot-out-plus-car-chase narrative. But it doesn't stop here, or in the movie theatre: the actual real-world screenplay for the movie *Adaptation* which you and I can buy in any bookstore also features two authors: Donald and Charlie Kaufman;[5] not to mention the fact that the book whose adaptation *Adaptation* is (and is about) is also anything but fictional, but real world author Susan Orlean's 1999 bestseller *The Orchid Thief* .

Whether *avant la lettre* or not, the above cases demonstrate that metalepsis is indeed a very powerful, widely practiced and appreciated trope that consciously plays with the logic of representation which underlies all aesthetic illusion. However, for the spectator or reader this play is not entirely without risk. Genette clearly pointed to this second aspect too, that of metalepsis's deeply aporetic ontological consequences. It was Borges who originally commented that, if fictional characters are believed to be able to assume the roles of readers and spectators, then we, their real readers and spectators, may by implication also find ourselves to have become fictional.[6] Representational unorthodoxy, it seems, will ultimately result in an ontological dilemma. If taken to the extreme metalepsis will thus amount to a double catharsis, a representational and an existential one. How and as what we may come out at the other side of it God alone would seem to know.

The purpose of this article is to prove that this last conclusion is possible, but by no means necessary, and that the fervor and awe which characterize some of the philosophical and philological exegeses of metalepses might be symptomatic of the critical debate's tendency to over shoot the mark. In terms of more pragmatic and functionally orientated approaches

David Herman has perhaps best expressed the general narratological consensus on metalepsis when he defined it as

> the interplay of situations, characters or events occupying diegetic levels that are prima facie distinct [7]

This definition is perfectly acceptable, save for the fact that it unintentionally downplays the functional aspect emphasized in Genette's initial approach. Significantly, Genette adopted the term *metalepsis* from rhetoric–the term, not the concept: for in literary rhetoric metalepsis is not a structural feature, but deemed part of the *ornatus*, the rhetorical means by which an utterance can be made more pleasing and appealing to its receiver.[8] Heinrich Lausberg in his *Elemente der literarischen Rhetorik* counts metalepsis under the tropes characterized by the use of synonyms.[9] More precisely, in terms of Lausberg's definition metalepsis refers to a *contextually inappropriate* use of synonyms. One such case of 'metaleptic' use is that in which a proper name is replaced by a synonym which would otherwise be perfectly acceptable, but in a given context simply defeats the communicative purpose of a proper name as an indicator for one particular individual only. The second case is that in which one replaces a word associated with two possible meanings, such as 'nature'. One of the word's meanings will normally prove contextually inappropriate; for example, in the Goethean 'nature and spirit'[10] the two nouns obviously refer to existential principles, and not to empirical entities. Traditional rhetorical metalepsis subverts our common practice of semantic disambiguation among competing synonyms by consciously choosing the one that will express the inappropriate rather than the appropriate meaning intended by the original term. Thus 'nature and spirit' will be translated into 'landscape and ghost', a formulation in which the synonyms are strangely at odds with the register and intended semantics of the original phrase.

As we can see the original rhetorical definition of metalepsis was in itself functional rather than ontological, and hence Genette's adaptation of the term in his narratological approach is at the outset methodologically consistent. What makes a chosen synonym metaleptic in a traditional rhetorical sense is not that it is lexically wrong, but that it is contextually inappropriate and functionally problematic. However, it is crucial to note that the idea of appropriateness is in itself already based on a particular historical concept of signification. This brings us to a second aspect of narrative metalepses which has hitherto been largely neglected. As we have just seen, metalepsis as a rhetorical concept presupposes that the link between signifier and signified is contextually defined and thus to a significant degree

arbitrary. The same applies to narrative metalepsis: it is a concept which simply does not work on the basis of a non-arbitrary concept of signification. For example, could Plato, whose poetological convictions stem from a decidedly non-arbitrary concept of signification implied by his idealist ontology, even 'think' something akin to a narrative metalepsis? The answer must clearly be 'no', and this not because of an idiosyncratic disregard for fiction. The impossibility to appreciate metaleptic aesthetic effects is anything but a whimsical peculiarity in Plato; in fact it is a perfectly logical consequence of the ontological and semiological presuppositions on which a Platonian universe is based.

Our situation today is exactly the obverse. Indeed, representational metalepses in art are quite fashionable because we deem them 'meaningful' in a more abstract sense and enjoy playful self-referentiality. Since Aristotle's' *Poetics* we have grown accustomed to the idea that statements made under the condition of fictional representation are exempt from tests for prepositional truth. At the same time, one would assume that it is precisely our voluntary abandonment of the criterion of referentiality which makes us all the more dependant on that of consistency—and logical consistency, it seems, is precisely what narrative metalepsis negates. The same of course applies to *myse en abyme*. In fact, one of the consequences of looking at metalepsis's formal properties is the realization that the distinction between *mise en abyme* and *metalepsis* concerns mainly the level of apparentness and unavoidability which the aporia assumes in a particular work. In other words, *mise en abyme* is simply a fully-blown, fully implemented instance of the type of paradox already implied in even the weakest case of metalepsis. In a formal model the distinction can thus be ignored, whereas it must certainly remain crucial to the design of typologies, as well as to descriptions and interpretive analyses of empirical examples in aesthetic artifacts.

Apart from Genette the original functional definition of the concept's predecessor in rhetoric has hardly played a role in narratology; one has generally preferred to explicate the aporetic design characterizing the phenomenon of metalepsis in two other regards:

a) in terms of ontological order, i.e. as an aporetic narrative statement negating the absolute validity of *ontological* distinctions among existential levels in worlds;

b) in terms of theory of communication, i.e. as an aporetic narrative statement leading to the identification of *communicative roles* normally considered as distinct.

Narratological approaches to metalepsis accordingly vary in terms of goals and methodologies; figure 1 attempts to systematize these:

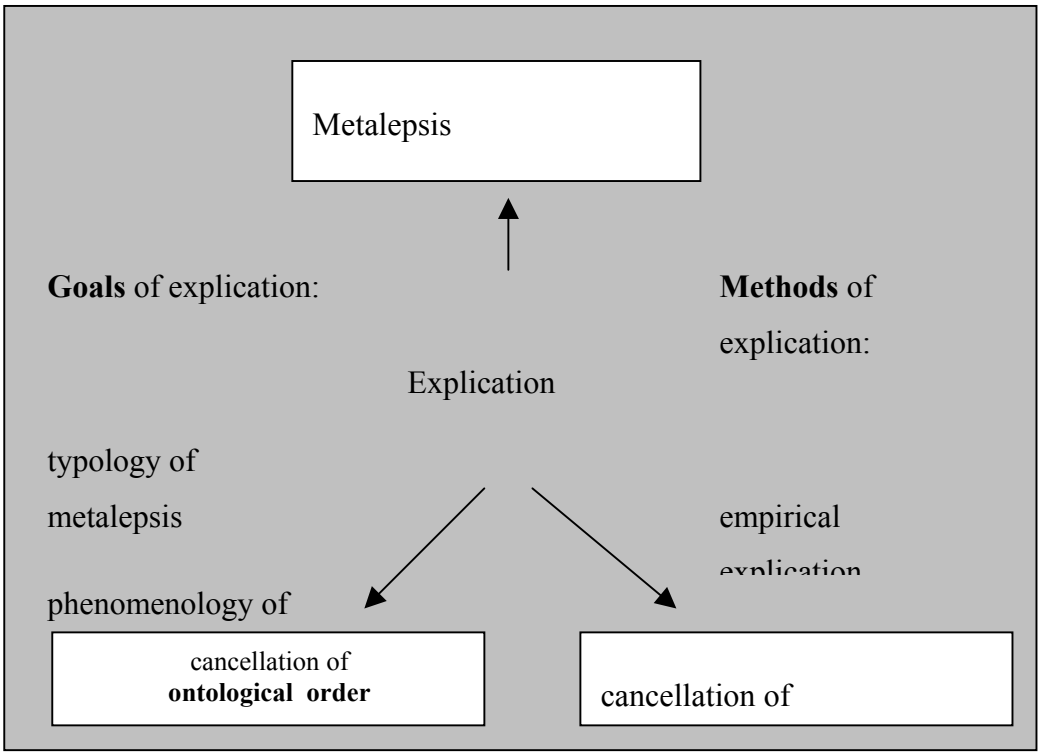

Figure 1: System of narratological approaches to metalepsis

Against this background I will now propose an explication of metalepsis that focuses on its consequences for the *communicative contract* entered into by author, narrator and reader of fictional narratives, a contract which in turn presupposes the validity of an even more fundamental—though mostly implicit—agreement which one might call the *representational contract*. The underlying hypothesis is that this contract is negated by metalepsis, but can be 'normalized' (restituted) by certain subsequent operations. The methodological consequence, therefore, is that metalepsis should not–as the ontological approach implies–be conceptualized as an absolute phenomenon, but rather as a case of representation turned self–referential in the extreme.

Methodologically my approach is closely related to that of Tom Kindt and Hans-Harald Müller whose contributions to the current volume are based on the similar considerations of principle. Kindt explicates the Gricean background to the notion of *communicative contract* and proceeds to compare metalepsis to other narrative procedures that tend to call this contract into question; his aim is to outline potential strategies of 'normalization' that are specific to metalepsis, as opposed to those pertaining to other forms of narrative anomalies, and particularly to narratorial unreliability. Müller presents a case study in which the

'narrative output' (Dällenbach) of a particular metaleptic novel (Leo Perutz' *Die dritte Kugel*) is evaluated in terms of competing and mutually exclusive reconstructions of the narrated events offered indiscriminately to its readers by the text. In other words, Müller's approach demonstrates how metalepsis can work as a kind of salvatory clause retrospectively inserted into the communicative contract, a clause which expressly licenses ambiguity on the base level of the interpretatively reconstructed *histoire* and thereby waves the hermeneutic postulate that any global interpretation presupposes a successful disambiguation of the interpreted material at base level.

My own approach is somewhat more abstract. I will attempt to identify the minimal logic conditions under which metalepses can occur, and the maximum complexity which it can reach, and will then try to illustrate the pragmatic constraints which are placed on metaleptic constructs. I will proceed by first giving a rather abstract formal definition of metalepsis in the form of a computer algorithm, and then activating that algorithm to test it for its boundary conditions. This approach basically reconceptualizes the narrative phenomenon as an *algorithmic* one, tests its functionality and limitations and then returns to a philosophical evaluation in which the implications of metalepsis for the representational contract are briefly considered. The overall methodological signature of my approach is that of humanities computing: a research praxis which is based on the belief that the reconceptualization of humanities' phenomena in a foreign methodological paradigm will help us to discover new aspects to old problems.[11]

II. Towards a computational model of metalepsis

In designing a formal model of metalepsis it is vital to note that metaleptic phenomena are by no means restricted to the aesthetic domain.[12] Let us look at mathematics for example (geometry, to be more precise), bearing in mind that the drawing of parallels between mathematics and literary science—in fact, of parallels between mathematics and anything for that matter—is risky. However, the translation of a mathematical theorem into a speculative metaphor may be permissible as long as we conceive of it not as an explanation, but as a *heuristic* employed for the purpose of reconceptualizing our understanding of "metalepsis", and I beg the reader to take it in this sense.[13]

One particularly relevant case is that of the analogy between metalepsis and theoretical objects such as the Möbius strip which visualizes August Ferdinand Möbius's (1790-1868) theorem of a one-sided surface (figure 2),[14] or that of the less well-known Klein bottle, a

theoretical object named after the German mathematician Felix Christian Klein (1849-1925) that attempts to illustrate the idea of a three-dimensional continuum that feeds back into itself (figure 3).

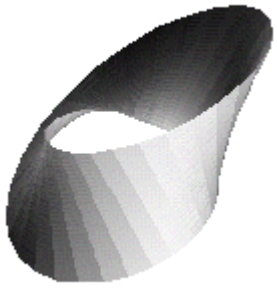

Figure 2: Möbius strip

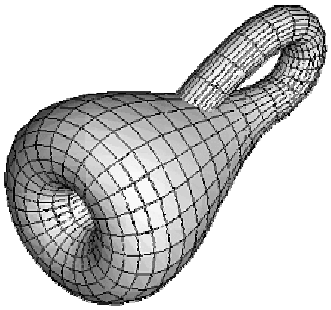

Figure 3: Klein bottle[15]

These playful theoretical objects serve to illustrate an epistemological problematic encountered even in the hardest of natural sciences, that is, in modern physics. It was Heisenberg who realized that according to the theory of quantum mechanics, you can either gather precise knowledge about a particle's impulse, or about the particle's spatial position. To have both at the same time is not possible, because the observer is necessarily involved in the process of observation. Or, as Wolfgang Pauli put it in a letter to Heisenberg:

> Man kann die Welt mit dem p-Auge und man kann sie mit dem q-Auge ansehen, aber wenn man beide Augen zugleich aufmachen will, dann wird man irre.[16]

In epistemological terms this is indeed what metalepsis amounts to: a case of being instructed to 'open both eyes at the same time'. One eye is needed to orientate ourselves on the level of discourse, and one to orientate ourselves within the world represented by it. The problem of

an impossible logic double-focus has troubled other disciplines as well; Wittgenstein's *Tractatus* for example approaches it from an analytical angle and states:

> Der Satz kann die gesamte Wirklichkeit darstellen, aber er kann nicht das darstellen, was er mit der Wirklichkeit gemein haben muß, um sie darstellen zu können – die logische Form. Um die logische Form darstellen zu können, müßten wir uns mit dem Satze außerhalb der Logik aufstellen können, das heißt außerhalb der Welt.[17]

The same dilemma underlies Gödel's famous mathematical problem, formulated in the so-called *Incompleteness Theorems*[18], and it reoccurs in yet another variant in Computer Science in the context of what is known as the *Halting Problem*. A current encyclopaedia definition describes it as follows:

> The halting problem is a decision problem which can be informally stated as follows:
>
> *Given a description of an algorithm and a description of its initial arguments, determine whether the algorithm, when executed with these arguments, ever halts (the alternative is that it runs forever without halting).*
>
> Alan Turing proved in 1936 that there is no general method or algorithm which can solve the halting problem for all possible inputs.
>
> The importance of the halting problem lies in the fact that it was the first problem to be proved undecidable. Subsequently, many other such problems have been described; the typical method of proving a problem to be undecidable is to reduce it to the halting problem.[19]

Marie-Laure Ryan, in her contribution to this volume, explains the relevance of the 'Halting Problem'-theorem for our understanding of metaleptic constructs in greater detail. What will be presented now is a practical example for a 'metaleptic machine' (Ryan) fundamentally affected by the halting problem: a computer algorithm that attempts to resolve the irresolvable representational problem of metalepsis. What will make this attempt at the impossible interesting to us not that it will fail—we know that right from the outset—but *how and why* it fails. This will hopefully shed some new light on our subject matter.

The task of our program shall be to generate a verbal representation of the famous sketch *Drawing* (1948) by Dutch artist Maurits Cornelius Escher (1898-1972), perhaps one of the best illustrations of the principle of metalepsis in that it visualizes the representational and the ontological aporia in one:

Figure 4: M.C.Escher: *Drawing* (1948)

Does the left hand draw the right hand, or is it the other way round? And which of the two hands is more 'real'? The question is impossible to answer, it seems, but let us try and forward it to the computer nevertheless. In order to do so, we need to feed the computer some data as well as some instructions. In this case data and instructions will both be contained in a little program which I wrote for this purpose, the *Metalepticon*. The program consists of two types of statements: statements about *facts* and about *rules*. These two classes are defined as follows:

- *facts* are true statements about the representational system; i.e. Escher's drawing
- *rules* determine how *facts* may be (re-)combined in order to interpret that system

Facts and *rules* represent the entire information about the representational system and its potential interpretations which we will make available to the *Metalepticon*. Once this virtual machine has 'read' (compiled) the input we will ask it to start processing it and generate output, that is, to combine the facts according to the rules and draw inferences, thus generating meta-representations or 'knowledge' about the representational system embodied in Escher's 'hand draws hand'-etching. We will proceed in a step-by-step fashion before eventually asking the *Metalepticon* to generate *all* logically consistent inferences that can be derived from its input. Here now is the actual program, written in standard PROLOG syntax (see next pages):[20]

```
%  Metalepticon v.1
%  JCM - 01.07.2003

%     Facts
%          ____________________________________________________
%     Facts known to the narrative system can be represented in 2 ways:

%     From the left perspective = index 1

                agent(1,`Left hand draws`).
                object(2,`right hand`).


%     From the right perspective = index 2

                agent(2,`Right hand draws`).
                object(1,`left hand`).


%      Rules
%       ____________________________________________
%      Two rules define the system's representational functions:


%     1. The rule for generating simple representations

      representation(Narrator, Narrated):-

                agent(AgentDomain,Narrator),
                object(ObjectDomain,Narrated),
                AgentDomain =\= ObjectDomain.


%     2. The rule for generating nested meta-representations

      meta-representation(MetaNarrator, Narration):-

                agent(MetaDomain,MetaNarrator),
```

```
                representation(Narrator, Narrated),
                agent(AgentDomain,Narrator),
                object(ObjectDomain,Narrated),

        Narration = how(Narrator, Narrated),
        NarrationDomain = MetaDomain-1,

%       the following adds any narration identified as object of a meta-narration to the
%       known facts

            assertz(object(NarrationDomain,(how(Narrator,Narrated)))).
```

Running the *Metalepticon* code will essentially amount to finding out what the concrete value or 'meaning' of its variables might be. In other words, all the program does is to try and slot the *facts* which it has received as input into the position of the variables while at the same time respecting all the *rules*.[21] In our experiment we have proceeded in three steps, instructing the computer to resolve three different questions:

(1) "On the level of *representation*, who can assume the roles of *narrator* and *narrated* in Escher's representational system?" – This question is the natural language equivalent of the *Metalepticon's* first head clause

```
representation(Narrator, Narrated):-
```

which is tied to the conditions defined in the remainder of rule 1. In processing our question the *Metalepticon* will produce a total of two possible answers (separated by the ';') as the following screen shot shows:

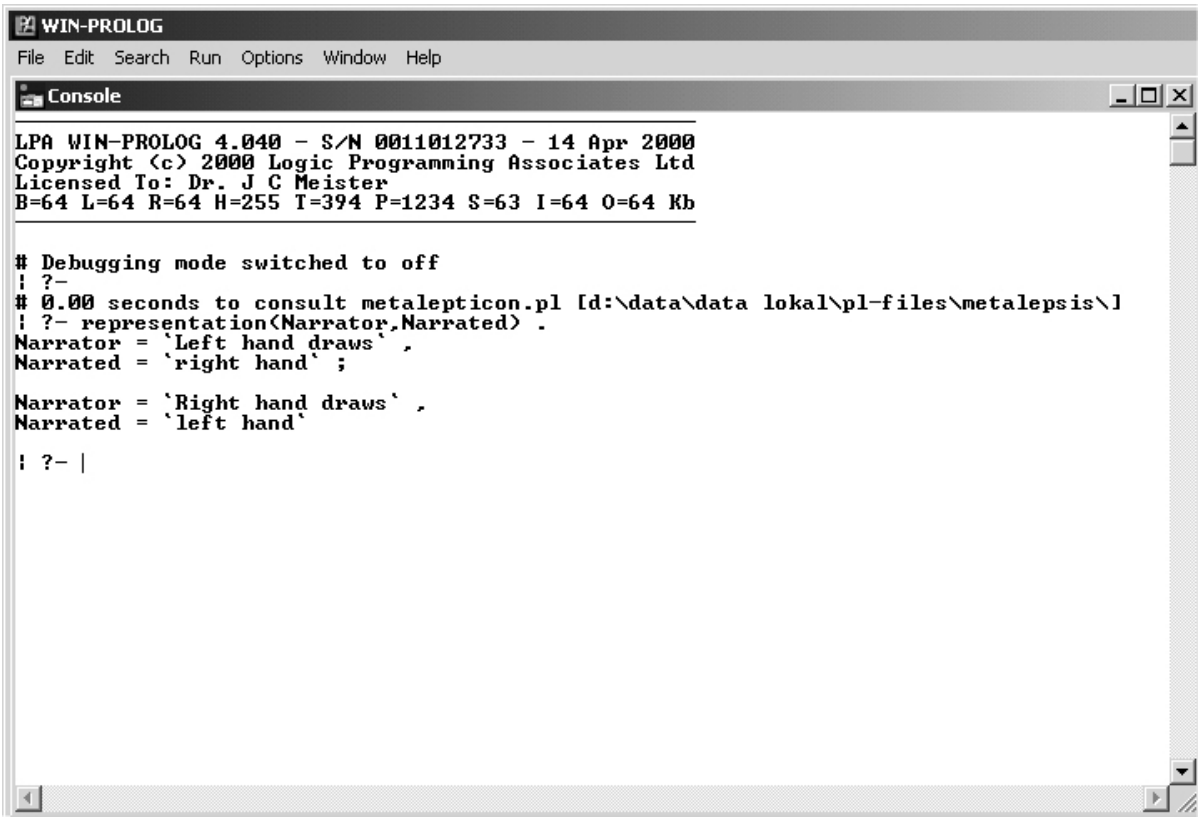

Figure 5: *Metalepticon* after processing of 1st query

(2) "On the level of *meta-representation*, who can assume the roles of *Meta-Narrator* and *Narration* in Escher's representational system?" – This question is the natural language equivalent of the *Metalepticon's* head clause

meta-representation(Meta-narrator, Narration):-

which is tied to the conditions defined in the remainder of rule 2. In processing this second question the *Metalepticon* will also produce an answer. By re-iterating the query we can ask it to find the second possible unique answer, then the third, fourth, fifth and so on. Here is the result:

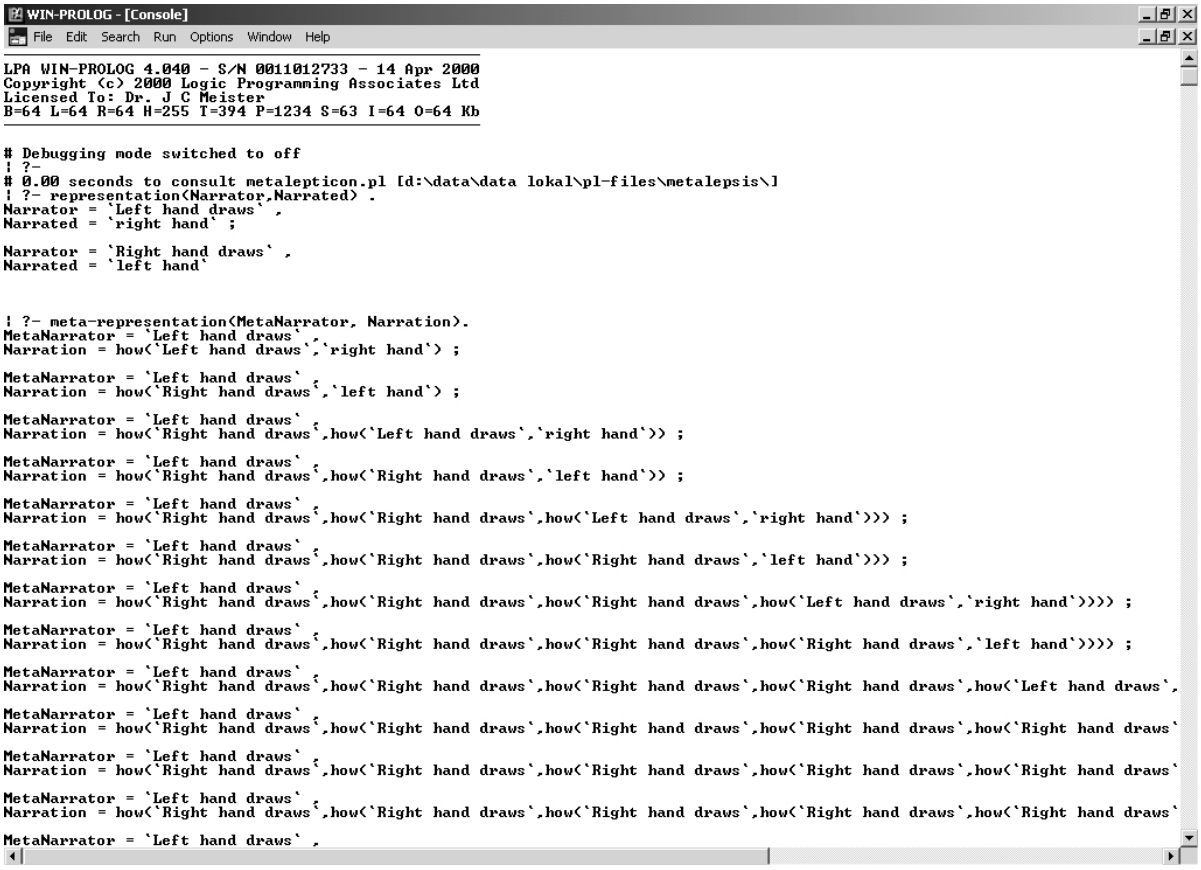

Figure 6: *Metalepticon* while processing of 2st query

As one sees it proves difficult to find out *how many* possible answers there actually are: every time we issue the repeat command, an ever deeper-nested structure will be generated. Since we don't want to waste our time pressing the repeat key millions of times we will take a shortcut by issuing a new command:

(3) "Generate *all* possible answers for the following question: 'On the level of *meta-representation*, who can assume the roles of *Meta-Narrator* and *Narration* in Escher's representational system?' " – This command makes use of a particular feature in the PROLOG programming language used for the *Metalepticon*, namely the possibility to force the program to generate a list of all correct unique answers to a given problem. For reasons soon to become apparent I have termed this clause the *go_crazy*- command:

```
go_crazy:-
    findall(X,meta-representation(MetaNarrator,Narration),List).
```

If we instruct the machine to execute this command the machine will (sooner or later, depending on the hardware used) abort the *Metalepticon* and report that it has confronted an error. Its screen will then look like this:

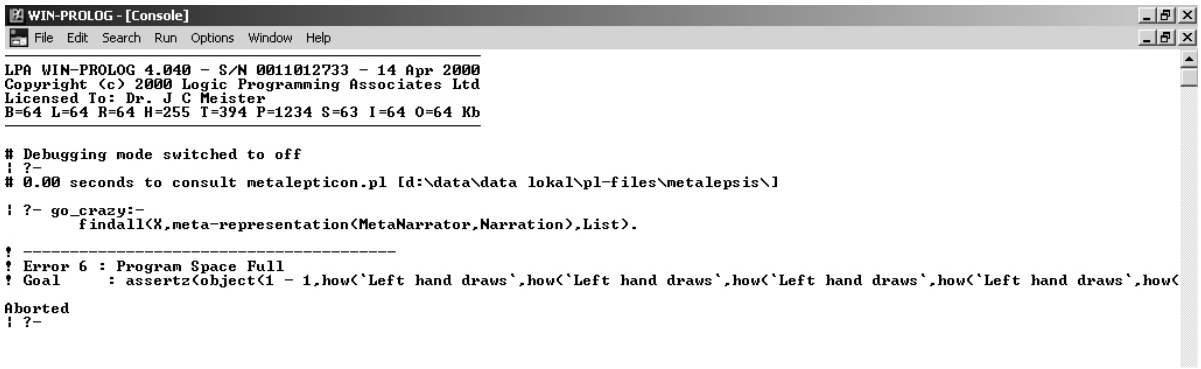

Figure 7: *Metalepticon* after processing of 3rd query

Consulting our on-line help about the mysterious 'Error 6' that caused the program to abort execution we will learn the following:

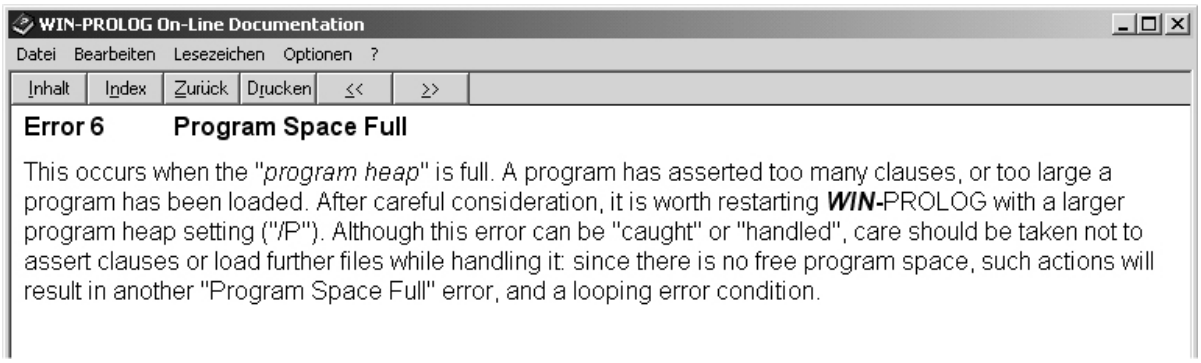

Figure 8: On-line information on PROLOG error 6

What has happened here? The machine, for all its computational power, seems to have hit a wall. However, it is important to note the exact nature of its problem, for contrary to what one might initially think the machine is not just engaged in inescapable recursion, a so-called infinite loop. In a classic condition of infinite looping the computer will generally not be able to even *begin* to output relevant results: caught in an inescapable recursion of processing logic, it will be forced to keep on stacking processing instructions on top of each other. This will eventually lead to an error whose effect is similar–the program will crash–but conceptually different, a so-called *stack overflow*. In PROLOG, the *stack* is a virtual segment of the machine's memory which is reserved for storage of dynamically generated processing

instructions, whereas the *heap* is that part of the memory which is used to store the original program and input data itself, as well as the interim results which it may dynamically generate and will temporarily store so that they may be reused by a recursive instruction at a later stage, until the end result is finally handed over to the output stream: normally a disk drive, a screen or a printer; in other words: some form of external representation device.[22]

Looking at the enormous amount of nested structures generated by the algorithm we realize that the *Metalepticon's* problem is that command (3) forces it to generate an indefinite amount of output which, at the same time, is also considered an interim result. It is this latter category that poses the problem; the machine simply cannot 'keep in mind' all the interim results. This is what our on-line help refers to by telling us that "the program has asserted too many clauses." What exactly does this mean? According to the *Metalepticon's* second rule, every result which the computer generates is immediately fed back into its own knowledge base, thus creating a new clause or *fact* which the machine needs to take into consideration thereafter. In other words, it is *the dynamic nature* of the *Metalepticon* which ultimately causes the problem, not necessarily its self referential design per se because, as the second run of the program has demonstrated, despite recursion the program *will* produce a finite number of results as long as it is given a finite number of *facts*.[23] However, once we instruct the *Metalepticon* to reinterpret every computationally identified correct *statement of fact* as a new *fact* which in itself needs to be computed, it will never be able to reach its halting condition: the program's demands on its *heap* memory keep on expanding, while at the same time ever deeper nested structures wait to be analysed and computed.

From a semiotic point of view the problem of this ever-expanding memory is rooted in the elimination of a stable logical distinction between *statements of facts* (meta-representations) and *facts* (representations). A 'normal' (strictly procedural) computer program would insist on resolving this blatant case of ambiguity and simply tell us that something is wrong, either in its own code, or in the data which we input into its knowledge base, and then stop to work. Seen in this light the dilemma of the *Metalepticon* proves to be not that it is too stupid, but rather that it is too intelligent: that it can learn and dynamically expand its knowledge about *facts*, and that it will insist on trying to find answers in the face of a conceptual ambiguity that results from recursion in as much as from reinterpretation. This attempt at 'intelligent' behaviour is what forces our program to fall prey to the metaleptic suspension of the base principle of representation, the principle of fundamental distinction between sign and signified. Had it not been for the inconspicuous last line of program code

assertz(object(NarrationDomain,(how(Narrator,Narrated))))

in which the *assertz*-predicate instructs the machine to behave 'intelligently' and add the newly computed *object*-result to its current knowledge no error would have occurred.

As stated at the outset the *Metalepticon* is merely an experimental modeling device. The interesting question raised by our experiment is not what the machine can handle, but rather how many recursions and what demands placed on our own memory we, the natural observers and cognitive processors of metalepses, are willing to tolerate before we report an error. This is bound to be contingent on various factors, some of an ontogenetic and some of a cultural order; just as some people enjoy Bach's quadruple canons and fugues (which possibly constitute the most intricate self-referential artistic structures to date), while others don't. Such reaction – similar to that owed to the restricted amount of memory available to the *Metalepticon* – is merely the result of pragmatically or conventionally imposed limitations. Knowing how metalepses work, or why our attempts to process them in terms of standard semiotic assumptions cannot, presents only a partial solution.

III. The meaning of metalepsis

Let us rephrase the question, then. What is the point in imposing limitations, of reporting a cognitive and hermeneutic processing error, so to speak? An important semiological and poetological necessity sets the case of a concrete, aesthetically represented and cognitively processed metalepsis apart from that of an abstract formal model of metalepsis like the *Metalepticon*. In reading and watching aesthetic metalepses we consciously choose to 'open both eyes at the same time', yet certainly have no intention of 'going crazy'. Rather than wasting our mnemonic faculties on ever deeper nested structures we will at some point decide that now has come the time to exit from the self-referential loop. It is precisely at this point where we no longer question what and how metalepsis represents something, but rather what metalepsis itself taken as a structure may mean. What, then, could be the *meaning* of metalepsis?

I believe that the metadiegetical 'switch' implied in metalepses is perhaps of a more profound nature than one would normally assume. To understand this we have to realize that in the case of metaleptic paradox, logical consistency—or rather, inconsistency—is precisely not a matter

of how a world separate from our own empirical one is *internally* organized. Or, to put it differently: metaleptic constructs prove a possible world impossible not because that world is shown to have some *immanent* logical defect. Rather, they do so because they imply that there is, indeed, only *one* world. In other words, they don't just negate the plausibility of a possible world. They negate *the very idea of a possible world* indexically distinguishable from the observer's reality. In the ongoing history of ideas metaleptic constructs thus play the role of a conceptual wormhole through which we get sucked back in time, way past Platonian idealism, back into the preceding magic universe where signs are things, and things are signs.[24] For metalepsis, when considered not primarily as an aesthetic, but as a semiotic phenomenon, amounts to a cancellation of the *representational contract* on which the modern concept of symbolic systems, taken in a common sense, is based. Borges was right: Metalepsis implicitly equals the observer with the observed, and the observed with the observer, and so forth. One can interpret this as an ontologic problem, if one so wishes, but one can also explain it in terms of its aporetic semiologic.

Which brings me to a conclusion that can be summed up in three simple points.

(1) We all know that what metalepsis states is, of course, completely absurd: $p = q$ doesn't' work.

(2) There are two ways of experiencing this: from the p-side, or from the q-side.

(3) There is however only one way of *knowing* that (1) and (2) are the case: from the outside.

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1 Gérard Genette, Die Erzählung. München 1998:167-169

2 The development of a proper taxonomy of metalepses is the research goal of Klaus Meyer-Minnemann's current project on Paradoxical transgressions of the levels of communication and/or existence in literary narratives: the narrative procedures mise en abyme, metalepsis, meta-/hypo- and pseudodiegesis (www.narrport.uni-hamburg.de). For a survey on the related field of self-referential narratives see Werner Wolf, "Formen literarischer Selbstreferenz in der Erzählkunst: Versuch einer Typologie und ein Exkurs zur ´mise en cadre´ und ´mise en reflet/série´", in: Erzählen und Erzähltheorie im 20. Jahrhundert: Festschrift für Wilhelm Füger, hg. von J. Helbig, Heidelberg (C.Winter) 2001:49-84.

3 Directed by H.C.Potter. See <http://www.streetswing.com/histmain/d5hlzply.htm> and <http://www.savoystyle.com/hellzapoppin.html> for further details on Hellzapoppin'.

4 Hitler had already been used as a metaleptic point of reference in the 1938 Broadway version of Hellzapoppin' in which he reportedly appeared (in one of the many impromptu scenes) addressing the public in Yiddish.

5 Adaptation. Screenplay by Charlie Kaufman and Donald Kaufman. Based on the book ‚the Orchid Thief' by Susan Orlean. Including commentaries by Susan Orlean and Robert McKee. Plus an interview with Charlie Kaufman and Spike Jonze. New York (New Market Press), 2002.

6 Jorge Louis Borges, Befragungen. In: J.L.Borges, Gesammelte Werke, Bd.5/II, München, Wien 1981:57. Reference according to Genette, op.cit.:169–In the discussion of my approach towards a computational modeling of metalepsis at the 2001 conference La metalepse aujour d'hui Gérard Genette jokingly suggested to label its outcome cataleptic.

7 David Herman, "Toward A Formal Description of Narrative Metalepsis"; in: Journal of Literary Semantics 26, 1997: 132.

8 In the system of rhetoric the concept of narrative metalepsis would rather seem to fall under the notion of perspicuitas—or in this case, obscuritas—in which the ordering of ideas with a view to the referential meaning to be communicated takes place.

9 Heinrich Lausberg, Elemente der literarischen Rhetorik. Ismaning (Max Hueber) 1990:§ 173.

10 Johann Wolfgang Goethe, Faust II, 1, 4897: ‚Natur und Geist'

11 On the general methodological and theoretical orientation of humanities computing see (among numerous others) the individual contributions by Willard McCarty, Jan Christoph Meister, Tito Orlandi, Geoffrey Rockwell and John Unsworth in Jahrbuch Computerphilologie, vol.4, Paderborn (Mentis Verlag) 2002. Incidentally, the topic of metaleptic and nested structures has recently also received attention on Humanist, the main electronic discussion forum in the field of humanities computing (edited and moderated by Willard McCarty). See entries 17.040 to 17.045, 17.046 and 17.064 (all accessable at the Humanist online archive: www.kcl.ac.uk/humanities/cch/humanist/).

12 See Douglas Hofstadter's Gödel, Escher, Bach. (1979) in which recursive logic as it affects diverse fields such as mathematics, graphic art and music has been explored and philosophically interpreted.

13 The debate triggered by Alan Sokal's hoax publication "Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity" (in: Social Text 46/47, 1996:217-252) has resulted in a sharpened awareness for the methodological problematic of some scholars' favor for metaphorical interpretations of theorems developed in the 'hard' sciences. Generalizations based on ill-informed readings of such theorems (for example, the interpretation of Heisenberg's Unschärferelation as stating that as a matter of principle, no objective knowledge of the empirical world whatsoever can be attained) are certainly not what the current article wishes to advocate. However, I do find it legitimate to use metaphors for heuristic purposes. Reverse processes of conceptual adaptation have been common practice in the hard sciences since their beginning.

14 See John Fauvel (ed.), Möbius and his band. Mathematics and astronomy in nineteenth century Germany. Oxford (OUP) 1993. Among the many internet resources on Möbius the entry on mathworld.wolfram.com is particularly instructive: http://mathworld.wolfram.com/MoebiusStrip.html (02.07.2003); it contains a detailed discussion of the mathematical aspects as well as visualizations.

15 On the Klein bottle see: http://www.kleinbottle.com/whats_a_klein_bottle.htm; a mathematical discussion of the Klein bottle is found at http://mathforum.org/library/drmath/view/55176.html (both 02.07.2003). A real Klein bottle can only be constructed in a non-Euclidean four dimensional space; in a 3D space the bottle's surface cannot go through itself without resulting in a discontinuity

16 "One can look at the world with the p-eye and one can look at it with the q-eye, but when you try to open both eyes at the same time, you will go crazy."-My translation; German original quoted after G.Münster, "Heisenbergsche Unschärferelation"; in: G.Münster, *Quantentheorie. Skriptum (...)*, Münster (Westfälische Wilhelms Universität Münster), 2002; online version http://pauli.uni-muenster.de/Lehre/quant-skript/node8.html (02.07.2003)

17 Ludwig Wittgenstein: Tractatus logico-philosophicus. Paragraph 4.12. Frankfurt a.M. (Suhrkamp) 1984:42

18 See the keyword entry for 'Derivability conditions'; in: The Routledge Encyclopedia of Philosophy version 1.0, 1998.

19 Entry "Halting problem"; in: *Wikipedia. The free Encyclopedia*. http://www.wikipedia.org/wiki/Halting_problem (02.07.2003) . *The Routledge Encyclopedia of*

Philosophy version 1.0, 1998 similarly states under the keyword 'Computer Science: 3. The Halting problem': "Given a particular Turing machine or more generally, a particular program, it would be useful to be able to know whether that program will halt when provided with a given input. Of course, in some cases, the answer is obvious. The problem here is to find a general method, another program, that can compute the answer to the halting problem for any given input program and its input. Putting the matter in terms of Turing machines: is there a Turing machine that, when provided with a (suitably encoded version of a) program on its tape, together with an input to that program, will output, say, a '1' if the program will halt on that input and a '0' otherwise. (It is assumed here that, after delivering its verdict, the Halter machine itself then halts.)—It turns out that no such Turing machine exists. This result is sometimes referred to as the undecidability of the Halting problem."

20 PROLOG is the acronym for 'Programming in Logic', a widely used artificial intelligence programming language. Some syntactic conventions particular to PROLOG need to be noted to interpret the *Metalepticon* code correctly:

- lines preceded by a '%'-sign are mere commentary lines which only serve to explain the actual program code to humans;
- all terms beginning with small case letters or embedded in quotes are *facts*;
- all terms beginning with capital letters are *variables*;
- *rules* consist of a combination of *facts* and *variables* by way of the following *logical operators:*

  , (comma) means a logical 'and'

  :- (colon+hyphen) means a logical 'is true if'

  =\= means a logical 'not identical to'

  . (full stop) means 'end'

  ; (semicolon) means 'either, or '

21 In order to make the code easier non-specific output and control routines embedded in the actual program have been omitted in our representation. The complete PROLOG source code for the *Metalepticon* is available at <http:www.jcmeister.de>

22 In an earlier version of this paper I had argued that on the base of my experiment, metalepsis could be conceptualized as a condition of stack overflow. In purely technical terms this has proved not to be the case; the category of error reported by the machine testifies to this. However, the distinction between heap and stack is of course merely theoretical. One might also argue that the effect of computational metalepsis is precisely that it disregards this theoretical distinction and attempts to force the computing machine to allocate more and more of its memory resources to the storage of interim results which in themselves begin to resemble program instructions, rather than proper output handed over to the external world.

23 To put it in more technical terms: in PROLOG, many recursive routine have an inbuilt boundary condition in that PROLOG will anyway only generate unique results—it remembers ('flags') the input elements and combinations which it has already tested, whereas other programs would simply retry them over and over again. These programs depend on an external halting condition (for example, the specification of an absolute number of iterations; e.g.'do this 5 times, then stop.')

24 See Ernst Cassirer, Philosophie der symbolischen Formen, II: Das mythische Denken. Darmstadt (Wissenschaftliche Buchgesellschaft) 1977. Cassirer considers 'mythical thinking' a distinct historical form of mental representation and cognitive processing in humans and argues that this form's characteristic inability to conceptualise the norion of abstract signifiers is best manifested in its unique concept of language. According to the mythic concept of language, a word and a name cannot be reduced to a mere representational function, but do in fact contain the represented entity and its real powers, or, as Cassirer writes: "Auch das Wort und der Name bezeichnen und bedeuten nicht, sondern sie sind und wirken." Ibid., p. 53.