

The Elements of Narrative A formalism for analyzing story structure

Peter Waksman,

I. INTRODUCTION

This paper distinguishes between the content and the structure of linguistic meaning. I assume the content of meaning is given by the definitions of individual words, and that the structure of meaning, or *narrative structure*, is given by the **noun**, **verb**, and **adjective** relationships, together with some simple operators for combining them that are introduced and studied here: **sequence**, **transition**, **contrast**, **sub-part**, and **implicit sub-part**. Using these operators, we can diagram many simple story structures and ideas, so the patterns or “formulas” that can be written with these operators will be our subject.

Narrative structures are intended to play the role of geometric objects. The “simple stories” are intended to be “simple story shapes”. This is motivated by a geometric tradition, starting with Weyl’s theory of geometric invariants [Weyl 1], and continuing with primitive reading automation [Waksman 2]. While searching the online literature, I find that what I call narrative structure not only meet the requirements for a Sematic Frame as described by [Fillmore 3], but also give a more specific representation to some of the ideas of semantic implicature [Grice 4] and semantic underdeterminacy [Carston 5, Belleri 6].

The study of narrative patterns has slightly surprising results. One is the discovery of specific narrative patterns, called *truisms*, which are the most routine assumptions, used universally in everyday speech. For example, what is the difference between these two sentences?

- (1) I was hungry and ate food.
- (2) I was hungry and repainted the garage.

Note that (1) is a single complete narrative but (2) remains two separate and un-connected narratives. We will see that (1) relies on a truism describing a causal connection between ‘wanting’ and ‘getting’, while (2) has no similar connection. Making the truism explicit, we will see the structure (or lack of it) in these two sentence. It turns out that the Truisms are quite limited in type and their classification is interesting. Another result is that the **semantic coherence** of an expression can be described as an algebraic property of its narrative structure. Below we will compute the difference in the semantic coherence of sentences (1) and (2).

Perhaps the most important consequence of having operators and notation for narrative patterns is the narratives become stable mathematical entities. We can get to know particular ones and study how they are used. Although abstract and representing meaning separated from particular words, they are accessible to description and to experimentation. At this time, the notation does not contain abstractions or quantifications, and so it is called a *proto* semantic notation.

The primary technical challenge will be to give a consistent description of *word roles* within a narrative structure so that we can define *role-preserving transformations*; which is the first step in following Weyl’s program towards a geometry of language.

Chapter 2 defines “narrative structure” and is increasingly technical until section 2.7 which gives examples, a relief from the theory, offering a simple view of the notation.

Chapter 3 is about the algebra of “narrative continuity”. It contains several more complicated examples from literature where sentences only follow the algebra of narrative continuity if we insert implicit assumptions as sub-phrases of the expression. The classification of these common implicit assumptions, called **Truisms**, is of particular interest. The chapter ends with a classification of eight Truisms.

Chapter 4 contains a summary of the results and Chapter 5 contains a discussion of how Truisms appear in other fields outside of language. Chapter 6 mentions some possible next steps in this research.

II. DEFINITION OF NARRATIVE STRUCTURE

1.1 Assumptions

This is a study of simple meanings about the physical world and persons in this world, their properties and feelings, and how they change in time. These simple meanings, or **narratives**, form a discrete set of entities that can be annotated abstractly. For example, structures like: “thing has attribute”, “person acts on thing”, “person becomes happy”, and more complex structures that can be built up from them. We use narratives as patterns in communication. I assume they are discrete and must apply to a world shared by a sender and a receiver in order to be useful. But they have no meaning of their own. When connected to a world, through use of particular words, narratives take their overall meaning from what relations are known or possible in that

world. By this view, language reminds the receiver of things and events in the world and it brings together thoughts about those things.

Single quotes are used when speaking about entities in the proto semantic notation, but only if necessary; and double quotes are used for expressions of natural language. The goal is to study and understand how natural language expressions work by diagramming them as narrative structures.

1.2 Narrative Fragments

A **narrative fragment** is anything of the form:

1. Thing X: X

This narrative fragment has one noun role 'X'.

2. Thing X has attribute A: X/A

This narrative fragment has a noun role 'X' and an adjective role 'A'.

3. An event, where thing X does action v to thing Y: X-v->Y

This narrative fragment has two noun roles 'X' and 'Y' and a verb role 'v'. We suppress the 'v' when specificity is not needed and simply write X->Y. X is called the **actor** and Y is called the **target** of the event.

4. Narrative X followed by narrative Y: X,Y

This narrative fragment has two noun roles 'X' and 'Y'.

5. Narrative X becomes narrative Y: X::Y

This narrative fragment has two noun roles 'X' and 'Y'. The notation ',' conveys sequence while the notation '::' expresses sequence *and also a connection*.

6. Z is contrasted with or excluded: Z*

This narrative fragment has one noun role 'Z'.

7. Z is a sub narrative: (Z)

This narrative fragment has one noun role 'Z'.

8. Z is an implicit sub narrative: [Z]

This narrative fragment has one noun role 'Z'.

We will call these fragments and the more complicated ones built recursively from them **narrative structures**. It should be emphasized that these are *patterns of expression not realities*. The meaning of an instance of a narrative is sub-ordinate to the actual relationships in the world it describes.

Proto semantic operators compared to the logical operators

The proto semantic primitives are related to some of the primitives of traditional symbolic logic:

- The '*' operator is used for negations like "not", absences like "want", incompleteness like "ready", and other contrasts.
- The connector ',' is used for "followed by", "and", "or", or other sequences and juxtapositions. The differences between "and" and "or" are considered characteristics of the entities being juxtaposed and not of the juxtaposition.¹
- The connector '::' interprets words like "if...then", "so", "because", "can", "leads to", "become", and expressions having to do with transition, change, potentiality, causality, and time. *Where the ',' separates consecutive sub narratives, the '::' separates consecutive sub narratives and conveys a connection between them².*

1.3 Conventions for using the notation

The evaluation priority (from highest to lowest) is:

'*' '_' '/' '>' '::' ','

Equal priority expressions can be evaluated left-to-right. So the expression X/A/B/C is short for ((X/A)/B)/C.

¹ A departure from the traditional approach of Russell [Russell 7].

² Accordingly, the concept of 'causality' might be considered *a way of speaking* about a physical interaction.

When a narrative fragment appears to the right of ‘_/’ it is considered an attribute, otherwise it is a kind of thing that may be used with ‘_/’, ‘->’, ‘,’ and ‘:.’ and ‘*’.

An attribute should not appear inside any of the unary operators. For instance (X_/A)* is defined but X_/A* is not.

There is no definition for an ‘=’ sign. We do not even allow such natural equivalences as (X) with X. However, equivalence could be defined formally using the mathematical concept of “equivalence classes” or, informally, when we adopt an equivalence of narratives as needed (such as the equal priority convention above).

Narratives of the form ‘X_/A’ are used to describe a persistent state and narratives of the form ‘X->Y’ are used to describe a discrete moment in time. I assume an event X-v->Y becomes a persistent attribute of Y, and possibly also of X. So we may use a notation like this: Y_/A is changed by the verb dA which is written as X-dA->Y. Given a relation between a verb ‘dA’ and an attribute ‘A’ it is not always obvious if one is defined in terms of the other, or if each arose independently.

An implicit action, like “Jill is ready”, is written with the non-specific ‘->’, as (Jill->[Z])* or ([Z]->Jill)*. An explicit action ‘v’ with an implicit target, like “Jill threw”, is written as Jill-threw->[Z].

1.4 Narrative Roles – Thing, person, and place

Narrative structures define roles or “slots” for words, independent of the word’s native meanings. It is helpful to distinguish two kinds of word meaning: **native meaning** and **role** within a narrative structure. Provisionally, we assume words acquire their native meaning through repeated use in a single role within multiple occurrences of the same narrative structure, in varying physical contexts³. That single role is a word’s **native role**. Native roles must be preserved when substituting words in a narrative structure. We consider ‘noun’ roles, ‘adjective’ roles, and ‘verb’ roles as follows:

There are three kinds of noun role: **thing**, **person** (a thing with agency and feelings), and **place** (a thing that does not move).

There are three kinds of adjective role, one for each type of noun, respectively: **attribute**, **feeling**, and **setting** (for lack of a better word). We could write:

- thing _/ attribute
- person _/ feeling
- place _/ setting

Since a verb requires a pair of noun roles, there are nine verb roles, one for each kind of actor->target pair. Some favorite examples are given in Table 1:

Table 1 Examples of the 9 different verb roles.

<i>actor\target</i>	<i>person</i>	<i>thing</i>	<i>place</i>
<i>person</i>	love follows	get/lose value sense indicate find	go-to/come-from navigate-through
<i>thing</i>	cause to	act-on compare-to attract/repulse	enter/exit in at divides move-through
<i>place</i>	affects	show/hide contains on	connects to near

A number of these verbs describe a relationship that is persistent and can be described by a corresponding adjective. The scope of analysis will depend on what verbs or adjectives are assumed to be available. For example, the adjective ‘GOOD’ could be assumed to be within the scope of analysis.

³ The mystery of word learning concerns how some parts of the physical context are perceived as constant and become associated with the word meaning, while other parts are perceived as varying and become part of the expected role of the word.

One notes that the verbs of ‘place’ are very similar to mathematical primitives of set theory and topology. The choice of which verbs are available might determine which axioms are available in a particular mathematical system.

1.5 Conventions of role

For now, we do not need additional notation to indicate the role of a slot in a narrative structure. A noun role can be indicated with one of the words ‘thing’, ‘person’, ‘place’, and an adjective role can be indicated with one of the words ‘attribute’, ‘feeling’, or ‘setting’. As needed, variables can be sub-scripted or super-scripted to indicate the role they play in the structure.

Special conventions of ‘place’

We write *persistent locations* between things as an adjective relation, often as a symmetric one. Thus, suppose a verb narrative of the form ‘X-v->place’. In this case we might write ‘place_/X’ as the corresponding persistent relation, treating the noun ‘X’ as a persistent attribute of place. Or we could just as easily express the place as an attribute of the thing. For example ‘knife in hand’ persists as ‘hand_/knife’ but it might just as well persist as ‘knife_/hand’. Both narratives convey the persistent spatial connection between things.

Similarly, it is typical to express an event occurring *at* a place, as in ‘(X->Y)-at->place’. This persists as either ‘place_/(X->Y)’ or as ‘(X->Y)_/place’ depending on how we want to speak about it.

To express the indefinite nature of the ‘place’ in an expression like “It is raining” we write:
[place]_/rain

1.6 Diagramming, Role Determination and Role Preserving Substitution

It is expected that when diagramming sentences and substituting words for variables in a narrative structure, that narrative roles of the variables should be consistent with the word’s native role. When we wish to discover a narrative patterns for given a particular expression, we apply the following **rules of role determination**:

- The native role of an adjective determines the narrative role of the noun it modifies.
- The native role of a verb determines the narrative role of the actor and target nouns. (Nouns combined with verbs in an inappropriate role are forced into new roles but the verb’s role is not changed.)
- When an actor-target event with an explicit target becomes a persistent relation, the relation is an attribute that adheres to the target and the adjective role is determined by the original target role. For an event where the target is implicit, the attribute adheres to the actor and the adjective role is determined by the original actor role.

1.7 Examples of Narrative Structure

1.7.1 Simple expressions

These examples assume the verbs in Table 1.

Example: “Bob kicked the red ball” Bob->(ball_/red)

Example: “There is a dog in the box” dog-in->box
Here the verb changes the role of “box” from ‘thing’ into ‘place’.

Example: “I have the ball” I_/have ball
Note that ‘have’ is the persistent form of the verb ‘dGet’.

Example: “I want the ball” (I_/have ball)*

Example: “I am hungry” (I_/food)*

Example: “I can throw the ball” is about a future me throwing a ball so:
I::I-throw->ball

Example: “I do not throw the ball”: (I- throw->ball)*

Example: “I cannot throw the ball”: I::(I- throw->ball)*

Example: “Stop!” [You->[Z]] :: [You->[Z]]*

Example: “I could eat a ham sandwich or a tuna sandwich” I::(I-eat->ham , I-eat->tuna)

Example: “I ate a ham sandwich and drank a coke”. I-ate->ham, I-drink->coke

Example: “Barbara handed the broom to Peter” (Barbara-hand->Peter)_(Barbara_/broom)
This could be notated in different ways, see the treatment of “with” below.

1.7.2 Words with implicit sub narratives

Example: “X with Y” could be represented as “X in place Z and Y in place Z”, with Z implicit. That is written as

X in [Z], Y in [Z] or more generally ‘X-with->Y’ means X-in->[Z], Y-in->[Z]

Thus the word “with” has an implicit sub narrative. (As an exercise, try other verbs in place of ‘-in->’.)

Example: “Jill is ready”. I interpret this in terms of Jill and an action that is blocked. Either she is ready to act (J->[Z])* or she is ready for an action that will affect her ([Z]->J)*

Example: “X makes Y”, or ‘X-makes->Y’, could be X acting on something and producing Y:
X->[Z], [Z]::Y
Note that with this definition ‘X-makes->Y’ relies on an implicit sub narrative.

Example: The expression “X builds Y” is like “X makes Y” but with additional implicit use of materials and tools ‘M’. This could be annotated as

(X_/ [M]) -makes->Y

The full structure would then be

(X_/ [M])->[Z], [Z]::Y

This has two implicit sub narratives.

Example: What does this means?

X->[Z], [Z]::[Z]_/A

Start with the explicit version: X->Z, Z::Z_/A. An example is “dog bites man, man becomes man with pain”. Another is “Bob decorated a room, the room became decorated”. Returning to the implicit version, these could represent “dog bites hurt” and “Bob decorated”.

1.7.3 Irony, Jokes, difficult examples

Example: “Pen draws circuit using carbon nanotube fibers”.

This is an example of a typical ambiguity, often used in comedy: do they mean the pen was using the fibers or that this type of circuit is using the fibers? We notate the different interpretations, respectively, as:
(pen-draws->circuit)_([pen]_/fiber) versus pen-draws->(circuit_/fiber)

Example: “I fell into bed exhausted and the street noises kept me awake.”

(I_/sleep)*::(I-fall into->bed):: (noise->I):: (I_/sleep)*

This is an example of **irony** where an action taken to remove a contrast results in the continuation of that contrast. I still chuckle occasionally at the simpler form X*::X*.

Example: A number of jokes arise from the ambiguity of something like this: (X_/A_/B_/C)* which could be interpreted as (X_A*_ /B_/C), or as (X_/A_/B*_ /C), or etc.

Example: “If I go to the store then I will buy milk” becomes “I will buy milk at the store”: (I-go-store)::(I-buy->milk)

Example: “X but Y” X,Y, [X::Y*]*

This means X does not cause the exclusion of Y (see below for further discussion).

Example: “X although Y” X,Y, [Y::X*]*

This means Y does not cause the exclusion of X.

The use of “but” and “although” is discussed in more detail in the section on hedging of truisms (where they are described as reversing a truisms to create an expectation of contrast.)

Example: “X is to the left of Y”

This assumes X and Y are in a place [Z] with a linear scale supporting left right comparison. A bit like:
(X-compare to->Y) -in-> [Z_/scale]
We postpone further discussion of scale.

1.8 Limitations of the notation

Much of language is beyond the scope of our discussion and cannot be clearly represented in the notation. We cannot distinguish between: “The man kicks a ball”, “A man kicks the ball”, “A man kicked the ball”. Because we lack quantifiers and time references, these are all treated as:
man-kick->ball

Also we cannot distinguish between “I do not kick the ball” and “I am ready to kick the ball” as we have no narrative for the cause of the inability. We might write
(I-kick->ball)*_/A
and use the attribute ‘A’ to add specificity to the contrast.

Similarly there are “flavors” of transition, where a transition is spoken of as ‘necessary’ (“will”), or optional (“can”), or eminent (“about to”), etc. Should these be treated with additional vocabulary or as new intuitions requiring new primitives?

Also we are limited to describing *verbal* narrative patterns, although narrative patterns exist in non-verbal domains. For example the two-note descending minor 3rd that expresses disappointment can occur with words such as “too bad”, “sorry”, “uh oh” and in the sarcastic “Ha Ha” of the Nelson character on *The Simpsons*. The same disappointment is expressed when a comedian’s joke falls flat and the drummer hits a top-hat followed by a cymbal. This is a non-verbal narrative pattern that we cannot represented in the current notation. Similarly for the yawn, the sniff of disdain, the raised eyebrow. The notation would need to be extended to represent such things.

Many other limitations of the notation could be listed, not the least of which is its potential vagueness. However, it is likely that something will always be missing from a fixed notation and we have enough to we make a start.

III. THEORY AND CALCULATIONS

1.9 Narrative Continuity

Comedian Louis C.K. tells a story: “I bought a tomato, I ate it, it was good”. We can diagram this as:
I-bought->T, I-ate->[T], [T]/GOOD
or
I-bought->T, (I-ate->[T])/GOOD
(depending on whether we regard “it” as referring to the tomato or to the act of eating.)

The variables ‘I’ and ‘T’ are present in every sub narrative and the variable ‘GOOD’ remains afterwards. As he says, the story is “all about the tomato”.

This sort of simplicity is rare. When trying to diagram slightly longer sentences, I observe that unless a thing, action, or attribute re-occurs in consecutive sub narratives, the overall structure falls apart into non-sequitur and that, often, implicit sub narratives need to be inserted before we can see this connection in a typical expression. I also observe that if a variable appears out of the blue and is not re-used, it is confusing because it seems irrelevant to the narrative. *These violations of coherent meaning are related to how sub narratives introduce and share variables.*

Examining the sharing of variables we can see why “I was hungry and ate food” is a single narrative and “I was hungry and painted the garage” is not. In the first, the two sub narratives share the variable ‘food’.
[NEED TO SHOW MY WORK HERE]

Examples like these lead to the following definition:

1.9.1 Definition of Narrative Continuity

For a given narrative structure, a variable is **external** if it has some usage antecedent or subsequent to the narrative, within a larger collection of narratives. A variable is **internal** if it only occurs within the given narrative. We say an internal variable is **complete** when it appears in more than one sub narrative. We say two adjacent comma separated sub narratives are **connected** when they share a variable. A narrative has **narrative continuity** when all internal variables are complete and all adjacent sub narratives are connected. This is illustrated in Fig. 1.

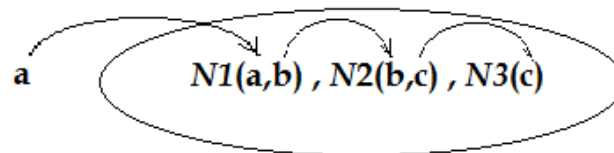


Figure 1. A narrative is illustrated as an oval containing three sub narratives. Curved arrows show how variables are re used. Every internal variable is re used and all adjacent sub narratives share at least one variable.

1.9.2 Example Calculations of Narrative Continuity

The narrative continuity of an expression, when diagrammed, depends on implicit assumptions and on a larger context containing the given narrative. Here are three examples. *Each one requires the insertion of a 'truism'* to exhibit narrative continuity. Truisms will be treated more systematically in the next section.

Example (paraphrased from a Lee Childs book [Childs 8]): "Pauline hit the print button and handed Reacher the pages as they came off the printer"

Let 'P' be Pauline and 'R' be Reacher. These are characters with antecedents in the story, so they are external variables. Let 'B' be the print button and 'G' be the pages coming from the printer. Then the *explicit* narrative is: $P \rightarrow B, ([P] \rightarrow R) / G$

Sub narratives are connected but internal variables 'B' and 'G' are not complete. However we have an implicit 'factoid' that says *print buttons produce pages*, or '[B::G]'. If we insert this, the internal variables become complete and the final diagram has narrative continuity: $P \rightarrow B, [B::G], ([P] \rightarrow R) / G$

Compare this to "Pauline hit the print button and handed Reacher a drink". No 'factoid' is available to connect the printer and the beverage.

Example (from *A Portrait of an Artist: A Biography of Georgia O'Keefe* by Laurie Lisle [Lisle 9]): "The day after she read the review, journalist Hutchins Hapgood found her in a fury". This is about the artist Georgia O'Keefe reacting to a review that called her art "gloriously feminine". Use 'R' for the review, 'G' for the artist, 'HH' for the journalist, and 'fury' for fury. This is a story about:

- the review affecting the artist: $R \rightarrow G$
- HH finding her: $HH \rightarrow G$
- her being in a fury: $[G] / \text{fury}$.

The *explicit* expression is:

$R \rightarrow G, HH \rightarrow ([G] / \text{fury})$

If we allow that 'G' has antecedents and 'HH' has subsequent use (the journalist is mentioned in a later sentence) then the internal variables 'R' and 'fury' are still incomplete. However there is a truism that says: *what affects someone causes them to have a feeling*, or '[$(R \rightarrow G) :: G / \text{fury}$]'. When it is inserted it completes the internal variables and demonstrates narrative continuity:

$R \rightarrow G, [(R \rightarrow G) :: G / \text{fury}], HH \rightarrow ([G] / \text{fury})$

Compare this to "The day after reading the review journalist Hutchins Hapgood found her in the kitchen.". No obvious truisms connect the review to her subsequent location.

Example (from *Shock Wave* by C. Cussler [10]): "He almost fell asleep under the soothing splash of the warm water.". This is about the character 'X' not falling asleep: ' $(X::X / \text{sleep})^*$ '. And the splash being soothing: ' $(\text{splash} \rightarrow [X]::[X] / \text{sooth})$ '. But what is the connection between 'soothing' and 'sleep'? Again, there is a 'factoid' that connects soothing things to relaxation and sleep. It is of the form ' $[X / \text{sooth}::X / \text{sleep}]$ '. So we can add an implicit fragment at the end, thereby re-using the internal variables, and demonstrating narrative continuity. $(X::X / \text{sleep})^*, (\text{SPLASH} \rightarrow [X]::[X] / \text{sooth}), [X / \text{sooth}::X / \text{sleep}]$

Having picked this example at random from the book *Shock Wave* I found myself wanting to know what happened to the character and went back to finish the paragraph. Thankfully, he falls into bed and a deep sleep. This illustrates something noteworthy: The narrative begins with a contrast that is resolved later, at the end of the paragraph *and the reader expects to see it resolved*. Contrast resolution, expressed as ' $X^*::X$ ' turns out to be a very general structure. Compare it to irony, which is of the form ' $X^*::X^*$ '.

In each example we observe the structure of coherent meaning only after identifying an obvious implicit assumption.

1.10 Truisms

The word **truism** is used conversationally and in literature to mean an idea so obvious it does not need to be stated. Here it means a specific kind of narrative structure that can be inserted into the representation of an explicit expression. The variables of the truism are assigned from variables of the explicit expression and such truisms may be inserted as comma separated sub narratives between or adjacent to the explicit sub narratives containing those variables.

In the previous section there were examples where narrative continuity was exhibited after inserting implicit factual knowledge, or **factoids** into the expression. For example the relationship between print buttons and pages or between soothing things and sleep. The original sentence only makes sense to a listener who knows about this relationship. I believe factoids might be regarded as examples of **semantic frames**. In any case, they are used all the time and are inferred rather than being implied. Factoids exist only temporarily when their parts are present explicitly in the surrounding expression. Thus we say *factoids are on-the-fly truisms*.

But many sentences use implicit relationships that are independent of particular facts, such as the truism used in the O'Keefe example or, for example, the truism "Events occur at a place, at a time, and in a manner" that Belleri writes about [Belleri]. These **general truisms** are always available without particular knowledge of the listener and, like factoids, become active when their parts are mentioned explicitly in the surrounding expression. Following G. Lakoff, I imagine the activation of a factoid or other truism as a simultaneous, synchronized activity between different parts of the brain [Lakoff 11]. *General truisms are not truths*. They are narrative structures we use to anticipate information and are a mechanism for inserting narrative continuity after the fact.

Importance of the word "but"

The word "but" reverses or **hedges** a truism to suggest contrast. All the truisms below that use the connector '::' correspond to situations where the word "but" could be used. When it is, the underlying truism reverses "polarity" to anticipate a contrast – switching from 'X::Y' to 'X::Y*' or from 'X::Y*' to 'X::Y'. Reversing the polarity of a truism is an example of what Grice calls **hedging**.

The word "but" allows you to discover new truisms: find a sentence that uses the word "but" and it always signals the presence of a truism having its polarity reversed.

1.10.1 A List of Known Truisms

The following are numbered in the order in which I became aware of them. There may be others, particularly if you expand the vocabulary.

Truism 1 [Belleri 5]: *Events occur at a place, at a time, in a manner:*

(X->Y)_[/place]_[/time]_[/manner]

This means an expression that begins with an event may continue with information about 'where', 'when', and 'how' but it is optional. This truism *cannot be hedged*.

Example: "Bob kicked the ball in the backyard".

Truism 2: *Affects change a person's feelings:*

(X->person) :: [person_/feeling]

This means an expression beginning with something affecting a person is expected to continue with information about how the person's feelings are changed.

Example: "I got hit on the head but it did not hurt."

Truism 3: *Feelings motivate actions (or "Passions evoke actions"):*

(person_/feeling) :: [person->Y]

This means an expression that begins with a person's feelings is expected to continue with information about what actions the person took.

Example: "She was angry and kicked the dog"

Example: "She was angry but smiled and patted the dog"

Truism 4A: *Attributes remain the same:*

X_/A :: [X_/A]

This means an expression that begins with a state of affairs at one time, is expected to also refer to a later time and confirm the previous state of affairs or else contrast with it.

Example: "There was a pretty girl working at the deli counter yesterday, but she was not there today."

Truism 4B: *Relationships remain the same:*

X-a->Y :: [X-a->Y]

Example: “I put the ice cream in the freezer when I got home, but it was gone when I went to get it after dinner.”

Truism 4C (“Barbara”⁴): *Values remain the same.*

Something like:

X_/A_/GOOD :: [X_/B_/GOOD] And X_/A_/BAD :: [X_/B_/BAD]

This is a variation of Truisms 4A and 4B but it is really about how judgements of value transfer from attribute to attribute. This form of truism should apply not only to GOOD/BAD but to any value that is part of a scale.

Example: “He was smart enough to keep his mouth shut”

(the value is transferred from intelligence to social skill).

Example: “She was poor but honest” (The value is transferred from wealth to truthfulness).

It should be noted that there is a “syntactic” version of Truism 4 that says any phrasing, if re-used, is expected to either be consistent with or use a “but” to signal a change in its sub phrases. But this cannot be represented in our notation.

Truism 5N: *All things we know in the universe are connected as we know them to be and behave as we expect them to behave.*

This is not a single truism but an infinite family of factoids. They set expectations in the short term within a sentence. For example, if both A and B appear in an expression and we know a narrative N(A,B) then the implicit [N (A,B)] is available as an on-the-fly truism.

Examples: the earlier Cussler and Childs examples.

Truism 6N: *What is implicit may be followed by it being explicit:*

N ([Z]), Z

This is not a single truism but an infinite family of truisms derived from any narrative having an implicit sub narrative. It says the narrative can be followed by any one of its implicit sub narratives being made explicit. But it is optional. Note this truism *cannot be hedged.*

Example, when N is a ‘setting’ adjective: “It is raining, in Paris”

Example, when N is Truism 1: “I bicycled down the street”

Example, when N is a word with an implicit meaning, like “with”: “Bob was with Peter, at the store.”

Example, when N is a complex factoid: “I was nailing studs, and hit my thumb with a hammer”.

Truism 6N applies whenever a word is used that is defined in terms of an implicit particular. The truism says that *optionally* the particulars may become explicit, following the word’s use.

Truism 7: *Contrast is resolved X*::X*

This is a “happy ending” narrative. Applied to the Cussler sentence, it leaves the reader expecting an outcome that, in fact, does occur at the end of the paragraph. This truism seems to belong to the semantics of literature but, believe it or not, it occurs in terse concrete language as well: “I was hungry so I went and ate food”, or “You get what you want”:

(X_/haveY)* :: (X_/haveY)

Truism 7 is a very general form. Note that irony ‘X*::X*’

is the hedging of Truism 7.

A hybrid Truism 6-7: *Contrast to the implicit is resolved by it becoming explicit N ([Z]*):: Z*

This amounts to saying that the ‘,’ of Truism 6N becomes the ‘::’ of Truism 7 in the presence of contrast. The truism becomes hedge-able and the result is expected, not optional. This seems to be the easiest explanation for why “Jill is ready” leaves one expecting to hear what she is “ready for” or “ready to”. For example, if we represent “Jill is ready to” as

(Jill->[Z])*

Then we expect an explicit ‘Jill->Z’.

⁴ My wife Barbara expressed something like this at the time I was hunting for truisms: “*If a person has an attractive personality we tend to judge them more physically attractive.*”

Truism 8A: *Actions are efficient* (person->X) :: [(person->X)/GOOD]

This means that when an expression begins by describing a person acting, it is expected to continue with how the action was done efficiently and was successful.

Example: “We drove from Paris to Barcelona but we took the slow route over the Pyrenees so we could visit Andorra.”

Truism 8B: *Efficient actions have positive outcomes* (person->X)/GOOD :: [X_/GOOD]

This means that when an expression begins with the positive value of an action, it is expected to continue with the positive value of the outcome.

Example : “She followed the recipe carefully and the cake was delicious.”.

It is noteworthy that “She cooked” (without “carefully”) can be thought of as activating *two implicit assumptions*: that she cooks well (8A) and that the outcome of good cooking is good food (8B). It explains why “but” works in the expression: “She cooked but the food was bad” - because there are two implicit assumption producing a (weak) expectation of a good outcome. However in “She cooked carefully but the food was bad” there is only one implicit assumption (8B) and the “but” is *required*. Apparently the expectation generated from a single implicit assumption *is stronger* than the expectation generated from two. This hints at the possibility of assigning quantity to an expectation and rules such as “expectation is inversely proportional to assumption.”

IV. RESULTS

1.11 Linguistic Results

Separating the content of expressions, into narrative *structure* and word *roles*, captures aspects of meaning that have been inaccessible. We build a notation from an elementary grammar together with primitive concepts of *contrast, implicitness, sequence, and becoming*. These are enough to represent a variety of narrative patterns. It is an achievement to represent such things as irony (X*::X*) and entropy (X*::X) with the same few symbols. Also the truisms serve to unify the theory of at least one kind of implicature.

Thus the concept of narrative patterns is legitimate and useful.

1.12 Mathematical Results – narrative continuity and coherent meaning

We note that the meaning of a coherent expression, including implicit assumptions, is highly structured and subject to requirements of narrative continuity. Narrative continuity is an *invariant of narrative* that counts how variables are shared by sub narratives. Its calculations shows that Weyl’s geometric program is possible – that we can treat narrative patterns as the entities of interest, subject to the transformations of role-preserving word substitution.

Because truisms can be inserted arbitrarily, they behave like “zeros” of content. But not of structure. Truisms are necessary to exhibit the complete algebraic structure of the meaning.

1.13 Philosophical and Psychological Results

Having identified the importance of truisms, their classification becomes interesting. We provide formulas for *eight truisms* and make remarks in the discussion below about how they also appear in science, art, and ethics. People are very comfortable with these patterns of language and thought and the patterns may be universal.

Having a descriptive notation for narrative patterns makes visible a layer of meaning between thoughts and words, a narrative layer, that has distinct structure and can be studied empirically. This moves several topics from the realm of philosophy into the realm of science.

V. DISCUSSION - TRUISMS IN OTHER CONTEXTS

1.14 Newton’s Laws

Newton’s Laws have significant parallels with these truisms and other definitions. Newton’s 1st Law of Motion says: “Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it.” This is a detailed version of **Truism 4** “Things remain the same”.

Newton’s 2nd Law of Motion: “Force is proportional to acceleration” or $F=m*dV/dt$ is a statement that the force F is a “action” modifying and changing the “attribute” of velocity V. “Force” is a useful verb.

Newton’s 3rd Law: “Every action has an equal and opposite re-action” does indeed have a parallelism with the beginning and ending of a persistent attribute. But we lack a definition of “equal and opposite”.

Since the semantic rules existed before Newton, it appears *Newton’s Laws were somehow semantically constrained*. This ought to be more than a bit strange - to find semantics underlying Physics – except, in the end, there may be no mystery. One explanation is that language developed in a physical world that obeyed Newton’s Laws, so both language and Newton’s Laws take their form from the same reality. Another view is that

Newton's genius was in finding vocabulary for the physical world that fits so naturally with how we communicate.

1.15 Truism 7 appears in odd places

Truism 7, "conflict is resolved", finds an outlet in the scientific language of **entropy** and of osmotic pressure. Possibly the law of entropy is a contrary version of the Truism 7 – depending on whether "chaos" is regarded as a tension or as a release. In any case, the idea "tension followed by release" is also a well-known musical convention, expressed as "breathe in...breath out", or the chords G7-C. The opposite direction, where release is followed by tension, "breathe out... breathe in" is not a complete narrative and it is always considered a beginning.

It is possible that Truism 7 also appears as Hegel's rule that "an object completes itself by its own negation" (if we believe W. James's reading of Hegel [James 12]). But our truism *places the negation on the initial state*, allowing the object to come forth from that state by the *removal of the negation*. Personally, I believe Hegel was describing something subtler.

Finally, a study of young babies, conducted at Yale University [Bloom 13] shows babies prefer a teddy bear that resolves a conflict to a teddy bear that preserves a conflict. Although the researchers conclude this is social and ethical behavior, it may simply be that babies recognize a difference between conflict resolution and conflict perpetuation – or irony - and prefer conflict resolution. *It is remarkable that a narrative preference could be interpreted as an ethical preference.*

1.16 Truism 8 and "least action"

Efficient action is called "least action" in physics and "least effort" in psychology. It has a long history. For example, as applied to word lengths and language efficiency as "Zipf's Law" [Zipf 14].

The idea of Truism 8B, that "efficient actions have positive outcomes" seems normative in the sense of defining the outcome as of positive value. As it is possible to confuse between narrative preference and ethical preference this particular truism might have a bearing on ethics.

1.17 Truism 2 is a standard story plot.

In terms of physics, Truism 2, "Passions evoke actions" is a bit like the conversion of potential energy into kinetic energy.

I frequently read movie synopses using this truism, for example this one from *Forgetting Sarah Marshall*:

"Devastated Peter takes a Hawaiian vacation in order to deal with the recent break-up with his TV star girlfriend, Sarah."

The use of truisms as high-level summaries suggests that narratives may not get much more complicated than truisms.

VI. CONCLUSIONS AND DIRECTIONS OF FUTURE WORK

We conclude that a simple notation of narrative, hiding many details, can be useful in representing narrative structures. Many of the structures are familiar, they deserve to be identified, and it is hard to imagine a simpler way to represent them symbolically.

Using the notation, we have been able to list **eight truisms** and find broad use of these patterns within language and also in other fields. It is somewhat surprising that Newton's Laws show up in sentence structure, and it is more than a coincidence that Truisms 7 and 8 correspond with well-known laws of physics. This suggests that truisms are patterns of thought in general and that the notation is providing a perspective on an underlying process. Whether the list of truisms is complete, or minimal and without redundancy remains to be determined.

The notation has also been used to define a concept of **narrative continuity** which shows the algebraic relation between variables and sub narratives in coherent meaning. It is not complicated but can only be described using a notation that allows us to insert truisms.

These are first steps. Some possible extensions of the work are as follows:

1.18 Next Steps

Broadening the current vocabulary: The discussion of **value** is far from complete. Truism 4C and the "hybrid Truism 6-7" show that contrast, implicitness, and value interact in a way that is not clearly defined. Truism 8 depends on assumptions that are not well developed. **Scale** needs to be understood in the same way as value.

The nesting of narrative patterns within narrative patterns has not been explored. For example when an entire paragraph follows Truism 7 or a plot synopsis follows Truism 2. Can narratives be nested to an arbitrary depth?

Equivalence classes of narratives: An “algebra” of narratives requires a concept of equality or equivalence between them, defined by axioms of equivalence such as ‘(X)~X’. Two directions of interest are (a) Examining collections of narratives; and (b) looking at how a collection of narratives develops dynamically and changes when a given ‘input’ narrative is exposed, word by word and the dynamic collection becomes a static structure which has been filled and can be queried afterwards. This is one approach to dynamic semantics.

Other noun types: Nouns of type ‘story’ require dedicated verbs like “tell” and “listen” which are in special relationship with ‘people’ nouns. ‘Story’ nouns also need a special concept of ‘about’ – possibly a new primitive type of bracket. Similarly, nouns of type ‘set’ require special verbs between ‘set’ and ‘thing’, related to selecting elements ‘from’ a set or determining membership when an element is ‘in’ a set. As noted, these concepts might arise as metaphors from the verbs of place. New operators could be needed and an interesting question is: *what are the truisms using these new noun and verb types?*

Non-verbal narratives: We noted the two-note sound of ‘disappointment’ as a non-verbal narrative pattern. Or consider the sound of a sigh, a yawn, or a sniff of disdain. Arguably the narrative patterns of music are the most complicated but they are already adequately described with musical notation. These emotionally patterns exist in a non-verbal “semantics” that is parallel with verbal semantics and supports verbal communication in ways that could be elaborated. It is unclear if these narrative patterns form a continuum or are discrete. Or if we are limited to a small finite set of them.

Geometric ‘similarity’ and ‘congruence’ of narratives: An original motivation for this work was to study how meanings are changed by substituting different words into a structure. This is refined as a discussion of *how narratives are transformed by role preserving word substitutions.*

An example suggests re-visiting Russell’s notion of the **intensional** definition of a set [Russell]: I have a colleague Bob who walks his cat. Consider which words can be substituted for ‘X’ in
Bob –walked-> X

We can easily substitute ‘dog’ for ‘X’ but ‘cat’ is a little awkward and we cannot substitute words like ‘whale’ or ‘jellyfish’. Why not? There is incredible richness to the individual words.

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