

# Focus Shifts as Indicators of Style in Paragraphs

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## 1 Introduction

Style is an integral part of language, but much of the research on style is highly subjective and lacks the exactness needed for computational applications. This paper describes an attempt to codify some of the connections between the semantic content of text (as opposed to the syntactic structure of individual sentences or the qualities of individual words) and its stylistic effect. This codification, called the *Semantic Stylistic System* [Ryan 1989], uses the way that focus changes from sentence to sentence to determine some of the stylistic content of a text. The justification for this method comes from a proposal by Enkvist [1973]. The Semantic Stylistic System stems from DiMarco's work [DiMarco and Hirst 1988], [DiMarco 1990] on the computational analysis of style, and together with her research on the relationship between syntax and style, is part of the ongoing development of a complete stylistic parser [BenHassine and DiMarco 1991], [Shelley *et al.* 1991].

We begin with a brief discussion of the theoretical background upon which the Semantic Stylistic System (SSS) is based. We then describe the parts that make up the SSS: the sentence-level processor, the paragraph-level processor, the grammar of abstract elements of style, and the grammar of stylistic goals. We present an example that shows how the SSS processes a paragraph to determine some of its *stylistic goals*. We conclude by describing BOGUE, the computational implementation of the SSS, as well as some possible applications in areas such as machine translation.

## 2 Background

The SSS takes as its input written texts. For each input paragraph, the SSS analyses the way that the focus changes from sentence to sentence, and produces as output a list of some of the stylistic goals that the paragraph achieves. We adopt DiMarco's [1990] *goal-directed* approach to style. In particular, we are interested in the stylistic effect of the paragraph only with respect to a set of the author's stylistic goals: the degree of *emphasis*, the degree of *clarity*, and the degree of *dynamism*. These can be thought of as dimensions in a "stylistic space". There are three possible settings in each dimension: a positive setting, a neutral setting, and a negative setting. These settings can be thought of as discrete val-

ues on a particular dimension. The goal dimensions and their settings are defined in the following manner:

- **Emphasis** — One element in the text is brought to the fore relative to the others. The positive setting for the emphasis dimension is *emphatic*; the negative setting is *flat*.
- **Clarity** — The text fulfills the reader's expectations and is easy to read. The positive setting for the clarity dimension is *clear*; the negative setting is *obscure*.
- **Dynamism** — The text deals with a large number of entities and ideas. The positive setting for the dynamism dimension is *dynamic*; the negative setting is *static*.

The positive setting is found in paragraphs that show the characteristics listed in the definition of the dimension. The negative setting is found in paragraphs that show characteristics opposite to those listed in the definition. The neutral setting (which is simply called *neutral* for all three dimensions) is found in paragraphs that show characteristics that neither follow the definition nor contradict it.

This represents, of course, only a tiny subset of all of the possible stylistic goals, but the system is designed to be able to incorporate new goals easily. It is important to note that we do not claim that these goals are the only stylistic goals that an author can have; there are many other possible goals. These three were chosen because they are evident in many pieces of text.

The SSS deals with a limited set of stylistic goals, and it uses only a small part of the semantic content of a paragraph to determine which goals are achieved. There are certainly factors in addition to the semantic content of a text that affect its stylistic content. DiMarco and Hirst [1988] have proposed an overall stylistic parser that would include syntactic, semantic, and lexical factors. The SSS only deals with a single semantic factor, the way that focus changes from sentence to sentence. This means that there will be texts to which the SSS, with its still-limited scope, might assign stylistic goals that contradict the reader's intuitive feelings.

The connection between the specific stylistic goals and the sentences in the input paragraph is made by looking at the way that the focus changes from sentence to sentence in the paragraph. For focus, we adapt one of

Carter's [1987] definitions:

Focus is the entity or idea in an individual sentence on which the reader of a text is centering his or her attention.

One might ask why we chose to use changes in focus to determine stylistic content. Our approach is predated by Enkvist [1973]. He defines *theme dynamics*, a method of describing the stylistic content of a sequence of sentences by identifying the ways in which the *theme* — the common ground between the reader and the writer — changes from sentence to sentence. Our approach differs from Enkvist's because we use focus rather than theme. We chose to use focus because we believe that it is a more purely semantic concept. Theme is determined by sentence position, while focus is not. Syntactic clues may help to determine focus, but focus ultimately depends on the meaning of a sentence, not its structure. Furthermore, the extensive computational research on focus [Sidner 1983], [Grosz 1981] provides a basis for determining the focus of a given sentence.

We employ paragraphs as the unit of text for analyzing the connection between semantics and style because the alternative units, single sentences and whole texts, are inappropriate. The sentence is inappropriate because semantic variation at the sentence level is precisely that, *semantic* variation. We argue that to attach stylistic significance to such variation would be to reduce *all* semantic variation to stylistic variation. We do not analyse entire pieces of text because such pieces can vary in length from a single sentence to hundreds of pages.

We define a paragraph to be a sequence of sentences that is set off from the surrounding text by a typographical device such as indentation or blank lines. A more traditional definition would require the existence of some kind of semantic relationship between the sentences of the paragraph, but such a definition would exclude many of the paragraphs that actually appear in written texts. We claim, in fact, that paragraphs that are made up of sentences that are not semantically related have a distinct stylistic effect.

### 3 The Semantic Stylistic System

The Semantic Stylistic System (SSS) consists of four parts. These four parts are applied to the input text in sequence, and the output of one part is used as input to the next. The first part, the *sentence-level processor*, defines the *focus set*, or the set of noun phrases (NPs) in each sentence that are most likely to be the focus. The second part, the *paragraph-level processor*, uses the focus sets from all of the sentences in a paragraph to create a *pattern of focus* for the paragraph. A pattern of focus describes how the focus changes from sentence to sentence in the paragraph. The third part, the *grammar of abstract elements of style*, relates the patterns of focus to elements of DiMarco's *stylistic meta-language*. This stylistic meta-language describes style in terms of three central characteristics: balance, position, and dominance. The fourth part of the SSS, the *gram-*

- |                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"><li>(1) direct object <math>\succ</math> subject</li><li>(2) subject <math>\succ</math> indirect object</li><li>(3) subject <math>\succ</math> object of preposition</li><li>(4) NP1 <math>\succ</math> NP2 if NP2 is a constituent of NP1</li><li>(5) if A <math>\succ</math> B and B <math>\succ</math> C then A <math>\succ</math> C</li></ol> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Table 1: The focus partial ordering focal-allowed rules.

*mar of stylistic goals*, uses the balance, position, and dominance settings to determine the stylistic goals that the paragraph satisfies. The following sections describe each of these parts.

#### 3.1 The Sentence-Level Processor

For each sentence<sup>1</sup> in the input paragraph, the sentence-level processor produces a *focus set*, a set of those NPs that are most likely to be the focus of the sentence. Of course, the focus of a sentence does not have to be an NP, but we chose to deal only with NPs because:

- We adopted Carter's definition of focus, and this definition specifies that the focus is an entity or an idea. Entities and ideas are usually expressed in written language as NPs.
- We wanted to keep the sentence-level processor as simple as possible.

Grammatical role and sentence structure are used to determine the likelihood that a particular NP will be the focus of a sentence. The NPs in each sentence are sorted (following insights from Taglicht [1984] and Sidner [1983]) into the following groups:

- Focal-assured — NPs that *must* be in the focus set, such as *this* and *that* NPs and the complement of *to be* in cleft sentences.
- Focal-prevented — NPs that *must not* be in the focus set, such as the understood *you* in imperative sentences.
- Focal-allowed — NPs that *might* be in the focus set.

The focus set is made up of the focal-assured NPs and those focal-allowed NPs that are not ranked below any other NPs by the *focus partial ordering* shown in table 1. These rules for determining whether a given NP is focal-assured or focal-allowed are based in part on a study of the relationship between grammatical role and focus by Ryan [1989].

Consider the following example:

- (1) It is a pleasure to give the books to you.

There are four NPs in this sentence: *it*, *a pleasure*, *the books*, and *you*. In this sentence, *a pleasure* is focal-assured because it is the complement of *to be* in a cleft sentence, while *it* is focal-prevented because it is just the dummy *it* in a cleft sentence and thus does not convey any semantic information. The focal-allowed NPs are *the books* and *you*. According to rules (1), (2), and (5)

<sup>1</sup> Each main clause is treated as a separate sentence.

in table 1. *the books* > *you* since *the books* is a direct object and *you* is an indirect object. This means that the focus set for this sentence is {*a pleasure, the books*}.

### 3.2 The Paragraph-Level Processor

The paragraph-level processor takes the focus sets produced by the sentence-level processor as input and produces patterns of focus as output. The focus sets defined for each sentence in the input paragraph by the sentence-level processor are used by the paragraph-level processor to define *patterns of focus*. There are two kinds of patterns of focus, *atomic* and *composite*.

Atomic patterns of focus describe how the focus changes between consecutive sentences. There are three atomic patterns of focus: *static*, *shift*, and *jump*. These patterns are defined in terms of Halliday and Hasan's [1976] cohesion relationships. We classify the cohesion relationships that deal with NPs as either *co-specificational* (the two NPs refer to the same thing or idea), or *specificationally related* (the two NPs refer to different things or ideas that are semantically related).

Two consecutive sentences have a *static* pattern of focus between them if there are two NPs, one from the focus set of each sentence, that are co-specificational. In the following example, and in all of the examples in this paper, the NPs that are in the focus set of their sentence are underlined:

- (2) The goddam movies. They can ruin you.<sup>2</sup>

Since both underlined NPs refer to the same thing, and since they are both in the focus sets of their respective sentences, there is a *static* pattern of focus between these two sentences.

Two consecutive sentences have a *shift* atomic pattern of focus between them if two non-focus-set NPs, one from each sentence, are either co-specificational or specifically related, or if two focus-set NPs, one from each sentence, are specifically related but not co-specificational. Consider the following pair of sentences:

- (3) She had a lot of charm. She had quite a lot of sex appeal, too, if you really want to know.<sup>3</sup>

The NP *she* is not in the focus set of either sentence, but since it refers to the same person in both sentences, the two NPs are co-specificational. In addition, the two focus-set NPs, *a lot of charm* and *quite a lot of sex appeal*, are specifically related because (in this context) they both refer to attractive personal characteristics. Thus, the two sentences have a *shift* atomic pattern of focus between them. If the sentences were changed so that the two focus-set NPs were no longer semantically related, there would still be a *shift* pattern between the two sentences because of the two occurrences of *she*.

Two consecutive sentences that have no NPs that are specifically related or co-specificational have a *jump* atomic pattern of focus between them. In the following example, no NP in the first sentence of the pair

is specifically related or co-specificational with any NP in the second sentence, and thus there is a *jump* pattern between the two sentences:

- (4) They can ruin you. I'm not kidding.<sup>4</sup>

Once the atomic patterns of focus between all of the consecutive sentences in a paragraph have been established, these patterns are used to determine the *composite* patterns of focus for the paragraph according to the rules in table 2. These composite patterns are based on the atomic patterns that exist between pairs of adjacent sentences in the paragraph. The composite patterns describe the focus changes over a sequence of two or more sentences.

The set of composite patterns for a paragraph is called its *composite pattern set*. Most paragraphs have a single composite pattern, and thus have only one member in their composite pattern set; but for some longer paragraphs it is not possible to gather all of the atomic patterns into a single composite pattern. This means that some paragraphs will be described in terms of the composite patterns of constituent sequences of sentences, and each such sequence will have a corresponding member in the composite pattern set.

Consider the following paragraph:

- (5) The goddam movies. They can ruin you. I'm not kidding.<sup>5</sup>

The examples given above for the atomic patterns of focus show that there is a *static* pattern of focus between the first two sentences and a *jump* pattern of focus between the last two. The rules in table 2 thus show that the entire paragraph has a *final-jump* composite pattern of focus, and the composite pattern set for this paragraph is {*final-jump*}.

### 3.3 The Grammar of Abstract Elements of Style

The *grammar of abstract elements of style* (GAES) connects the composite pattern set produced by the paragraph-level processor with elements of DiMarco's [1990] stylistic meta-language. These elements describe style in terms of three characteristics:

- Balance — The stylistic effect of the *relationship* between sequences of sentences in the paragraph.
- Position — The stylistic effect of the *placement* of sequences of sentences in the paragraph.
- Dominance — The *relative contribution* that each sequence of sentences makes to the paragraph as a whole.

The terms that describe these three characteristics are called the *abstract elements of style*.

<sup>2</sup>Salinger, J. D. *The Catcher in the Rye*. Little, Brown and Company (1951): p. 136.

<sup>3</sup>*Ibid.* p. 17.

<sup>4</sup>*Ibid.* p. 136.

<sup>5</sup>*Ibid.* p. 136.

static ← static (static)*	jagged ← jump shift	final-jump ← static jagged
stepped ← shift (shift)*	jagged ← jagged (jagged)*	initial-shift ← stepped static
jagged ← jump (jump)*	final-shift ← static stepped	initial-jump ← jagged static

neutral-focus ← no atomic pattern of focus

cycle ← the focus sets of the first and last sentences of the sequence (which is at least three sentences long) have co-specificational elements, and these elements are not co-specificational to any elements of the focus sets of the intervening sentences.

Table 2: Composite patterns of focus

**Balance:**

homopose ← static	contrapose ← final-shift
homopose ← (homopose) <sup>+</sup>	contrapose ← final-jump
homopose ← homopose neutral	contrapose ← jagged
counterpose ← initial-shift	contrapose ← contrapose neutral
counterpose ← initial-jump	neutral ← stepped
counterpose ← cycle	neutral ← (neutral-focus) <sup>+</sup>
counterpose ← counterpose neutral	
counterpose ← (contrapose   counterpose   homopose)* counterpose	
counterpose ← (contrapose   counterpose   homopose)* (contrapose   counterpose) homopose	
contrapose ← (counterpose   counterpose   homopose)* contrapose	

**Position:**

concord ← static	resolution ← initial-jump
concord ← concord neutral	resolution ← cycle
discord ← final-shift	resolution ← (discord) <sup>+</sup> (concord) <sup>+</sup>
discord ← final-jump	dissolution ← (concord   discord)* discord
discord ← jagged	neutral ← stepped
discord ← discord neutral	neutral ← (neutral-focus) <sup>+</sup>
resolution ← initial-shift	
neutral ← (concord   discord)* concord discord (concord) <sup>+</sup>	

**Dominance:**

neutral ← neutral-focus	centroschematic ← initial-jump
monoschematic ← static	centroschematic ← final-shift
monoschematic ← stepped	centroschematic ← final-jump
monoschematic ← jagged	centroschematic ← cycle
centroschematic ← initial-shift	
polyschematic ← (monoschematic   centroschematic) (monoschematic   centroschematic) <sup>+</sup>	

**Notation:**

- (*pattern1* | *pattern2*) matches with one of *pattern1* or *pattern2*.
- (*pattern*)<sup>\*</sup> matches with zero or more occurrences of *pattern*.
- (*pattern*)<sup>\*</sup> matches with zero or more occurrences of *pattern*.
- (*pattern*)<sup>+</sup> matches with one or more occurrences of *pattern*.

Table 3: The grammar of abstract elements of style

The GAES can assign the following terms from DiMarco's stylistic meta-language for *balance*:

- Homopose — There is no disturbance in the consistency of focus.
- Counterpose — There are inconsistencies in focus from sentence to sentence in the paragraph, but these inconsistencies *support* the overall stylistic balance.
- Contrapose — There are inconsistencies in focus from sentence to sentence in the paragraph that *disturb* the stylistic balance.
- Neutral — The changes in focus neither support nor disturb the stylistic balance of the paragraph.

The GAES assigns the following terms from DiMarco's stylistic meta-language for *position*:

- Concord — A sequence of sentences shows stylistic unity and agreement.
- Discord — A sequence of sentences shows stylistic disunity and incongruity.
- Resolution — The paragraph moves from *discord* at the beginning to *concord* at the end.
- Dissolution — The paragraph moves from *concord* at the beginning to *discord* at the end.
- Neutral — The paragraph displays neither *concord* nor *discord*.

The GAES assigns the following terms from DiMarco's stylistic meta-language for *dominance*:

- Monoschematic — One composite pattern of focus can describe the entire paragraph, and this composite pattern is made up entirely of one kind of atomic pattern. In other words, the composite pattern set for the paragraph is {*static*}, {*stepped*}, or {*jagged*}.
- Centroschematic — One composite pattern of focus can describe the entire paragraph, and this composite pattern is made up of more than one kind of atomic pattern.
- Polyschematic — More than one composite pattern of focus is needed to describe the paragraph. In other words, the composite pattern set has more than one element.
- Neutral — The paragraph is described by the *neutral-focus* composite pattern of focus.

For each paragraph, rules such as those shown in table 3 assign a setting for balance, position, and dominance according to the contents of the composite pattern set. For example, a paragraph with the composite pattern set {*jagged*} would have a balance setting of *contrapose*, a position setting of *dissolution*, and a dominance setting of *monoschematic*.

### 3.4 The Grammar of Stylistic Goals

The *grammar of stylistic goals* (GSG) relates the abstract elements of style produced by the GAES to a limited set of stylistic goals (degree of *emphasis*, degree of *clarity*, and degree of *dynamism*). The GAES describes each

- |                                                 |
|-------------------------------------------------|
| (1) emphatic ← (contrapose, dissolution, _____) |
| (2) obscure ← (contrapose, dissolution, _____)  |
| (3) dynamic ← (contrapose, dissolution, _____)  |

Table 4: Sample rules from the grammar of stylistic goals

paragraph in terms of balance, position, and dominance. The GSG then uses these descriptions to produce a setting for each of the stylistic goals.

Consider, for example, a paragraph to which the GAES assigns a balance setting of *contrapose*, a position setting of *dissolution*, and a dominance setting of *centroschematic*. Table 4 shows three of the fifty rules that make up the GSG. These three rules are the ones that are relevant for this example.

Rule (1) says that if a paragraph has a balance setting of *contrapose* and a position setting of *dissolution*, the setting for the emphasis dimension is *emphatic*. Rule (2) says that under the same circumstances, the setting for the clarity dimension is *obscure*, and Rule (3) says that the setting for the dynamism dimension is *dynamic*.<sup>6</sup> Thus, for this example the GSG produces the following settings for the stylistic goal dimensions:

- Emphasis — *emphatic*
- Clarity — *obscure*
- Dynamism — *dynamic*

The rules in the GSG are based on the definitions of the stylistic goals and on the definitions of the settings for balance, position, and dominance. In the above example, for instance, the GSG gives the *obscure* setting to the clarity dimension because:

- The balance setting is *contrapose*, and the definition in the previous section says that a paragraph that displays *contrapose* has inconsistencies in focus that disturb its stylistic balance.
- The position setting is *dissolution*, and the definition in the previous section says that a paragraph that displays *dissolution* ends with a stylistic note of disunity and incongruity (*discord*).

Of course, this kind of analysis is only as good as the definitions upon which it is based, and definitions in the area of stylistics are notoriously nebulous. Nevertheless, DiMarco's stylistic meta-language is based on established stylistic theory (including the work of Vinay and Darbelnet [1958]), and we claim that the SSS successfully uses the meta-language to capture a small but essential part of the stylistic content of paragraphs.

## 4 An Example

In order to show how the entire SSS works, the following paragraph will be analysed:

<sup>6</sup>For these three rules the dominance setting is not relevant, but other rules in the GSG do use the dominance setting.

- (6) The goddam movies. They can ruin you. I'm not kidding.

We showed earlier that this paragraph has the composite pattern set *final-jump*. The rules in table 3 show that this paragraph has a balance setting of *contrapose* (that is, there is an offset that disturbs the overall stylistic balance of the paragraph), while the rules for position assign a setting of *dissolution* (that is, the paragraph ends with a sense of disunity), and those for dominance assign a setting of *centroschematic* (that is, there is more than one kind of atomic pattern of focus). The preceding description of the GSG showed that given these settings for balance, position, and dominance, the GSG assigns an emphasis setting of *emphatic*, a clarity setting of *obscure*, and a dynamism setting of *dynamic*.

Are the settings assigned by the SSS valid? We claim that they are, and we will appeal to the definitions of the stylistic goals listed at the beginning of this paper to justify this claim. The paragraph is *emphatic* because one entity, *the goddam movies*, is relatively more prominent. This element is mentioned twice, while the other entities (the general body of opinion *you* and the narrator *I*) are only mentioned once.

The paragraph is *obscure* because the narrator, who has not been mentioned explicitly before, is introduced in the last sentence, while the focus of the first two sentences, *the goddam movies*, is not mentioned in the last sentence. The reader expects a paragraph to end with a summary, or with some kind of elaboration on a topic that has already been introduced. Paragraphs that fulfill this expectation do not jar the reader, and they do not necessarily introduce a note of disunity. The reader does not expect a new topic (the narrator's *attitude*) to be introduced in the very last sentence of the paragraph. Because this paragraph goes against the reader's expectations, it is relatively obscure.

The paragraph is *dynamic* because in the space of only three short sentences three distinct entities are introduced: *the movies*, the general body of opinion *you*, and the narrator *I*.

## 5 Conclusion

The SSS has been implemented as a semantic stylistic parser, BOGUE. BOGUE consists of separate modules for the sentence-level processor, the paragraph-level processor, the GAES, and the GSG. Together, these modules constitute over 3,000 lines of C-Prolog that run under UNIX. BOGUE does not implement all of the features of the SSS (cataphora, for example, is not dealt with), and its parser and knowledge representation schemes are rudimentary. Nevertheless, BOGUE does demonstrate that the SSS is amenable to a computational implementation.

We believe that there are a number of applications for this kind of stylistic analysis. The first is machine translation, which is the motivation for the work [DiMarco and Hirst 1988], [DiMarco 1990] from which the SSS stems. If some of the aspects of style can be codified, then such a codification can be used by a machine translation system to ensure that the style of the source

text is reflected in the target text. The SSS could also be applied as part of a prescriptive style checker. A third application is in the teaching of natural languages. One of the most difficult aspects of mastering another language is learning to make appropriate stylistic choices [Payette 1990]. An overall stylistic parser, of which the SSS would be a part, could analyse a student's work to determine whether or not its style is appropriate for a given situation.

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