Structural Analysis of an Expository Text: Its Overall and Subordinate Schematic Patterns

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For a better and deeper comprehension of a text, it is crucial to understand that language operates not merely at the levels of individual words or sentences but also at the levels of the paragraph and the text as a whole. Reading instructions widely conducted in Japan, however, seem heavily weighed towards the lower levels of text structure, and the consequence is often the learners who are too preoccupied with single sentences to consider them in a larger context. This paper attempts to clarify how an authentic English text written for real, purposeful language use is structured at higher or macro levels by elaborate examinations of its components and diagrammatical representations of their hierarchical relations. The analysis showed that the sample text follows a General-Specific pattern and embeds within itself General-Specific, Claim-Counterclaim, Problem-Solution, and Question-Answer patterns as subordinates. It was also found that among the basic clause relations the matching relation is most frequently employed. Finally, some pedagogical implications were suggested in relation to some findings of this paper.

Key words: structural patterns, General-Specific, Problem-Solution, Claim-Counterclaim, matching relations

1. Introduction

Successful comprehension of a text depends to a large extent on how effectively the interaction between the reader and the text, or the reader's 'dialogue with the author' (McCarthy, 1991: 28), develops. If the text is a product of the writer's poor textualization (Coulthard, 1994: 1), even the ideal reader would find it difficult or, worse, impossible to understand it; if the reader on the other hand has only limited skills in reading, then even the ideal text might be subject to insufficient comprehension or unintended misunderstanding.

Here in Japan, where English is taught as a foreign language and learners' reading proficiency is generally underdeveloped, it is reasonable for English classes to employ more of bottom-up approaches (Cook, 1989: 79-82) to reading, primarily emphasizing the lexis and syntax. Indispensable as such grammatical knowledge is (Bachman and Palmer, 1996: 66-75), it is not enough for learners to engage in an effective interaction with the text. They often have difficulty, for example, in discerning main points from supporting details or summarizing paragraphs in their own words, failing to "see the woods for the trees."

Obviously, more attention should be paid to the development of learners' higher-order, or macro-level reading comprehension skills. Activation of learners' schemata (McCarthy, 1991: 168-9) regarding the topic of the text prior to actual reading would hence be recommendable. It would provide them with an opportunity to be ready for the text first. Likewise, acquisition of formal schemata regarding how written discourse in English are typically organized in the English speaking community would no doubt be beneficial for the development of their reading skills. They can anticipate what is to follow while reading.

Such formal knowledge about common textual patterns in English would be especially useful to non-native-speaking teachers of English as well. It would allow them to evaluate with more confidence how well (or poorly) the English texts they use in the classroom are composed, which in most cases are abridged and adapted for spatial and pedagogical reasons and thus not fully qualified to be called authentic. If equipped with such knowledge, however, they will be able to make a more accurate judgment and better use of such texts.

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1.1 Purpose of this Study

The purpose of this study is to examine an authentic English expository in terms of its structural organization in order to identify recurring English rhetorical patterns. The analysis and discussion will mainly be focused on the following two points:

1) What overall pattern can be found in the text, and what signals can be detected for that?
2) What subordinate patterns does the text display, and how are they signaled and related to the overall pattern?

Through detailed analysis of the text in quest of hidden patterns and frameworks, it is hoped, comprehension at the macro-level of the text will be achieved.

1.2 Overview of the Paper

After the introduction (Section 1), three textual patterns and clause relations commonly used in English are briefly explained in Sections 2 and 3 respectively. Section 4 is an analysis of a sample text, Section 5 presents pedagogical implications, and Section 6 will be the conclusion.

2. Three Basic Types of Textual Pattern

There are three basic textual patterns often found in English. They are the Problem-Solution, the General-Specific, and the Claim-Counterclaim patterns.

2.1 Problem-Solution Pattern

The Problem-Solution (henceforth P-S) pattern consists of four components: *Situation, Problem, Response*, and *Evaluation*. Table 1 shows an example of such pattern.

Table 1: Basic P-S pattern

I was on sentry duty.	**Situation**
I saw the enemy approaching.	**Problem**
I opened fire.	**Response**
The enemy retreated.	**Evaluation**

(adapted from Winter in Coulthard, 1994: 8)

Although Coulthard (1994: 8) uses the term *Solution* instead of *Response*, this study chooses to use the latter because "the word *solution* contains within it an evaluation of a particular response as successful" (Hoey, 1994: 30), when in fact problems are not necessarily guaranteed to be solvable.

2.2 General-Specific Pattern

2.2.1 G-S Pattern with Horizontal Specifics

Another type of discourse structure often employed in English is the General-Specific (henceforth G-S) pattern. A sample text, *Useful plants*, is shown below (Table 2).

Table 2: G-S pattern with horizontal specifics

general statement (GN)	*Long ago, people found out that plants are useful.*
specific 1 (SP1)	*Some plants have been grown for food and other uses for thousands of years.*
specific 2 (SP2)	*Many medicines and health products are made from plants.*
specific 3 (SP3)	*So are beauty products.*
general statement (GN)	*All sorts of plants are useful to us, from small flowers to large trees.*

(adapted from *Kingfisher Child's World Encyclopedia*, 1994: 246)

It begins with a general statement (henceforth GN) about the topic (*useful plants*), followed by three specific (henceforth SP) statements (*useful for food, health,* and *vanity*), concluding with a generalization (*all sorts of plants are useful*). The logical development of the text can be illustrated as follows (Table 3), where three specifics are on the same level of generality to each other.

Table 3: Hierarchical representation of the G-S (horizontal) pattern

GN		
SP 1	**SP 2**	**SP 3**
GN		

2.2.2 G-S pattern with Vertical Specifics

The other type of the G-S pattern is the one whose specifics are not horizontally but vertically developed. A sample text with its componential divisions is given in Table 4.

Table 4: G-S pattern with vertical specifics

general statement	*The opposition is indispensable.*
specific (SP1)	*A good statesman, like any other sensible human being, always learns more from his opponents than from his fervent supporters.*
more specific (SP2)	*For his supporters will push him to disaster unless his opponents show him where the dangers are.*
even more specific (SP3)	*So if he is wise he will often pray to be delivered from his friends, because they will ruin him.*
general statement (with a reason)	*But, though it hurts, he ought also to pray never to be left without opponents; for they keep him on the path of reason and good sense.*

(adapted from *The New Oxford Guide to Writing*, Thomas S. Kane, 1988: 72)

The text, which concerns politics, starts with a GN, followed by SP1 that offers a reason for the GN. A basis for SP1 is then provided by SP2, whose logical conclusion is then presented in SP3. The final statement is basically a reinforcement of the initial GN. Shown in Figure 1 (below) is a diagrammatical representation of this pattern, which is 'similar to [the shape] of a glass or cup' (Swales & Feak, 1994: 33).

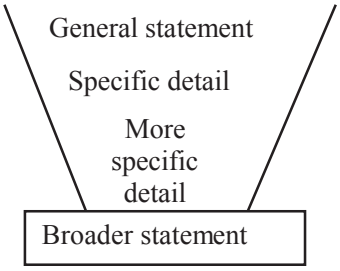


Figure 1: G-S (vertical) pattern

(adapted from Swales & Feak, 1994:33)

2.3 Claim-Counterclaim Pattern

The third common textual pattern is the Claim-Counterclaim (henceforth C-C) in which a series of claims on an issue is presented along with their corresponding counterclaims. Such textual patterns can be found especially 'in political journalism as well as in the letters-to-the-editor pages of newspapers and magazines' according to McCarthy (1991: 161). In fact, the sample text, *Giving Earth a Voice*, (see Table 5) is from the 'Inbox' section of *TIME* magazine (November 26, 2007 issue: 6).

Although sentence [1] (henceforth S1) offers background information about the e-mail contributor and the problem to be discussed, the title of the issue "Heroes of the Environment" itself is evaluative and thus constitutes a Claim. S2 disapproves of TIME's nomination of Richard Branson as one (*counterclaim*), and in opposition to their justification (*claim*) in the subordinate clause of sentence 3, she expresses her doubt (*counterclaim*) in the main clause. After a brief acknowledgement of Mr. Branson's financial contribution to the advancement of the mutual cause (*common ground*), the writer is quick to discredit his efforts as an act of deception (*counterclaim*). Both questions in S6 are rhetorical; in her mind there is no doubt that the first claim which is likely to be embraced by TIME should be denied while the latter, her last counterclaim, should be affirmed.

Table 5: Text with a C-C pattern *Sentences are numbered for reference.

CLAIM	COUNTERCLAIM
COMMON GROUND	
[1] *I am an environmental educator who works internationally, and I bought the "Heroes of the Environment" special issue with great interest [Oct.29].*	
"Heroes of the Environment"	[2] *However, I was disappointed to see Virgin tycoon Richard Branson alongside real environmental heroes such as Gaia theorist James Lovelock and Green Belt Movement co-founder Wangari Maathai.*
[3] *Although the writer defended Branson's inclusion,*	*I am not convinced.*
COMMON GROUND	
[4] *I acknowledge that he is giving a large sum of money to scientific research for developing clean fuels, and this will certainly help our fight.*	
	[5] *But his environmental efforts are akin to offsetting long-haul flights by planting trees to ease his conscience.*
[6] *Do his actions really tackle the root issue,*	*or do they just cover over it with a thin veneer to make us feel warm and green inside?*

Ruth Mumby, ***SOUTH CROXTON, ENGLAND***

3. Clause Relations

The interpretations of relations between textual segments, or clauses, which 'may be phrases, [syntactic] clauses, sentences or groups of sentences' (McCarthy, 1991: 28), are obviously important for accurate understanding of a text. Winter (1994: 46-55) emphasizes the value of the clause-relational approach to text analysis. He defines clause relations as 'sequential relations between clauses both inside the grammatical domain of their sentences and immediately outside this domain' (ibid.: 46), and lists three basic clause relations: the matching, logical sequence, and multiple clause relations. The first two clauses will be briefly examined here.

3.1 Matching Relation

Winter (1994: 50) explains that '[t]aking comparisons, which can be compatibility and incompatibility, we note that a matching relation is where we compare or match one attribute, person, action, event, thing, etc. in respect of their similarities and differences'. Hoey (2001: 31) further elaborates that in matching relations, 'statements are brought together with a view to seeing what light they shed on each other'. Thus relations such as contrast, similarity, exemplification, preview-detail, and exception are included.

3.2 Logical Sequence Relation

The logical sequence relation is concerned with representing selective changes in a time/space continuum from simple time/space change to deductive or causal sequence, which can be expressed by such questions as 'What happened next/before that?' and 'What did that lead to?', 'What caused that to happen?' (Winter, 1994: 52-3).

4. Analyses and Discussion of the Text

4.1 Text

The sample text chosen for analysis is '*Size and Shape*' (see Appendix 1 for the script) written by Stephen Jay Gould, an American paleontologist (1941-2002). A series of his essays, expository as a genre, originally appeared in the monthly column for *Natural History Magazine* from 1974 to 1977 in the USA, and were later complied into a book *Ever Since Darwin—Reflections in Natural History,* 1979. Following the definition of Harmer (1991: 185), this study defines an 'authentic' text as one 'designed not for language students, but for the speakers of the language in question', a condition the sample text perfectly matches.

The reason that this particular text was selected for analysis is that its adapted and abridged version appears in one of the English textbooks currently (as of 2010) used in Japan for high school seniors (*One World English Reading* published in 2004 from *Kyoiku Shuppan* Publishing Co.). It is hence hoped that a discoursal analysis of its original version could provide some useful insights for teachers as well as students who are using the textbook.

4.1.1 Overall Pattern of the Text

Overall the text seems to follow the General-Specific pattern, in which the writer presents his argument with deductive reasoning, proceeding 'from a generalization to particular facts which support it' (Richards & Schmidt, 2002: 146). (See Appendix 2 for a summary.) The overall structure of the text would be illustrated as follows (Table 6).

Table 6: Overall structure of the text

<table>
<tr><td colspan="3">GN (P1-4)
lawfulness in the basic design of organisms:
correlation of size and shape</td><td>GN (P13)
size and kinetic energy</td></tr>
<tr><td>SP1 (P5-8)
size and decreasing surface areas

(with animals)</td><td>SP2 (P9-12)
size and different forces: gravity vs. surface forces
(with insects)</td><td>TRAN-SITION
(P14)</td><td>SP3(15-16)
size and decreasing surface areas, increasing gravitational forces
(with churches)</td><td>SP
(P13-FN)
dwarfs of Das Rheingold</td></tr>
<tr><td colspan="3">(with organisms)</td></tr>
<tr><td colspan="4">GN (P17-18)
The limits are expanded, but the laws still operate.</td></tr>
</table>

Paragraphs 1-4 (henceforth P1-4) introduce the writer's main proposition or general statement (GN) that there is a *striking "lawfulness"/regularity in the basic design of organisms* that manifests itself *in the correlation between size and shape*. P5-8 illustrate how the problem of relative decrease in surface is dealt with by small and large animals (Specific1); P9-12 explain how difference in size results in a subordination to different domineering forces (surface forces and gravity), which in turn results in different living conditions for small and large animals (SP2); P13 and its footnote (FN) are unique in that they are concerned not with size and shape but with size and kinetic energy, hence placing them at the same level of generality as the first GN; P14 could be interpreted as a transitional paragraph which summarizes the preceding discussion and predicts the next focus of discussion whereas P15-16 are again back on the problem of size and shape, though this time the focus is on medieval churches (SP3); lastly, P17-18 juxtapose large animals and medieval churches for their commonalities in order to emphasize the effects of the same laws of size, concluding with an intriguing episode of two little girls at a playground. Possible section boundaries of the text are shown in Appendix 3. (See also Hunston, 1994: 204-5)

4.1.2 Signals of the Overall Pattern

There may be two signals indicating the overall G-S pattern of the sample text. One is the abstractness of the initial argument developed in the first four paragraphs. Although the writer's key proposition is stated in S2.2-3 (*Yet, ...we must also acknowledge a striking "lawfulness" in the basic design of organisms. This regularity is most strongly evident in the correlation of size and shape*.), even the writer himself would not have expected his Imagined Reader (Coulthard, 1994: 5) to understand immediately what *lawfulness* and *regularity* actually refer to or what *the correlation between size and shape* really signifies. In other words, the argument at this point is so conceptual and abstract that it requires concrete examples and explanations (i.e. specifics) to substantiate it, which hence frames this expository in the pattern of G-S.

The second indicator of the overall G-S pattern of this text can be found in its macro-level organization. This becomes obvious when what are called 'topic sentences' (McCarthy, 1991: 58) of some transitional paragraphs are examined side by side (see below).

General :
↓ ***…we must…acknowledge a striking "lawfulness" in the basic design of organisms…evident in the correlation of size and shape*** (S2.2-2.3).
Specific 1:
↓ ***Why is this important to animals?*** (S5.1)
Specific 2:
↓ ***We are prisoners of the perceptions of our size,…*** (S9.1)
Specific 3:
↓ ***Yet its generality extends beyond life, for the geometry of space constrains ships, buildings, and machines as well as animals.*** (S14.3)
General :
The limits are expanded, but the laws* [of size] *still operate. (S17.7)

The initial four paragraphs are concerned with the theoretical argument of the writer's main proposition. What follows are two specific examples—organisms (i.e. animals) and inorganic physical objects (i.e. medieval churches)—to prove his point. The whole argument is concluded with the synthesis of these two specifics, leading to the reaffirmation of the initial proposition and hence the completion of the G-S sequence.

4.2 Analyses of Subordinate Patterns

The sample text displays different subordinate patterns at Levels 3 and 4. Section-by-section analyses of these patterns will be discussed now.

4.2.1 Analysis of P1-4
Claim-Counterclaim Pattern

It seems that P1-4, where the writer presents his general proposition, follows a C-C pattern.

Basis for Claim:
↓ ***…doctors of what's possible could reason half the jungle out of being.*** (P1)
Claim:
↓ ***…diversity of life will forever frustrate our arrogant claims to omniscience.*** (S2.1)
Common Ground:
↓ ***…however much we celebrate diversity…of animals*** (S2.2)
Counterclaim (modification):
↓ ***Yet,…we must also acknowledge a striking "lawfulness"…evident in the correlation of size and shape.*** (S2.2-3)
Basis 1 for Counterclaim:
↓ 1) ***animals' best adaptation of forms to size by natural selection*** (P3)
2) ***regularity of the effect of fundamental forces (e.g. gravity) on size*** (P3)
Basis 2 for Counterclaim:
geometry of space (S4.1)

P1 serves as a Basis for the Claim which appears in S2.1, whose role as such is indicated by the word *belief*; a Common Ground and a Counterclaim appear in S2.2-2.3 with the lexical items *must…acknowledge* and *evident* signaling the latter. *Yet*, an adversative conjunction (Halliday, 1994: 323-30) and contrastive discourse marker prominent in this pattern, informs the start of a Counterclaim. Since S2.3 is concerned with where that *lawfulness* is to be found (i.e. *in the correlation of size and shape*), this sentence is to be included in the Counterclaim. Finally, P3-4 provide Bases for the Counterclaim, elaborating on its theoretical background. Meanwhile, the Counterclaim (S2.2-2.3) and its Bases (P3-4) can also be interpreted to form a GN and its SPs on their own.

What is interesting here is the use of the first person plural *we* in the subordinate clause of S2.2 (*however much we celebrate…*). Although the cohesive devise of adversative conjunction *however* signals the beginning of a Counterclaim (or a Correction, according to Hoey, 2001: 180), the *we* seems to soften the negative effect of confrontation which inevitably accompanies any presentation of a counterclaim. It indicates that 'you and I are on the same side of the argument' and forestalls unnecessary antagonism from the reader. This buffer effect seems to be reinforced by the use of *also* in the main clause, too, which implies not a denial but an extension or modification of the Claim which is quite likely to be accepted by the readers at this point. In this sense, the subordinate

clause of S2.2 could be regarded as a Common Ground, and the main clause as more of an addition than a counterclaim.

The writer seems to be using the matching relations quite effectively here (see Table 7), putting his central theme (*regularity in organisms*) in a clear contrast with the popular belief of *diversity of life*, without which the argument in this section would have been less powerful and more difficult to comprehend.

Table 7: Matching relations in P1-3

DIVERSITY	REGULARITY
believe, belief	*reason, doctors, omniscience*
ant, giraffe, jungle	*theory, blueprint*
diversity, peculiarities	*lawfulness, regularity, basic design, correlation*
animals	*physical objects*
	natural selection, fundamental forces, gravity
	in a regular way, systematically

It would not be surprising to see matching relations in the C-C pattern considering their central function of contrasting two opposing parties against each other for the supremacy of one over the other. Although there are several pairs which could be regarded as matched items (e.g. *size-shape*, *believe-reason, ant-giraffe, in theory/blueprint-being*), the one that the writer focuses on most should be that of *diversity* and *regularity*. It could be said that what is held constant (Winter, 1994: 51) is the contrast between the two concepts and there are several variables which exemplify them. However, emphasis is clearly more on regularity than on diversity.

4.2.2 Analysis of P5-8

Problem-Solution Pattern of P5-8

P5-8, which constitute SP1 of the overall G-S pattern, seem to form a P-S pattern. (See Appendix 4 for the componential analysis of the paragraphs.)

Several signaling lexical items can be detected here. *Suffer* in S4.2 indicates a Problem; *solution* in S6.1 (one of 'discourse organizing words' according to McCarthy (1991:75)) clearly signals a Response (and also identifies *decreasing surface* as the problem); P5, which starts with the interrogative with an anaphoric reference of *this*, could be interpreted as a Situation because the paragraph retrospectively provides a background information about what aspect of the Situation can be affected by the Problem. Furthermore, the two subjects of S7.1, [s]*ome simpler animals* (a comparative reference serving to maintain textual cohesion (Halliday, 1994: 316)) and S8.1, [o]*ther animals*, suggest different Responses to the same Problem. (See Appendix 5 for the summary of the signaling words.)

The Responses vary according to the type of animals, and so do the Evaluations. Whereas the solution of complex animals is evaluated positively, those of the other two kinds of animals are not. Since the negative Evaluation in S7.2-3 is beyond retrieval (Hoey, 2001: 133), this means that it is the only response available to the tapeworm; since the likewise negative Evaluation in S8.5 is based on the hypothetical Response, the real response in S8.1 is the only choice that is left for insects (see Appendix 6 for the recursive nature of the P-S pattern).

To summarize, this unit P5-8 seems to form a P-S pattern except that it deviates from the typical sequence (Section 2.1) of the Problem preceding the Situation, not the other way round. A 'standard' version would be as follows:

Situation:
↓ ***Many functions that depend upon surfaces must serve the entire volume of the body.*** (P5)
Problem:
↓ ***[However,] [s]imply by growing larger, any object will suffer continual decrease in relative surface area when its shape remains unchanged.*** (P4)
Response 1:
↓ ***[L]arge and complex organisms have responded by the development of internal organs.*** (P6)
Evaluation (positive)
[It has enabled] progressive evolution. (P6)

Question-Answer and General-Specific Patterns in P5

P5 in itself seems to follow a Question-Answer (Q-A) pattern (Hoey, 2001: 172), with S5.1 obviously posing a question and the rest of the paragraph answering it (see Table 8). The first two sentences can be connected with the conjunction *because* in Vocabulary 2 (Winter 1977a in Hoey, 1994: 33). The answering part of P5 itself constitutes a G-S pattern, with S5.2 functioning as a general statement and the rest of the paragraph specifying it.

Table 8: Q-A pattern in P5

QUESTION (S5.1) ***Why is this important to animals?***		
ANSWER = GN (S5.2) ***Many functions that depend upon surfaces must serve the entire volume of the body.***		
SP1 (S5.3) ***food digestion***	**SP2** (S5.4) ***oxygen absorption***	**SP3** (S5.5) ***weight supporting***
		SP4 (S5.6) ***Galileo's discovery***
		SP5 (S5.7) ***that large animals need disproportionate thickening of bones***

The specifics display both horizontal and vertical relations: SP1-3 all indicate surface-dependant functions and thus are horizontal whereas SP3-5 are vertical where SP3 (*bone* and *weight*) is elaborated by SP4 (*Galileo* the first discoverer), which in turn is justified by SP5.

General-Specific Pattern in P6

P6 seems to be organized in a G-S pattern (see Table 9). The subject of S6.1 [o]*ne solution* could constitute an advance label (Francis, 1994: 83) and *the development of internal organs* its lexicalization. SP1-3 are all concrete examples of the GN of S6.1

Table 9: G-S pattern in P6

GN (S6.1) ***development of internal organs***		
SP1 (S6.2) ***convoluted lungs***	**SP2** (S6.3) ***extensive circulatory system***	**SP3** (S6.4) ***villi of small intestine***

The writer did not match the SPs of the surface-depending *functions* with those of developed *internal organs*: that is, the three specifics in P5 appeared in the order of SP1 (*food digestion)*, SP2 (*oxygen absorption*), and SP3 (*weight supporting*), the first two of which should have corresponded with SP3 (*villi of small intestine*) and SP1 (*convoluted lungs*) of P6 respectively. Thus had the order of the SPs of P6 been SP3, 1 and 2, the matching relations between functions and organs might have been clearer.

4.2.3 Analysis of P9-12

General-Specific Pattern

This segment (P9-12) can be interpreted to be following a G-S pattern (see Table 10 below for its hierarchical analysis). S9.1 constitutes a GN, accompanied by two SPs in S9.2-9.4. P10 presents two horizontal sub-specifics (two types of *surface forces*) of SP2 of the previous paragraph (P9). Likewise, P11 continues to elaborate on SP2 of P9 as is indicated by the word *also* (S11.1), which makes it horizontal to P10 in its function as a sub-SP. At the same time it forms a subordinate G-S pattern, introducing a related (*gravity*) but new aspect of the same topic (*different mode of growth*). P12 can be regarded as another specification, not of SP2 of P9 but of P9 as a whole, because it provides a concrete example of *prisoners of the perceptions* of the GN of P9. Meanwhile, P12

itself contains a G-S pattern, where S12.1 serves as a GN, S12.3-5 as SP1, S12.6-10 as SP2, and S12.11-12 as a vertical SP of the SP2. (See Appendix 7 for the tree-diagram analysis, Appendix 8-1 for the matching relations in P9, 10, and 12, and Appendix 8-2 for a possible reading comprehension exercise focusing on the matching relations).

Table 10: Hierarchical analysis of G-S Patterns in P9-12

<table>
<tr><td>P9</td><td colspan="5">GN (S9.1)
prisoners of perceptions failing to recognize different world of small animals</td></tr>
<tr><td></td><td>SP1 (reason) (S9.2)
large animals (humans) ruled by gravity</td><td colspan="4">SP2 (reason) =GN (S9.3-4)
small animals (insects) ruled by surface forces</td></tr>
<tr><td colspan="2"></td><td>P10</td><td>SP2.1 (example) (S10.1-2)
surface adhesion</td><td>SP2.2 (example) (S10.3-4)
frictional forces</td><td>P11</td><td>SP2.3 (elaboration) = GN (S11.1)
different mode of growth</td></tr>
<tr><td colspan="6"></td><td>SP2.3.1 (explanation) (S11.2-7)
molting</td></tr>
<tr><td>P12</td><td colspan="5">SP3 = GN (S12.1-2)
movie creators captives of own perceptions</td></tr>
<tr><td></td><td colspan="3">SP3.1 (example) (S12.3-5)
small people</td><td colspan="2">SP3.2 (example) (S12.6-10)
large insects</td></tr>
<tr><td></td><td colspan="3"></td><td colspan="2">SP3.2.1 (explanation) (S12.11-12)
…their sheer bulk would have grounded them permanently.</td></tr>
</table>

[Note]: Although P12 should be placed next to P9 as is demonstrated in the tree-diagram in Appendix 7, due to the spatial limitation it is positioned below P10-11.

Problem-Solution Pattern in P11

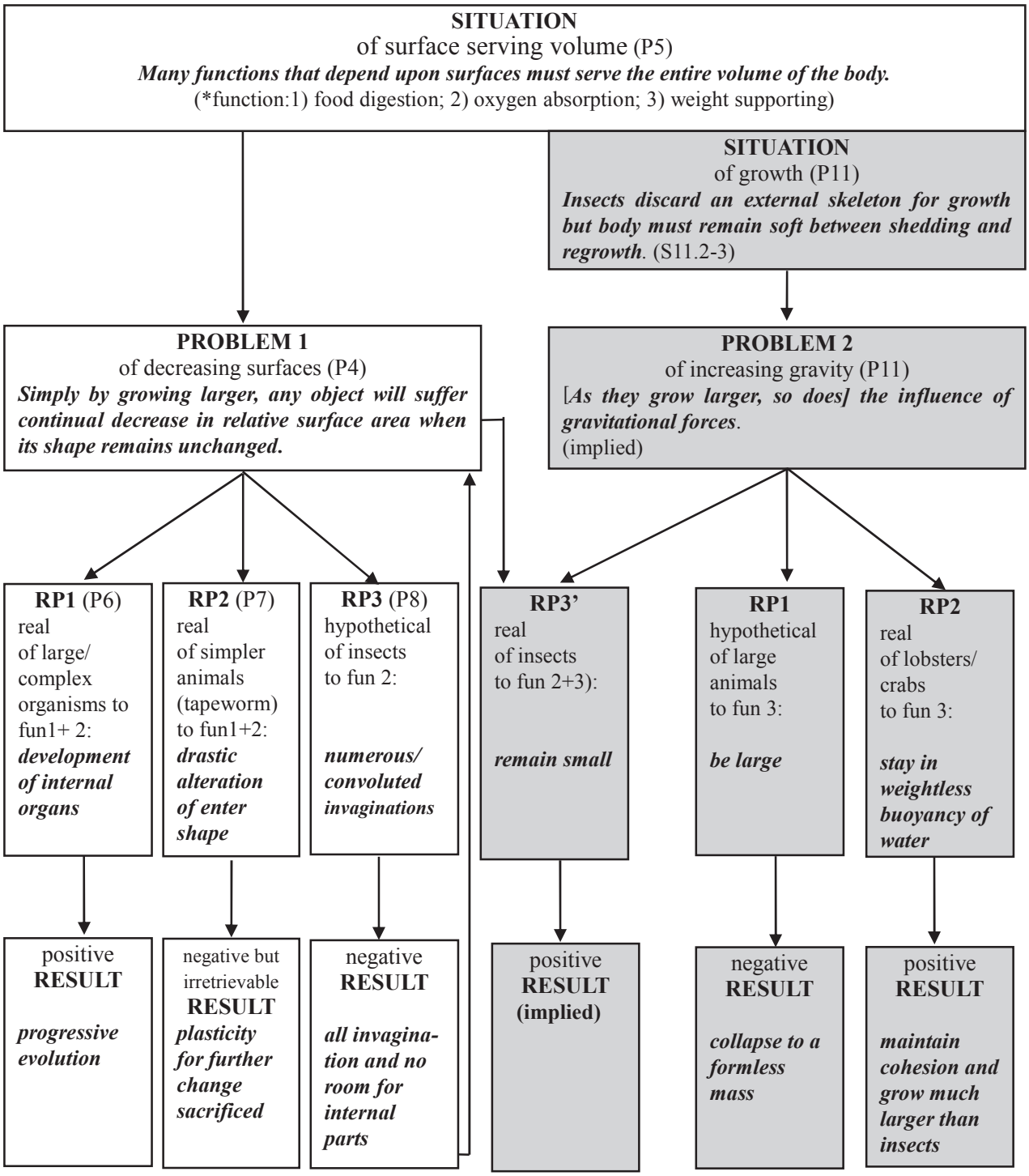
P11 seems structured in a P-S pattern. The following is the componential analysis:

Situation:
↓ ***Insects discard an external skeleton for growth but the body must remain soft between shedding and regrowth.*** (S11.2-3)
Problem:
↓ ***[As they grow larger, so does] the influence of gravitational forces.*** (S11.4) (implied)
Response:
↓ ***the small size of insects*** (S11.7)
Evaluation:
The relative weakness of gravitational forces…permits a mode of growth that large animals could not maintain. (S11.1)

Here, the Evaluation comes not last but first in S11.1 because of its appositional role to the previous paragraph P10, both serving as sub-specifics of SP2 of P9 (see Table 10 above). What is of interest is the pairing of *large mammals* with *insects* placed in the same situation. This intriguing matching functions very effectively in demonstrating both the necessity for large animals to possess robust structures to support themselves and for insects to be small.

Furthermore, P11 is unique in that it is concerned both with SP1 and SP2 of the overall G-S pattern. This is because the external skeleton of insects functions both as a surface 'that must serve the entire volume of the body' (SP1) and also as a support that must hold up the body against gravity (SP2). In the analysis of SP1 (see Appendix 4), Response 3 of insects was to function 2

(*oxygen absorption*) and hypothetical; here in P11, however, the Response is to function 3 (*weight supporting*) and real. Hence a modification can be made of the diagram with the Responses of insects, large animals and crustaceans added to it (see Diagram 1 below). (See also Appendix 9 for the summary of the lexical signals.)



**Note*: RP = Response; fun = function

Diagram 1: P-S Patterns in P5-8 (SP1) and P11 (SP2) juxtaposed

Claim-Counterclaim (Denial) Pattern in P12

Although it has already been shown that P12 as a whole serves as SP3 of GN of P9 and that it

embodies a G-S pattern within itself (see Table 10 and Appendix 7), the SP2 might be further analyzed in terms of a C-C (Denial) structure (Hoey, 2001: 180). See below.

Reason for Claim:
↓ ***…: a normal ant is a fraction of an inch long and can fly hundreds of feet; these ants are many feet long*** (S12.8-12.9)
Claim:
↓ **…[they]** ***must be able to fly as much as 1,000 miles*** (S12.9)
Reason for Counterclaim (Denial):
↓ ***But the ability to fly depends upon the surface area of wings (*which increases as the square of length), while the weight that must be borne aloft increases as the cube of length.*** (*implied) (S12.11)
Counterclaim (Denial):
…their sheer bulk would have grounded them permanently (S12.12)

4.2.4 Analysis of P13 and Footnote
General-Specific and Claim-Counterclaim Patterns

P13 and its footnote could constitute an 'odd man out' in this expository text because they are the only segments that discuss not size and shape but size and force (*kinetic energy*). The first sentence introduces a GN, which is elaborated on for the rest of the paragraph with two specific examples, theoretical and real, hence forming a G-S pattern. Interestingly, when the footnote (FN) is seen to be supplementary to P13, it is possible to interpret it as a Counterclaim (or Correction according to Hoey, 2001: 180) hence forming a C-C pattern (see Appendix 10). Lexical signals can be found in FN1 (*pointed out*) for Correction and FN2 (*so*) for Affirmation.

4.2.5 Analysis of P14-16
Transition and Claim-Counterclaim Pattern in P14

P14 seems to work as a transitional stage in the overall organization that bridges its two major subjects of analysis of the text (i.e. *organisms* and *churches*; see Table 6). It summarizes what has been discussed so far and then introduces what is to come, which resembles Tadros' idea of Recapitulation (1994: 76). The shift in argument from one subject to another is lexically signaled by the conjunction *yet* (S15.3). Also the paragraph on its own seems to be organized in a C-C pattern (see below), in which the Claim is not denied or corrected but modified as is lexically signaled by *extend* and *as well as* (conjunction of addition) in S14.3.

Claim:
↓ ***This simple principle of differential scaling with increasing size may well be the most important determinant of organic shape.*** (S14.1)
Support for Claim:
↓ ***J. B. S. Haldane once wrote that "comparative anatomy is largely the story of the struggle to increase surface in proportion to volume."*** (S14.2)
Counterclaim (modification):
↓ ***Yet its generality extends beyond life*** (1st clause of S14.3)
Reason for Counterclaim:
the geometry of space constrains ships, buildings, and machines, as well as animals. (2nd clause of S14.3)

General-Specific and Problem-Solution Patterns in P15-16

P15-16, which constitute the third specific (SP3) of the overall organization of the text (see Table 6), seem to follow a G-S pattern. S15.1 is an obvious GN; the rest of P15 and P16, which are concerned with two testing subjects, form SPs; and S16.5 (…*but the laws of size required their*

presence) serves as a concluding GN. However, it is also possible to interpret P15-16 to embed another pattern within: a P-S parallel to that in P5-8 (see Appendix 4). Diagram 2 below demonstrates a componential analysis of P15-16.

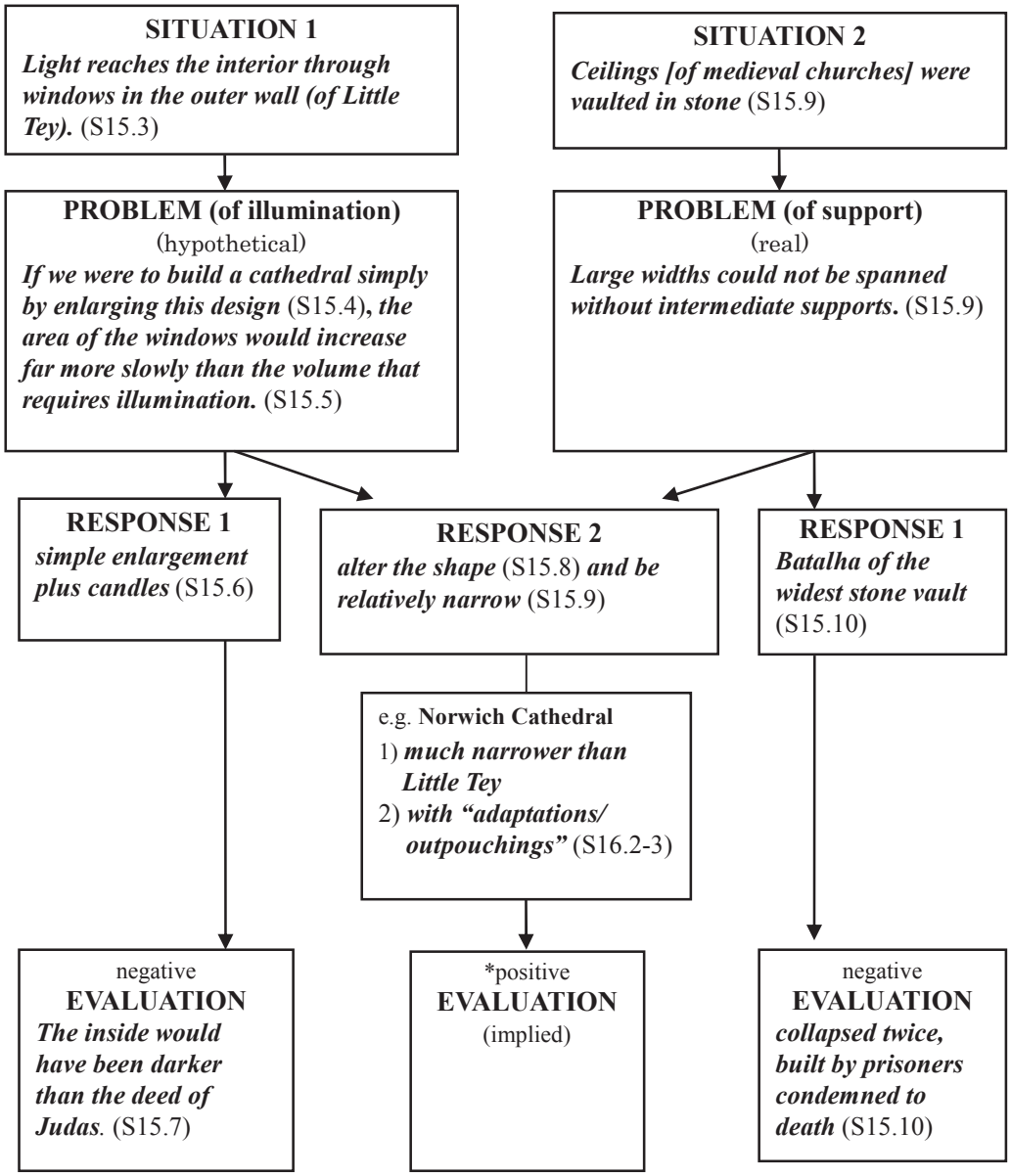


Diagram 2: P-P pattern in P15-16

Also see Appendix 11 for the summary of the matching relations.

4.2.6 Analysis of P17

General-Specific Pattern in P17

P17, a concluding GN in the overall G-S pattern of this text, seems to form a G-S pattern on its own, with S17.1 serving as a GN, and the rest (S17.2-8) as SPs (explanations) based on the matching relations between large animals and large churches (see Table 11 below). The comparison between these two subjects proceeds not in the pattern of AAA—BBB but AB—AB—AB pattern (Heasley, 2006: 35-6). (See Appendix 12 for a syntactic parallelism found in S17.5 and S17.6.) Although the SPs contain a concession in S17.5-6 (*limits expanded* by *inventions*), the conclusion ends with the affirmation of the dominant laws of size again.

Table 11: G-S Pattern in P17 based on the matching relations

GN (S17.1) ***few options of large animals and large churches***	
large animals	large churches
SP1 (S17.2-3) ***thick legs, stout bodies***	**SP2** (S17.4) ***long, with abundant outpouchings***
concession	
SP1.1 (S17.5) ***limits expanded by the invention of internal organs***	**SP2.1** (S17.6) ***limits expanded by the invention of internal lighting and structural steel***
GN (S17.7) ***but the laws still in operation***	
SP1(*2nd clause of S17.8) ***no sagging middle***	**SP2** (*1st clause of S17.8) ***not wider than long***

[Note]: One thing noticeable in this table is the reverse order of the pair in S17.8; it is only here that the order of appearance of the matching pair has changed from animal-church to church-animal. SP2, which concerns churches, is described first and SP1, which is about animals, comes after that. This is probably because of the lingering effect of SP2.1 (S17.6) immediately preceding the GN in S17.7; however, had the order in the last pair been as it had been before, that is, animal-church, the matching relation might have been more consistent and clearer.

4.2.7 Analysis of Paragraph 18

Question-Answer Pattern

P18 is an anecdotal conclusion bringing the reader back to the reality, which is accomplished, along with the commonality of the situation, by the author's use of the first person singular *I* as a narrator. Only twice has it been used in this expository work (here in P18 and S13.6), and this sudden change of register from formal to casual, or a shift of genre from exposition to narrative, seems to have a positive, refleshing impact on the reader. Although it is generally accepted in persuasive/argumentative paper that 'a first person point of view [should be avoided] to help the reader focus on the subject, rather than the writer' (Sorenson, 2000: 143-4), this deliberate deviation from the norm seems to work advantageously to the writer due to its favorable effect on the reader, who has been lectured on a highly theoretical issue for quite a while and now may be feeling in need of some relaxation.

The recounting of this past experience in P18, though equipped with only two components of a story —*orientation* and *event*—could be analyzed in terms of Q-A patterning (Hoey, 2001: 170-6).

Situation:
↓ ***two young girls in a New York playground discussing the size of dogs (S18.2)***
Questions (of a girl for the other girl):
↓ ***Can a dog be as large as an elephant?(S18.3)***
Answer (to the question by the other girl):
↓ ***No (S18.4)***
Basis for Answer:
↓ ***if it were as big as an elephant, it would look like an elephant. (S18.5)***
Evaluation (positive):
***How truly she spoke*.(S18.5)**

The last sentence (S18.4) can be a positive Evaluation by the writer to the Answer given by the girl. The Basis for that Evaluation is not offered here because the writer regards it redundant now, trusting the readers to have been convinced by now of his argument.

4.3 Summary of the Subordinate Patterns

It has been demonstrated that the sample text contains, within its overall G-S pattern, different types of subordinate patterns. They are summarized below in the order of appearance (Table 12):

Table 12: Summary of Subordinate Patterns of the Text at Levels 3 and 4

Segment	Pattern
1	Claim-Counterclaim (P1-4)
	General-Specific (P4)
2	Problem-Solution (P4-8)
	Question-Answer (General-Specific (horizontal & vertical)) (P5)
	General-Specific (horizontal) (P6)
	General-Specific (vertical) (P7)
	General-Specific (vertical) (P8)
3	General-Specific (P9-12)
	General-Specific (horizontal) (P9, 10)
	General-Specific (P11)
	General-Specific (vertical & horizontal) (P12)
	Claim-Counterclaim (P12)
4	General-Specific (P13-FN)
	Claim-Counterclaim (FN)
5	(*Recapitulation) Claim-Counterclaim (extension) (P14)
6	General-Specific (P15-16)
	Problem-Solution (P15-16)
7	General-Specific (P17)
8	(*Recount) Question-Answer (P18)

5. Pedagogical Implications

The sample text can be utilized in several important ways in the EFL classroom. The teacher can demonstrate to the students how different segments of the text play different structural roles within and yet function collaboratively to form a coherent whole. The students can use that knowledge in developing their reading and writing skills. If they understand that English texts are typically written in accordance with certain conventional patterns, they can, for instance, foresee that a general statement (GN) should soon be followed by some specifics (SPs) to reinforce it. Or when they write about some difficult experience in English writing class, they can organize their works with four basic components and put them in the order of *situation – problem – response - evaluation*.

Such structural knowledge should greatly help learners process English texts more easily and gain a deeper understanding of them in reading comprehension. Also in writing, such formal schemata should help improve the quality of their writings, which are observant of English conventions and therefore more acceptable in the English-speaking community. Although structural patterns and clause relations may not be so easy notions to understand for less skilled students, they are no doubt worth learning.

6. Conclusion

This study examined an authentic English text to see if there are any recurring rhetorical patterns—overall and subordinate—underlying it as well as some signals that indicate them.

It turned out that this text is organized overall in a General-Specific pattern, with the first few paragraphs argued in highly abstract theoretical terms followed by example-based specifics for the rest of the text, which are manifested in different types of subordinate patterns. Although there were some clear lexical signals that indicated particular structural patterns, it was most by the

logical development of the argument itself that the structural patterns of this text were identified.

During the process of text examination, another noticeable feature of the text became apparent; that is, the prevalent use of matching relations. They functioned effectively to clarify the central proposition of the author's argument of the correlation between size and shape by juxtaposing these two attributes for the effect of contrast. It proved to be quite a powerful way of persuasion.

It was well worthwhile and encouraging to discover that an authentic English text can be analyzed with a limited number of structural patterns. Such formal schemata, when employed in the process of reading in general, would certainly help the learner engage in a more successful 'dialogue' with the writer. Studies on the structural patterning used in authentic English texts would hence have a great potential in contributing to the further development of EFL teaching in Japan.

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Appendix 1: *Size and Shape*

Size and Shape

1

(1) Who could believe an ant in theory?
(2) A giraffe in blueprint?
(3) Ten thousand doctors of what's possible
(4) Could reason half the jungle out of being.

2 (1) JOHN CIARDI's lines reflect a belief that the exuberant diversity of life will forever frustrate our arrogant claims to omniscience. (2) Yet, however much we celebrate diversity and revel in the peculiarities of animals, we must also acknowledge a striking "lawfulness" in the basic design of organisms. (3) This regularity is most strongly evident in the correlation of size and shape.

3 (1) Animals are physical objects. (2) They are shaped to their advantage by natural selection. (3) Consequently, they must assume forms best adapted to their size. (4) The relative strength of many fundamental forces (gravity, for example) varies with size in a regular way, and animals respond by systematically altering their shapes.

4 (1) The geometry of space itself is the major reason for correlations between size and shape. (2) *Simply by growing larger,* any object will suffer continual decrease in relative surface area when its shape remains unchanged. (3) This decrease occurs because volume increases as the cube of length (length × length × length), while surface increases only as the square (length × length): (4) in other words, volume grows more rapidly than surface.

5 (1) Why is this important to animals? (2) Many functions that depend upon surfaces must serve the entire volume of the body. (3) Digested food passes to the body through surfaces; (4) oxygen is absorbed through surfaces in respiration; (5) the strength of a leg bone depends upon the area of its cross section, but the legs must hold up a body increasing in weight by the cube of its length. (6) Galileo first recognized this principle in his *Discorsi* of 1638, the masterpiece he wrote while under house arrest by the Inquisition. (7) He argued that the bone of a large animal must thicken disproportionately to provide the same relative strength as the slender bone of a small creature.

6 (1) One solution to decreasing surface has been particularly important in the progressive evolution of large and complex organisms: the development of internal organs. (2) The lung is, essentially, a richly convoluted bag of surface areas for the exchange of gases; (3) the circulatory system distributes material to an internal space that cannot be reached by direct diffusion from the external surface of large organisms; (4) the villi of our small intestine increase the surface area available for absorption of food (small mammals neither have or need them).

7 (1) Some simpler animals have never evolved internal organs; (2) if they become large, they must alter their entire shape in ways so drastic that plasticity for further evolutionary change is sacrificed to extreme specialization. (3) Thus, a tapeworm may be 20 feet long, but its thickness cannot exceed a fraction of an inch because food and oxygen must penetrate directly from the external surface to all parts of the body.

8 (1) Other animals are constrained to remain small. (2) Insects breathe through invaginations of their external surface. (3) Oxygen must pass through these surfaces to reach the entire volume of the body. (4) Since these invaginations must be more numerous and convoluted in larger bodies, they impose a limit upon insect size: (5) at the size of even a small mammal, an insect would be "all invagination" and have no room for internal parts.

9 (1) We are prisoners of the perceptions of our size, and rarely recognize how different the world must appear to small animals. (2) Since our relative surface area is so small at our large size, we are ruled by gravitational forces acting upon our weight. (3) But gravity is negligible to very small animals with high surface to volume ratios; (4) they live in a world dominated by surface forces and judge the pleasure and dangers of their surroundings in ways foreign to our experience.

10 (1) An insect performs no miracle in walking up a wall or upon the surface of a pond; (2) the small gravitational force pulling it down or under is easily counteracted by surface adhesion. (3) Throw an insect off the roof and it floats gently down as frictional forces acting upon its surface overcome the weak influence of gravity.

11 (1) The relative weakness of gravitational forces also permits a mode of growth that large animals could not maintain. (2) Insects have an external skeleton and can only grow by discarding it and secreting a new one to accommodate the enlarged body. (3) For a period between shedding and regrowth, the body must remain soft. (4) A large mammal without any supporting structures would collapse to a formless mass under the influence of gravitational forces; (5) a small insect can maintain its cohesion ((6) related lobsters and crabs can grow much larger because they pass their "soft" stage in the nearly weightless buoyancy of water). (7) We have here another reason for the small size of insects.

12 (1) The creators of horror and science-fiction movies seem to have no inkling of the relationship

between size and shape. (2) These "expanders of the possible" cannot break free from the prejudices of their perceptions. (3) The small people of *Dr. Cyclops, The Bride of Frankenstein, The Incredible Shrinking Man*, and *Fantastic Voyage* behave just like their counterparts of normal dimensions. (4) They fall off cliffs or down stairs with resounding thuds; (5) they wield weapons and swim with olympic agility. (6) The large insects of films too numerous to name continue to walk up walls or fly even at dinosaurian dimensions. (7) When the kindly entomologist of *Them* discovered that the giant queen ants had left for their nuptial flight, he quickly calculated this simple ratio: (8) a normal ant is a fraction of an inch long and can fly hundreds of feet; (9) these ants are many feet long and must be able to fly as much as 1,000 miles. (10) Why, they could be as far away as Los Angeles! (Where, indeed, they were, lurking in the sewers.) (11) But the ability to fly depends upon the surface area of wings, while the weight that must be borne aloft increases as the cube of length. (12) We may be sure that even if the giant ants had somehow circumvented the problems of breathing and growth by molting, their sheer bulk would have grounded them permanently.

13 (1) Other essential features of organisms change even more rapidly with increasing size than the ratio of surface to volume. (2) Kinetic energy, in some situations, increases as length raised to the fifth power. (3) If a child half your height falls down, its heard will hit with not half, but only 1/32 the energy of yours in a similar fall. (4) A child is protected more by its size than by a "soft" head. (5) In return, we are protected from the physical force of its tantrums, for the child can strike with, not half, but only 1/32 of the energy we can muster. (6) I have long had a special sympathy for the poor dwarfs who suffer under the whip of cruel Alberich in Wagner's *Das Rheingold*. (7) At their diminutive size, they haven't a chance of extracting, with mining picks, the precious minerals that Alberich demands, despite the industrious and incessant leitmotif of their futile attempt.*

***Footnote (FN)** (1) A friend has since pointed out that Alberich, a rather small man himself, would only wield the whip with a fraction of the force we could exert—(2) so things might not have been quite so bad for his underlings.

14 (1) This simple principle of differential scaling with increasing size may well be the most important determinant of organic shape. (2) J. B. S. Haldane once wrote that "comparative anatomy is largely the story of the struggle to increase surface in proportion to volume." (3) Yet its generality extends beyond life, for the geometry of space constrains ships, buildings, and machines, as well as animals.

15 (1) Medieval churches present a good testing ground for the effects of size and shape, for they were built in an enormous range of sizes before the invention of steel girders, internal lighting, and air conditioning permitted modern architects to challenge the laws of size. (2) The small, twelfth-century parish church of Little Tey, Essex, England, is a broad, simple rectangular building with a semicircular apse. (3) Light reaches the interior through windows in the outer walls. (4) If we were to build a cathedral simply by enlarging this design, then the area of outer walls and windows would increase as length squared, while the volume that light must reach would increase as length cubed. (5) In other words, the area of the windows would increase far more slowly than the volume that requires illumination. (6) Candles have limitations; (7) the inside of such a cathedral would have been darker than the deed of Judas. (8) Medieval churches, like tapeworms, lack internal systems and must alter their shape to produce more external surface as they are made larger. (9) In addition, large churches had to be relatively narrow because ceilings were vaulted in stone and large widths could not be spanned without intermediate supports. (10) The chapter house at Batalha, Portugal—one of the widest stone vaults in medieval architecture—collapsed twice during construction and was finally built by prisoners condemned to death.

16 (1) Consider the large cathedral of Norwich, as it appeared in the twelfth century. (2) In comparison with Little Tey, the rectangle of the nave has become much narrower; chapels have been added to the apse, and a transept runs perpendicular to the main axis. (3) All these "adaptations" increase the ratio of external wall and window to internal volume. (4) It is often stated that transepts were added to produce the form of a Latin cross. (5) Theological motives may have dictated the position of such "outpouchings," but the laws of size required their presence. (6) Very few small churches have transepts. (7) Medieval architects had their rules of thumb, but they had, so far as we know, no explicit knowledge of the laws of size.

17 (1) Large organisms, like large churches, have very few options open to them. (2) Above a certain size, large terrestrial animals look basically alike—(3) they have thick legs and relatively short, stout bodies. (4) Large medieval churches are relatively long and have abundant outpouchings. (5) The "invention" of internal organs allowed animals to retain the highly successful shape of a simple exterior enclosing a large internal volume; (6) the invention of internal lighting and structural steel has permitted modern architects to design large buildings of essentially cubic form. (7) The limits are expanded, but the laws still operate. (8) No large Gothic church is wider than long; no large animal has a sagging middle like a dachshund.

18 (1) I once overheard a children's conversation in a New York playground. (2) Two young girls were

discussing the size of dogs. (3) One asked: “Can a dog be as large as an elephant?” (4) Her friend responded: “No if it were as big as an elephant, it would look like an elephant.” (5) How truly she spoke.

Appendix 2: Summary of the Text

Despite apparent diversity of life, there is regularity in the basic design of all organisms evident in the correlation between size and shape. When they grow larger, their growth is more rapid in the volume than in the surface because volume increases as the cube of length (length^3) while surface does as the square (length^2). This simple geometric principle imposes various constraints on the development of large and small animals alike, resulting in their own peculiar problems and solutions. Also the great difference in size prevents us humans from seeing how different a world insects live in. Their world is predominantly governed by surface forces whereas ours is by gravity. Lastly, the influence of size upon the shapes in fact applies to all physical objects; small and large medieval churches prove the point.

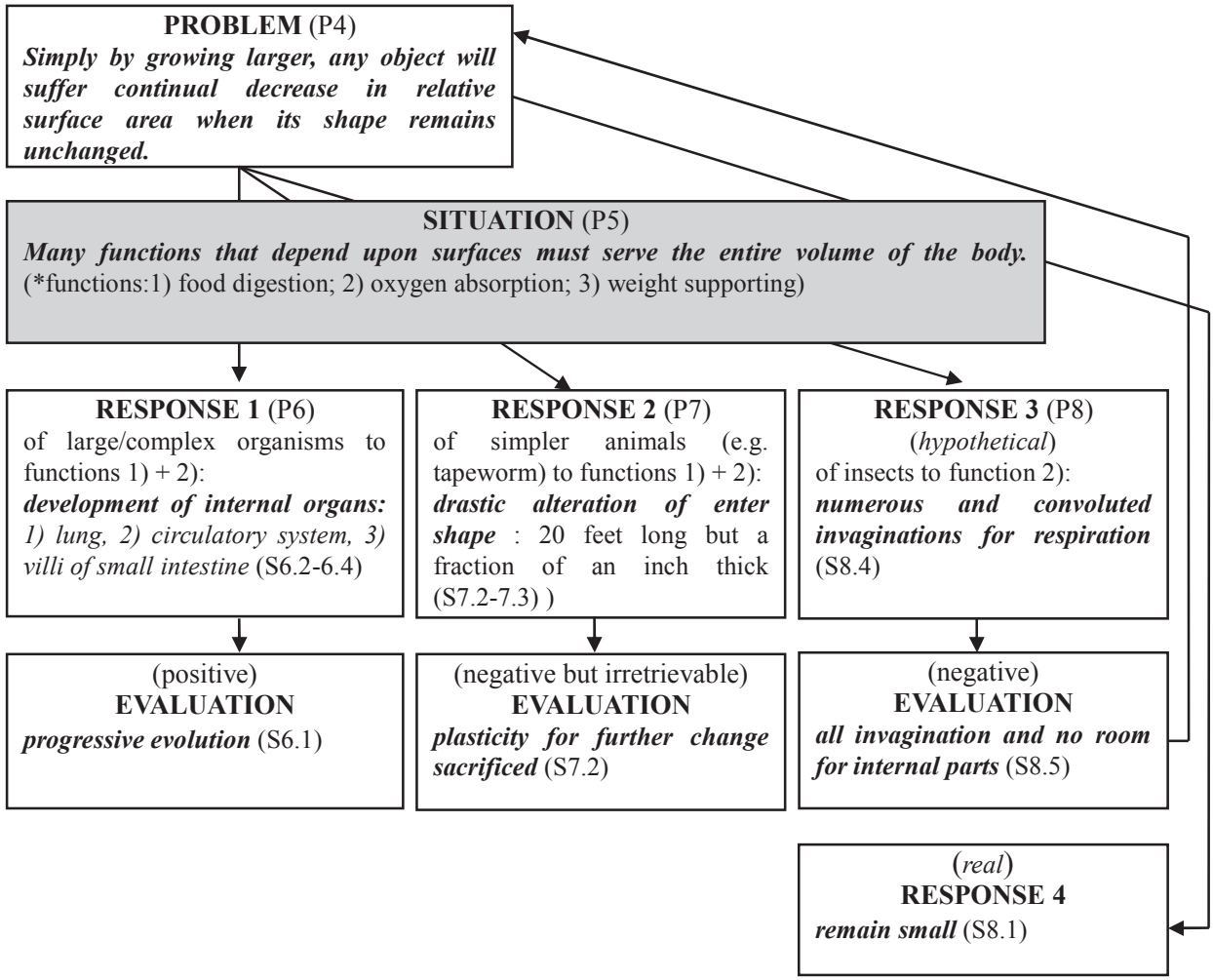
Appendix 3: Section Boundaries and their Components of the text

Paragraph	Level 1	Level 2
1	**judgment**	**general**
2		
3	**explanation**	
4		
5		**specific** 1
6		
7		
8		
9		**specific** 2
10		
11		
12		**general**
13		**specific**
*FN		
14		**transition**
15		**specific** 3
16		
17		**general**
18		

*FN = footnote

(figure adapted from Hunston, 1994: 205)

Appendix 4: Componential Analysis of P-S Components in P4-8 (=SP1)



Appendix 5: Signaling Vocabulary of the P-S Pattern in P4-6

Situation (P5)	*important, depend on, must (serve), depends on, must (hold up), must (thicken)*
Problem (P4)	*suffer, decrease* (v)*, decrease* (n)*, (increase) only as…*
Response (P6)	*solution, development,*
Evaluation (P6)	*important, progressive (evolution), (a) richly (convoluted), increase,*

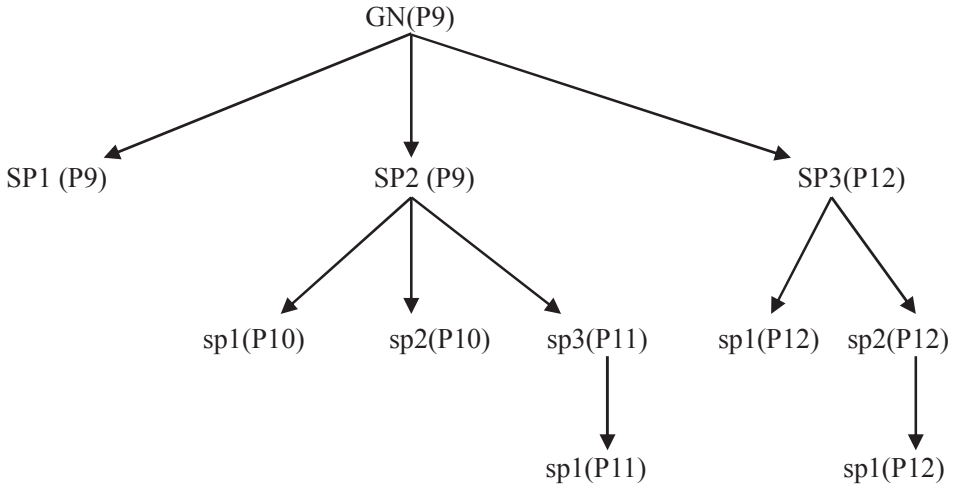
Appendix 6: Recursive Nature of the Problem-Solution Pattern

Situation
Problem
Response
Negative Evaluation = **New Problem**
Response
Negative Evaluation = **New Problem**
Response
Negative Evaluation….

(adapted from Hoey, 1991: 41)

[Note]: Coulthard (1994:8) states that when "the Evaluation of a Solution [Response] is negative…the same or slightly modified problem is reinstated and an alternative solution tested; this creates a potentially indefinitely recursive structure'.

Appendix 7: Tree-diagram Representation of P9-12



Appendix 8-1: Matching Relations in P9, 10, 12

P9	*we*	*small animals*		for contrast
	small surface with large size	*high surface to volume ratios*		for contrast
	gravitational forces	*surface forces*		for contrast
P10	*gravitational forces*	*surface adhesion / frictional forces*		for contrast
		surface adhesion	*frictional forces*	for compatibility
P12	*small people*	*large insects*		for contrast/ compatibility
	fall…with resounding thuds / [move] *with olympic agility*	*walk up walls or fly*		for compatibility
	could fly as far away as Los Angeles	*would have been grounded permanently*		for contrast

[Note]: The matching of *small people* and *large insects* could be interpreted both for contrast and for compatibility: for contrast because they are opposite in size, and for compatibility because they both serve to illustrate the movie creators' *no inkling of the relationship between size and shape* (S12.1). They are in contrast with what they should have been (at least in theory), which is actually described in S12.10. Here it might pedagogically be worthwhile to have learners consider what the other pairs of each matching relations should be.

Appendix 8-2: Exercise for Matching Relations

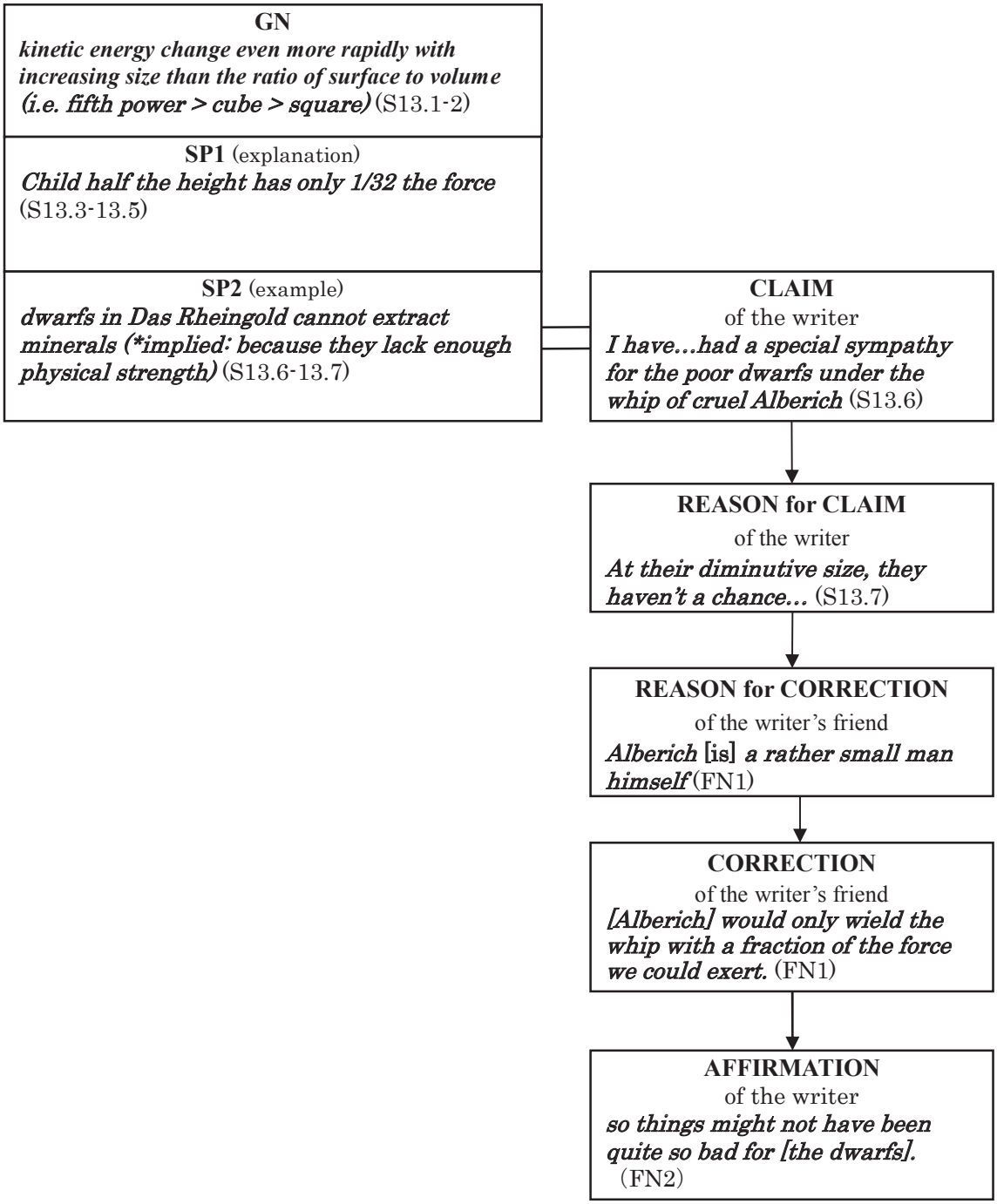
P12	*(small people) fall…with resounding thuds*	*but they should have*	*1)**
	(small people)… swim with olympic agility		*2)**
	(large insects)…walk up walls		*3)**

*Answer Keys: 1) *floated gently down;* 2) *been trapped on the surface of water*; 3) *been grounded permanently*

Appendix 9: Signaling Vocabulary of the P-S Pattern in P11

Situation	*can only (grow by…), must remain (soft),*
Problem	*under the influence (of gravitational forces),*
Response	*a mode (of growth) without (any supporting structures)*
Evaluation	*permit, could not maintain, would collapse, can maintain cohesion, reason for*

Appendix 10: G-S and C-C Patterns in P13 and Footnote



Appendix 11: Matching Relations in P15-16

architectures			animals	purpose
Pair A		**Pair B**	**Pair C**	
medieval		*modern*		for contrast: with or without means to defy the laws of size
		steel girders, internal lighting, air conditioning	**(bones, circular systems of large/ complex animals)* (S5.5, S6.3)	for compatibility in possession of counter measures
medieval churches			*tapeworms*	for compatibility in 1) lack of internal systems and 2) alteration of their (entire) shape for development
light through windows of Little Tey			**(oxygen through invaginations of insects)* (S8.2-3)	for compatibility in the dependency on surfaces
church of Little Tey	*large Norwich Cathedral*			for contrast in 1) width and 2) presence of adaptations

[Note]: P15-16 contain intricate matching relations. Basically the matching is between two medieval churches—*Little Tey* and *Norwich Cathedral*—to emphasize their differences. However, there seems to be another underlying parallelism here between these churches and the animals that have already been discussed in SP1 and SP2 of the overall organization: that is, *Little Tey* is to *Norwich Cathedral* as insects are to large animals. These two sets of pairs seem to be matched for compatibility to emphasize similarities in their developmental problems and responses imposed by *the laws of size* (S15.1, 16.5, 16.7), both sharing *the story of the struggle to increase surface in proportion to volume* (S14.2).

Appendix 12: Syntactical Parallelism between S17.5 and S17.6

S17.5	*The "invention" of internal organs*	*allowed*	*animals*	*to retain*	*the highly successful shape of a simple exterior enclosing a large internal volume*
S17.6	*the invention of internal lighting and structural steel*	*has permitted*	*modern architects*	*to design*	*large buildings of essentially cubic form*

[*Note]: The matching relations between *large animals* and *large churches* are also syntactically reflected in the parallel sentence structure of S (n. + *of* phrase) + V + O + to-infinitive of S17.5 and S17.6: