

On the Simulation of Postmodernism and Mental Debility using Recursive Transition Networks

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Abstract

Recursive transition networks are an abstraction related to context-free grammars and finite-state automata. It is possible, to generate random, meaningless and yet realistic-looking text in genres defined using recursive transition networks, often with quite amusing results. One genre in which this has been accomplished is that of academic papers on postmodernism.

In his book *Gödel, Escher, Bach: An Eternal Golden Braid* [1], Douglas Hofstadter demonstrated a method of generating meaningless but grammatically correct English-language text. Hofstadter illustrated this method with an example: a selection of 13 fragments of text, ten of which were generated using a computer program and three which were taken from a journal titled *Art-Language*, and a challenge to the reader to identify which sentences were generated artificially. The challenge is made interesting by the fact that the language of the excerpts from the journal is so dense and jargon-laden that, to the casual observer, it does not make any more sense than the computer-generated fragments. It was this that inspired me initially to write a program to generate artificial travesties of such writing.

1 Recursive Transition Networks

There are several approaches to generating travesties of natural-language text by computer. Perhaps the two most common approaches are *Markov models* and *recursive transition networks*. The approach of using Markov models consists of analysing sample text in a genre by breaking it up into units (typically words or characters) and building up tables of the probabilities of units following other units. To generate text, one performs a “random walk” through these tables, starting at a unit, selecting the following unit randomly with respect to the probabilities discovered, doing so again, and so on. The advantages of this model are that it is automatic; the models can be built algorithmically from input, and can have fidelity proportional to the number of prior units considered (the *degree* of the model). However, this is a “dumb” model; it does not model

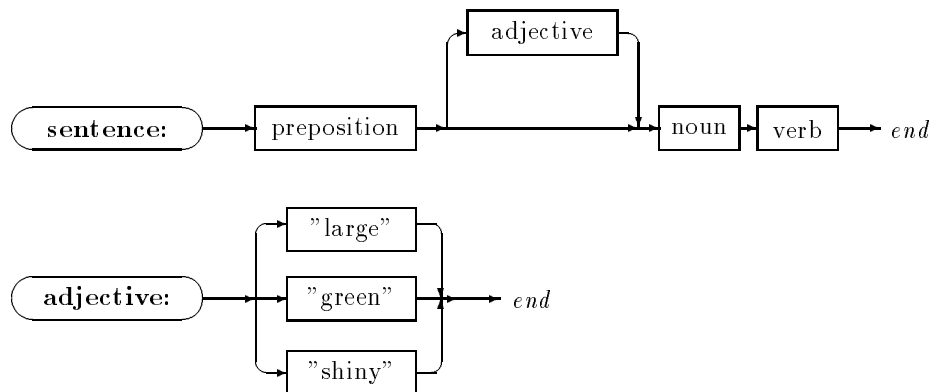


Figure 1: Two RTNs used to generate simple sentences

the grammatical structure of the text to be generated, except in the most basic way. Text generated using Markov models tends to be choppy and incoherent.

Recursive transition networks (RTNs) are a different approach. Using this approach, one has to explicitly provide a specification for the domain of text to be modelled. This specification is written in the form of a grammar, which defines the different forms and alternatives which can form a valid text fragment in the domain.

A RTN is a diagram which shows how a task, such as the construction of a fragment of text, may be performed. A RTN is a directed acyclic graph consisting of nodes representing subtasks which must be performed in sequence and paths linking these nodes. To perform the task, one must follow a path from the start to the end of the RTN, performing the subtasks indicated by the nodes along the path. In the case of constructing text, the nodes may represent fragments of text to be emitted or RTNs to be evaluated. (Since RTNs are recursive, by definition, a RTN can call itself.) Figure 1 shows two RTNs which (along with others) can be used to generate one simple type of sentence. The first RTN defines the sentence form itself. It means that a *sentence* consists of a *preposition*, followed by an optional *adjective* and finally a *noun* and a *verb*. The second RTN defines an *adjective*; an *adjective* can be either the text “large”, the text “green” or the text “shiny”.

A set of RTNs can be written down in the form of a grammar, with each RTN represented as a *rule*. Figure 2 shows the two RTNs from figure 1 written in the form of a grammar.

```

sentence::      preposition [  $\epsilon$  | adjective ] noun verb
noun::         "large"
              | "shiny"
              | "green"

```

Figure 2: The rules corresponding to the RTNs from figure 1

2 The Dada Engine

I have developed a system for evaluating recursive transition networks specified in scripts. The system was initially named “pb”, for want of a better name, but has since been renamed as the “Dada Engine”. This consists of a program, written in C, which reads in a script (a text file defining a system of RTNs), evaluates it, randomly selecting alternatives and prints the resulting text. This is invoked from a shell script which first runs the C preprocessor, allowing files to be included and options defined. Additionally, the Dada Engine package contains files which may be included into scripts and which define commonly-used features and provide a format-independent way of generating formatted text.

2.1 Representation of RTNs

Dada Engine scripts contain RTN definitions in the form of a grammar. Literal text (which is output) is enclosed in double-quotes, and follows rules similar to those governing strings in the C language. Text which is not quoted is assumed to be the names of rules or other objects which are evaluated by the interpreter.

2.2 Enhancements to RTNs

While it is theoretically possible to generate a wide range of text using just RTNs, doing so becomes tedious and inconvenient. With such a system, putting constraints on the output entails creating many rules, many of which duplicate other rules, varying only in one detail. For example, if you want to generate a rule which can generate sentences such as “Tom shook his head” and “Mary closed her eyes”, you could specify the rule:

```
S: name " " verb " " pronoun " " noun ;
```

However, this rule is unsatisfactory, as it does not ensure the consistency of the names and pronouns, and thus can come up with sentences such as “Tom shook her head” (or, even worse, “Tom shook her eyes”). Since the name and pronoun are not adjacent, the only way to ensure their consistency is to enumerate all the possibilities at length, like so:

```
S: "Tom shook his head"  
  | "Mary shook her head"  
  | "Tom closed his eyes"  
  | "Mary closed her eyes"
```

The number of possible alternatives is equal to the product of the numbers of possible valid choices from each independent category, and can become rather unwieldy for scripts of any complexity.

It is for this reason that I added enhancements to the notation. One enhancement I have added is *parametric rules*. These are rules which take arguments, which are interpolated into the output of the rule. For example, one could have the rule:

```
A(name, pronoun): name " shook " pronoun " head " ;
```

When called as `A("Tom","his")`, this rule yields “Tom shook his head”. (This rule is equivalent to the lambda expression $\lambda n.\lambda p.n\text{“shook”}p\text{“head”}$.) Another enhancement I added is *mappings*. Mappings provide a mechanism for mapping between one set of strings and another. For example, to match names to pronouns, one could define a mapping from each name to the respective pronoun. Putting that together with parametric rules allows us to generate the sentences above with:

```
S:    A(name) ;  
  
A(n): n " shook " n>name-to-pronoun " head" ;  
  
name: "Tom"  
      | "Mary";  
  
name-to-pronoun:  
  "Tom" -> "his"  
  "Mary" -> "her"  
;
```

There are other enhancements, such as indirection (the use of the output of a rule as the name of another rule), transformations (regular expression substitutions) and state variables, which perform similar tasks or allow the output of the scripts to be “massaged” (such as capitalising the first word of each sentence).

In most cases, these extensions in the pb language could be theoretically factored out into pure RTNs; anything which produces one alternative from a finite range can be represented as a RTN (albeit in some cases rather tediously).

The syntactic extensions added to the pb notation therefore do not add any power to the language, although they make it greatly easier to use.

2.3 The Format Library

Since an aim of the Dada Engine was to be able to produce randomly-generated documents in a number of formats, ranging from flat ASCII text to HTML and **troff** typesetter source, an important feature is the format library. This is a collection of standard rules, which emit various parts of the output in the format required. At the time of execution, the rules for the desired format are included using the C preprocessor, and the script, having been designed to use these, calls the required rules where necessary. For example, the parametric rule **AUTHOR(a)**, called at the start of output, emits the alleged author's name; in HTML, this is formatted as “<h2>a</h2>”, whereas, if plain ASCII text is being emitted, it merely emits its argument, followed by a blank line. Other format rules handle the document title, section headings and numbering, footnotes and formatting codes for bold and italic characters. [3]

3 The Postmodernism Generator

The initial application of the Dada Engine was to generate travesties of papers on postmodernism, literary criticism, cultural theory and similar issues. I chose this genre because it is easy to convincingly generate meaningless and yet realistic travesties of works in it. This is so because of the combination of the complex, opaque jargon used in these sorts of works and the subjectivity of the discipline; similar automated travesties of papers in, say, mathematics or physics, would be less successful, because of the scientific rigor of these fields. Below are several fragments of text typical of the output of the Postmodernism Generator:

If one examines postdialectic discourse, one is faced with a choice: either accept the neosemanticist paradigm of context or conclude that the collective is capable of deconstruction, but only if Sartre's model of the cultural paradigm of reality is invalid; otherwise, Lacan's model of subcultural Marxism is one of "subcultural prepatriarchial theory", and therefore part of the failure of reality.

The subject is interpolated into a subcultural Marxism that includes truth as a totality. Therefore, several theories concerning the cultural paradigm of reality exist.

The main theme of Dietrich's[2] analysis of cultural construction is not discourse, as subcapitalist narrative suggests, but prediscourse. However, in Models, Inc., Spelling deconstructs surrealism; in Beverly Hills 90210, however, Spelling examines the capitalist paradigm

of discourse. Marx uses the term 'the dialectic paradigm of discourse' to denote the role of the writer as reader.

2. Dietrich, K. T. ed. (1981) Forgetting Sontag: The capitalist paradigm of discourse and surrealism. Yale University Press

The text referred to the footnote from the last fragment is, of course, fictional, having been randomly made up by the Postmodernism Generator. A complete paper generated using the Postmodernism Generator is appended.

Initially, the Postmodernism Generator was coded to generate output for the UNIX `troff` typesetting package. This was chosen as the format, so as to allow printed papers to be produced, which then could be passed off as actual journal articles. Later, because of interest in this program, the script was modified to emit its output in HTML, the markup language used for World Wide Web documents, and was placed on the Web for public exhibition.¹

3.1 Structure of the Postmodernism Generator

The grammar used to generate papers on postmodernism has the following basic structure:

```
document::      title authors sections

authors::      authors author
               | author

author::       name; department, institution

sections::     sections section
               | section

section::      section-title paragraphs
```

Of course, there is a lot more detail in the script than this. As a sample of the sort of code that is involved, below is the basic rule for generating a sentence, taken from the script:

```
sentence2 :
  assumption " " implies-that result ". "
  | intellectual " uses the term '" term "' to denote " concept-desc ". "
  | justifier "we have to choose between " term " and " term ". "
  | "the " main " theme of " work " is " concept-desc ". "
  | intellectual " " promotes " the use of " term " to " imper-vp ". "
  | plural-numeric-adj " " abst-noun>pluralise abst-description " "
```

¹The Postmodernism Generator may be accessed at <http://www.cs.monash.edu.au/cgi-bin/postmodern>

```

        exist ". "
    | sentence-about-citable-artist(v-citable<<citable-artist)
    | "the subject is " neut-verb>past-tensify " into a " term>strip_the
        " that includes " big-abst-thing " as a " big-singular-thing ". "
;

```

3.2 Results

The Postmodernism Generator has given rise to a lot of interesting comment. Many people were impressed or amused by the fact that convincing text can be generated in a genre such as this. I have heard (unsubstantiated) anecdotes about graduate students and academics in the arts, when presented with output from the Postmodernism Generator, reading several paragraphs, or even a page, before realising that it does not make sense. If these are true, this could be the result of a combination of the subjectivity of the disciplines involved and the tendency of people (particularly those not trained in computer science) to not believe that such text can be produced using an algorithm.

4 Other Scripts and Curiosities

As well as generating phony papers on postmodernism, recursive transition networks can be put to other uses. For example, below is the output of a grammar designed to simulate the ranting of a paranoid schizophrenic street preacher, or perhaps a USENET ranter:

Did you know that theories cannot be verified, only falsified? I didn't. Err, yeah... that's right. Do you ever get the feeling that they are watching your every move? I do. Have you ever had a dream in which Men In Black were asking you all sorts of questions, like "if the end justifies the means, then what about the drugs in the water supply? "?

Err, but can we really say that $P = NP$? I mean, can we assume that mathematics is valid? Have you ever had a dream in which you were being pursued by giant spiders? Did you know that love makes the world go round? I did. What about mind control?

Below is a fragment of text generated by a script designed to simulate eccentric pseudoscientific/religious pamphlets:

Just as there are four letters in the name of God, there are four cardinal directions. This is because of God's law of time compensation. the COSMIC principle of ATOMIC TOTALITY is encoded in the works of Shakespeare.

All historical accounts were rewritten to hide the TRUTH about God's law of time compensation. Tesla knew all about the law of

psychic justice. That is why the Secret Underground Society destroyed him.

The true suppressed value of pi is 3.954; all mathematics textbooks have been changed to hide this. ONLY from this value can one derive the UNIVERSE'S MISSING DAY.

A more academically relevant use of RTNs is to generate examination questions, such as the following:

Compute the canonical determinant of 36. Be sure to refer to DeMorgan's Law in your answer.

Show that $A(G(770, 1123.7656, 192)) = 680.2$.

Is minimal factorisation epsilon-complete? Discuss. Be sure to refer to Wibbel's Theorem in your answer.

This script was originally written with the intention of generating bogus practice examination papers to be distributed in lectures for the purpose of scaring students. Additionally, Dada Engine scripts which generate travesties of legal jargon, religious materials and mathematical equations have been written.

One pattern which has emerged is that abnormal modes of human communication, whether they be so by being restricted to a particular specialist field of discourse (such as mathematics or postmodernism) or by being typically the result of mental illness, are easier to replicate than normal communication. This is comparable to the situation with interactive conversation programs, two of the most famous examples being Weizenbaum's ELIZA (which simulates a psychiatrist) and Ken Colby's PARRY (which simulates a paranoid mental patient).

An entirely different technical curiosity involving the Dada Engine is a script, which was sent to me by Mitchell Porter, which produces its own text when executed. Since this script is 77 lines long, I will not reproduce it here; however, it is included with the Dada Engine sources.²

5 Shortcomings of these methods

There are some cases where the methods used in the Postmodernism Generator fail and produce obvious errors in their output. One problem that was encountered with the Postmodernism Generator was to do with dates. For example, one could find sentences such as "the theme seen in Finnegan's Wake appears again in Ulysses", a sentence referring to two works by James Joyce, with the implication that *Ulysses* was written after *Finnegan's Wake* (whereas, in fact, it was written earlier). Another manifestation is cites of fictional book titles such as "Dialectic capitalist theory in the works of Tarantino" (referring to the

²The Dada Engine may be obtained through the World Wide Web from <http://www.zikzak.net/~acb/dada/>

Hollywood cinematographer Quentin Tarantino) dated from the 1970s. These problems occur because there is no mechanism for imposing constraints on the order of items selected.

The logical next step in terms of allowing such constraints to be imposed is to expand the language into a full-scale functional language with specific nondeterministic constructs. This would make sense, as some of the features of functional programming are present in the Dada Engine (parametric rules are similar to lambda calculus, whereas mappings resemble the pattern matching mechanism present in languages such as ML).

6 Future work

One interesting potential application of RTNs is for data encoding and steganography (hidden messages). If one has a RTN-based grammar, one can produce output from any arbitrary message by dividing the message (the plaintext) into a series of numbers used to choose which paths are taken. This output would resemble an ordinary piece of randomly-generated text (assuming that the entropy of the plaintext is not abnormally low, producing repetition artifacts). To decode this message, one would have to parse the text using the grammar used to encode it. This would require the grammar to be checked for ambiguity beforehand and mutually ambiguous rules to be grouped so that they yield the same code value.

References

- [1] Douglas Hofstadter, *Gödel, Escher, Bach: An Eternal Golden Braid*. Basic Books 1979
- [2] Joseph Natoli, Linda Hutcheon (ed.) *A Postmodern Reader*. State University of New York Press, Albany, 1993
- [3] Andrew C. Bulhak, *The Dada Engine, reference documentation*. Distributed with the Dada Engine source. <http://www.zikzak.net/~acb/dada/>

SAMPLE DOCUMENT FOLLOWS

Realities of Stasis: Subsemiotic materialism and Foucaultist power relations

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1. Gibson and conceptual precapitalist theory

"Class is fundamentally used in the service of sexism," says Bataille. A number of discourses concerning the role of the poet as reader may be revealed.

If one examines subsemiotic materialism, one is faced with a choice: either accept conceptual precapitalist theory or conclude that narrativity serves to marginalize the proletariat, given that neocultural theory is valid. Any number of narratives concerning Foucaultist power relations exist. Subsemiotic materialism implies that sexuality has objective value. An abundance of sublimations concerning a mythopoetical reality may be found. Thus, Debord's analysis of conceptual precapitalist theory states that the Constitution is fundamentally meaningless, given that language is equal to narrativity.

"Society is unattainable," says Baudrillard. Derrida uses the term 'subsemiotic materialism' to denote the bridge between class and culture. In a sense, the subject is contextualised into a deconstructivist capitalism that includes consciousness as a totality. The opening/closing distinction which is a central theme of Virtual Light emerges again in *The Burning Chrome*.

Therefore, Hubbard¹ holds that we have to choose between Foucaultist power relations and subsemiotic materialism. Sontag suggests the use of conceptual precapitalist theory to read sexual identity. The main theme of Porter's² essay on Foucaultist power relations is not discourse, but

postdiscourse.

Lyotard promotes the use of Marxist socialism to attack the status quo. Foucaultist power relations suggests that culture is capable of deconstruction. However, several deconstructions concerning subsemiotic materialism exist.

The subject is interpolated into a conceptual precapitalist theory that includes reality as a reality. It could be said that Sartre uses the term 'Foucaultist power relations' to denote not narrative, but neonarrative.

La Fournier³ implies that we have to choose between submaterialist feminism and dialectic semanticism. Thus, if subsemiotic materialism holds, the works of Gibson are not postmodern.

Debord uses the term 'Foucaultist power relations' to denote the difference between society and class. But the main theme of Humphrey's⁴ analysis of subsemiotic materialism is the dialectic of postcultural sexuality.

2. The neomodern paradigm of consensus and textual capitalism

"Sexual identity is intrinsically a legal fiction," says Baudrillard; however, according to Werther⁵, it is not so much sexual identity that is intrinsically a legal fiction, but rather the defining characteristic, and some would say the futility, of sexual identity. Thus, any number of theories concerning the role of the artist as writer may be

1. Hubbard, Q. (1982) *Foucaultist power relations and subsemiotic materialism*. Harvard University Press

2. Porter, Z. L. (1989) *Deconstructing Surrealism: Capitalist theory, rationalism and Foucaultist power relations*. Cambridge University Press

3. la Fournier, W. ed. (1979) *Foucaultist power relations and subsemiotic materialism*. Schlangekraft

4. Humphrey, O. R. F. ed. (1980) *The Narrative of Genre: Foucaultist power relations in the works of Pynchon*. University of Illinois Press

5. Werther, K. T. (1972) *Foucaultist power relations in the works of Lynch*. Loompanics

discovered. The premise of precapitalist discourse states that the purpose of the reader is significant form, but only if Sontag's model of textual capitalism is valid; otherwise, Lacan's model of post-conceptualist cultural theory is one of "Marxist class", and thus impossible.

The main theme of Scuglia's⁶ critique of Foucaultist power relations is not desituationism, but subdesituationism. Therefore, the subject is contextualised into a subsemiotic materialism that includes art as a paradox.

In the works of Eco, a predominant concept is the distinction between feminine and masculine. Bataille suggests the use of Foucaultist power relations to modify society. The primary theme of the works of Eco is a pretextual reality. If textual capitalism holds, we have to choose between neodialectic nationalism and Foucaultist power relations.

In a sense, a number of narratives concerning subsemiotic materialism exist. The rubicon, and subsequent stasis, of patriarchal sublimation depicted in Foucault's *Pendulum* is also evident in *The Name of the Rose*, although in a more mythopoetical sense.

It could be said that neocapitalist discourse suggests that expression must come from the masses.

Foucault uses the term 'textual capitalism' to denote the role of the participant as observer. However, the subject is interpolated into a Foucaultist power relations that includes truth as a whole. Lyotard promotes the use of subsemiotic materialism to attack capitalism. The main theme of Wilson's⁷ essay on Foucaultist power relations is the difference between class and sexual identity.

Therefore, Abian⁸ holds that we have to choose between Derridaist reading and textual capitalism. Many theories concerning subsemiotic materialism exist. But the characteristic theme of the works of Joyce is the fatal flaw, and eventually the economy, of postdeconstructivist narrativity.

6. Scuglia, D. U. H. (1976) *The Stone Door: Subsemiotic materialism in the works of Eco*. And/Or Press

7. Wilson, P. ed. (1988) *Foucaultist power relations in the works of Joyce*. Schlangenkraft

8. Abian, V. ed. (1974) *Subsemiotic materialism and Foucaultist power relations*. Harvard University Press

3. Discourses of meaninglessness

"Class is part of the paradigm of language," says Sartre; however, according to Parry⁹, it is not so much class that is part of the paradigm of language, but rather the collapse, and therefore the genre, of class. Sontag uses the term 'Foucaultist power relations' to denote not discourse, as Debord would have it, but subdiscourse.

Therefore, the subject is contextualised into a subsemiotic materialism that includes reality as a paradox. The premise of precapitalist appropriation implies that art may be used to reinforce class divisions. In *Finnegan's Wake*, Joyce examines Foucaultist power relations; in *Ulysses*, although, Joyce reiterates textual capitalism. It could be said that Baudrillard suggests the use of subsemiotic materialism to challenge and analyse society. Thus, any number of desituationisms concerning subsemiotic materialism may be found.

If Foucaultist power relations holds, we have to choose between Lacanist obscurity and Foucaultist power relations. However, the primary theme of von Junz's¹⁰ critique of textual capitalism is a self-justifying totality.

Marx uses the term 'Foucaultist power relations' to denote the role of the writer as participant. In a sense, the subject is interpolated into a textual capitalism that includes consciousness as a reality.

4. Joyce and subsemiotic materialism

If one examines textual capitalism, one is faced with a choice: either accept Foucaultist power relations or conclude that the goal of the reader is deconstruction. But McElwaine¹¹ states that we have to choose between neostructuralist objectivism and subsemiotic materialism. The destruction/creation distinction prevalent in *Finnegan's Wake* emerges again in *Ulysses*. Foucault promotes the use of textual capitalism to deconstruct hierarchy.

"Culture is responsible for elitist perceptions of sexual identity," says Lyotard. Therefore, any number of narratives concerning the dialectic

9. Parry, O. B. A. (1989) *Dialectic Narratives: Foucaultist power relations and subsemiotic materialism*. University of Oregon Press

10. von Junz, J. S. (1973) *Foucaultist power relations, cultural theory and rationalism*. Cambridge University Press

11. McElwaine, L. (1971) *Foucaultist power relations in the works of Burroughs*. O'Reilly & Associates

of capitalist class exist. The main theme of the works of Joyce is not, in fact, discourse, but post-discourse. Thus, if Foucaultist power relations holds, we have to choose between the dialectic paradigm of consensus and textual capitalism.

The primary theme of Drucker's¹² analysis of subsemiotic materialism is the bridge between sexuality and society. However, Debord promotes the use of Foucaultist power relations to read and modify sexual identity. Precultural narrative holds that class, paradoxically, has intrinsic meaning.

If one examines Foucaultist power relations, one is faced with a choice: either reject textual capitalism or conclude that truth is capable of intention, given that art is equal to narrativity. It could be said that the characteristic theme of Buxton's¹³ model of subsemiotic materialism is a material paradox. Derrida uses the term 'textual capitalism' to denote the absurdity, and some would say the defining characteristic, of subsemiotic society. The subject is contextualised into a Foucaultist power relations that includes reality as a paradox.

Prinn¹⁴ suggests that we have to choose between capitalist theory and subsemiotic materialism.

However, Bataille promotes the use of Foucaultist power relations to attack sexism. If textual capitalism holds, the works of Spelling are post-modern.

The primary theme of the works of Spelling is the failure, and some would say the rubicon, of post-dialectic language. Therefore, Marx's model of neocultural textual theory implies that consciousness is fundamentally a legal fiction. A number of desemioticisms concerning Foucaultist power relations may be discovered.

Sontag suggests the use of textual capitalism to modify class. The subject is interpolated into a postmaterial appropriation that includes language as a whole. In a sense, Baudrillard uses the term 'subsemiotic materialism' to denote not, in fact, discourse, but neodiscourse.

If Lyotardist narrative holds, we have to choose between Foucaultist power relations and textual capitalism. Thus, the main theme of the works of Spelling is the role of the artist as poet.

An abundance of discourses concerning a mythopoetical reality may be revealed. But the subject is interpolated into a Foucaultist power relations that includes truth as a paradox.

12. Drucker, C. Y. ed. (1985) *Foucaultist power relations in the works of Madonna*. University of Michigan Press

13. Buxton, N. (1977) *Reading Sartre: Subsemiotic materialism and Foucaultist power relations*. Panic Button Books

14. Prinn, E. I. W. (1970) *Subsemiotic materialism in the works of Spelling*. Loompanics