



PROCESSING DIFFERENCES IN ADDITIVE RELATIONS

Finding complexity in ‘simple’ structures

Abstract

Readers generate their understanding of whole texts by processing the meaningful links, known as Coherence Relations, between text segments. This paper argues that additive Coherence Relations, which are generally considered to be the simplest, in fact show varying structural complexity. In an eye-tracking experiment the processing difficulty of different additive structures was tested, as well the impact of connectives on the processing of these relations. More structurally complex ‘list’ structures were found to be read more slowly than simpler ‘elaborations’, suggesting greater processing difficulty, although participants may be influenced by the more causal-like nature of the simpler structures. Connectives typically caused texts to be read more quickly, even when incorrect. We suggest that this is because while correct marking may be beneficial, imperfect additive connective marking risks causing readers to abandon their efforts to process the text, with the more complex list structures at greater risk.

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1. Introduction

When we read text, we expect it to be coherent. One of the central requirements for coherence is that the different segments of the text fit together meaningfully: that the segments are somehow related. These relations are therefore known as Coherence Relations, which will be abbreviated to CRs throughout this paper. It is important to understand that CRs exist in the mind of the reader, and they can be constructed without being explicit. To illustrate this, consider Example 1. For the sake of clarity this example will be divided into numbered segments. This convention will hold throughout the paper.

1: [1] John tripped over a rock. [2] He fell into a puddle.

The question here is how do segments [1] and [2] relate? Arguably the most obvious interpretation of Example 1 is as a ‘causal’ CR: that [2] happened *because* of [1]. However, it is perfectly acceptable that this could simply be a list of misfortunes that have befallen John this week, which would make it an ‘additive’ CR: that [2] happened *in addition* to [1], but the two are not otherwise related. Alternatively, in the context of a teacher explaining prepositions it could be contrastive: John fell *over* a rock but *into* a puddle. The CR that the reader forms influences their ‘mental representation’: their understanding of the text.

Of course example 1 in isolation, despite its many potential CRs, is very simple. It contains two segments which relate directly to each other. In most situations, CRs form a much more complicated network. Consider a textbook that explains to students about a historical situation comprised of four key events. The mental representation the textbook is meant to convey is depicted in Figure 1.1.

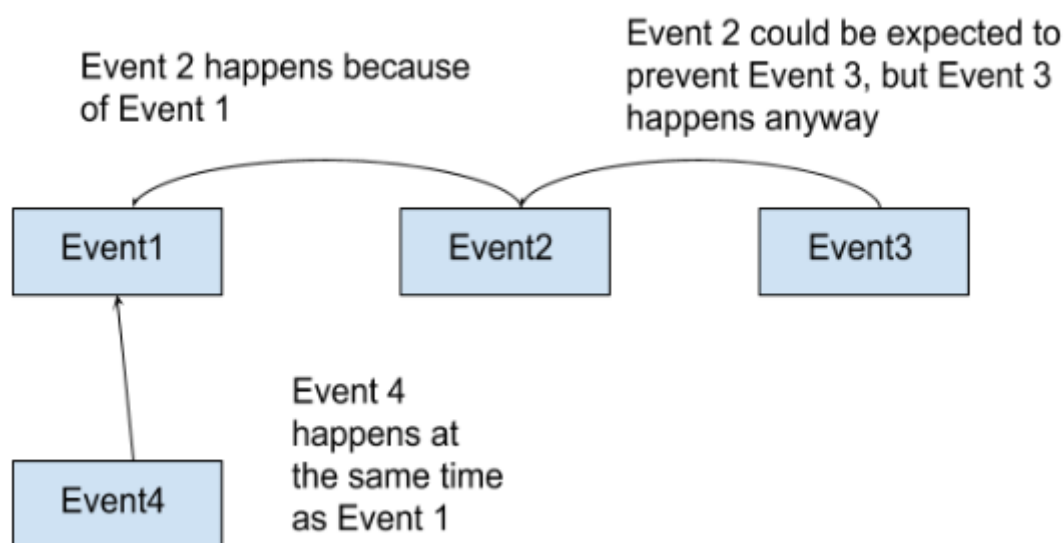


Figure 1.1. A moderately complex mental representation

Here we can see that for the students to properly understand the lesson, it is not enough for them simply to grasp all four events: they must learn how the events relate. These relations can all be expressed through Coherence Relations. CRs are vital for proper understanding of the point at hand: if any of the relations are not grasped by the students, they may learn the events but have an incorrect understanding of how they relate, undermining their mental representation and resulting in an incomplete or incorrect understanding of the historical situation. This highlights the potential for structural concerns when dealing with CRs: while a relation may hold between two segments, it doesn't happen in a vacuum. In Figure 1.1 Events 4 and 2 both relate to Event 1: in a written text this means that at least one of the two CRs that explain the relations is likely going to have to hold between

non-adjacent segments, assuming Event 1 is described first, as Events 4 and 2 can't both be described immediately after Event 1. In short, texts can form rather complex structures of CRs.

In this paper, we will be looking at how such structural concerns influence additive relations. Specifically, we propose a distinction between 'lists' and 'elaborations'. The proposed distinction is captured in Examples 2 and 3.

2:[1] Paul tries to exercise every day. [2] He rock-climbs a lot.

3: [1] Paul tries to run every day. [2] He rock-climbs a lot.

These are both obviously very similar examples, and at first glance, very similar relations. There is a distinction between the two, however. In Example 2, [1] establishes a general circumstance and [2] provides an example to illustrate it. In this sense, [2] directly provides more information about [1]: it is an *elaboration*. Conversely, in Example 3 there is no direct link between [1] and [2]: it is a *list*, in this case of Paul's exercises. In elaborations the segments are referring to each other but in lists they both refer to a higher level issue. This list-elaboration distinction has a dual motivation: the need for the distinction is suggested by both experimental anomalies in connective behaviour and theoretical gaps in existing systems' capacities to capture the difference between [1] and [2]. The experimental anomalies will be discussed first.

There are suggestions that additives may be read differently to other CRs when explicitly marked. In the case of all the examples used so far the CR is considered to be implicit because it falls to the reader to interpret the text and determine what CR should link the two segments. To avoid the confusion that this ambiguity can bring, it is possible to mark the CR with a connective; *because, consequently, in addition, but*, and so on. This saves the reader the effort of interpreting an implicit CR, and has generally been found to improve reading times and text comprehension (Loman & Mayer, 1983; Sanders & Noordman, 2000; Van Silfhout, Evers-Vermeul & Sanders, 2015, among others) when used appropriately. However, a study by Kleijn, Pander Maat & Sanders, (2019) into the effect of CR marking on reader comprehension found that while readers' understanding of causal, temporal and contrastive relations were either facilitated or unaffected by the addition of Coherence Relations, additive relation markers actually had an inhibitory effect on comprehension. The additive relations used by Kleijn et al. also used 'list' and 'elaboration' relations, differentiated on roughly the same basis as in examples 2 and 3: whether a segment refers to the previous segment or an implicit topic. In a post-hoc analysis they suggested that the inhibitory effect of connectives may be greater in list relations than elaborations. This provides the experimental motivation for this study, and leads into our two research questions. The primary research question is whether this distinction between list and elaboration structures is a functional one in terms of how readers deal with them; while the structural differences may be appealing and logical, this may not extend to actual use.

Is there a difference in how readers process list and elaboration structures?

Following the results of Kleijn et al., we will also investigate the impact of additive markers have on the processing of these relations:

What is the effect of introducing elaboration and list coherence markers to texts containing list and elaboration relations?

However, there is a theoretical discussion that arises as regards our division of additives into lists and elaborations in that additive relations are not a universal defined category: three theoretical systems will be compared in this paper, of which only one (Sanders, Spooren and Noordman, 1992) formalise additives in their system. Nonetheless, they are a useful and reasonably widely accepted category of

simple, non-causal and often non-temporal and non-contrastive relations (cf. Kleijn et al., 2009; Louwerse, 2001). In this definition, additives are typically considered to be the simplest relation available: children learn them before other relation types (Bloom, 1980; Evers-Vermeul & Sanders, 2009), and they are regarded as less informative than other relations because they only add the information contained in the text segments themselves, without establishing causes, contrasts, or temporal elements. Some systems even suggest that other relation types presuppose additives – that every type of relation fulfils the criteria for being an additive, and that more complicated relations simply have more elements that distinguish them from the more ‘basic’ additives.

We argue that while additives are not as often studied as other relation types, possibly because they are considered unlikely to produce worthwhile results due to this perception of simplicity, additives should in fact be considered more carefully. This paper attempts to challenge the assumption of additive simplicity; we propose that additives can be structurally complex and are certainly worthy of further study.

To seriously propose this we must first consider precisely how we will define our list and elaboration relations. As the distinction between the two additives forms the core of this paper we need some more precision in our definition. To achieve this, the next section will consider the elaboration-list distinction in light of a number of theories of CRs.

2. Background

2.1. Mann & Thompson, Rhetorical Structure Theory

The first theory to be considered when attempting to motivate the distinction between lists and elaborations is one that revolves around structural considerations. The two relations can be very easily distinguished using Rhetorical Structure Theory (Mann & Thompson, 1988), from here on abbreviated to RST, which proposes that Examples 2 and 3 (repeated below), despite having only one word different, form entirely different discourse structures. These structures as diagrammed using RST are presented in Figure 2.1.

2:[1] Paul tries to exercise every day. [2] He rock-climbs a lot.

3: [1] Paul tries to run every day. [2] He rock-climbs a lot.

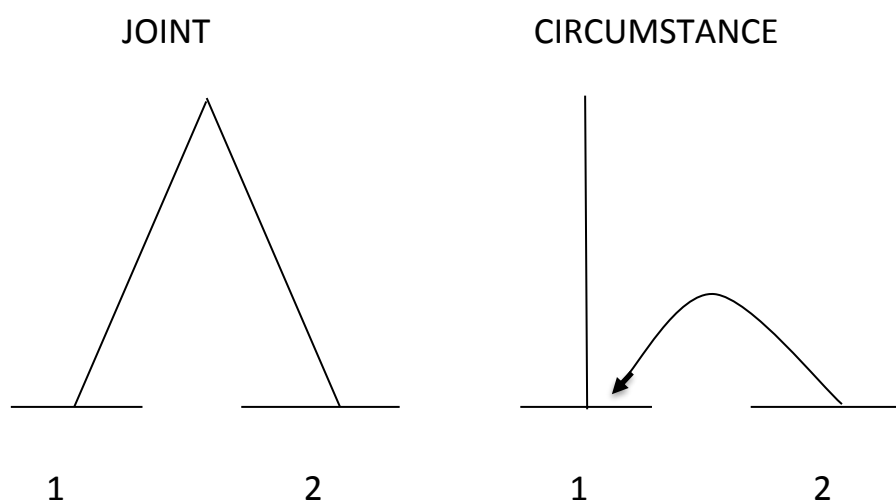


Figure 2.1. A comparison of JOINT and CIRCUMSTANCE structures as diagrammed using RST

These are the simplest forms of our list (example 3, using the JOINT structure) or elaboration (example 2, using the CIRCUMSTANCE) structures. While both LIST and ELABORATION structures are defined in RST, somewhat confusingly they use different definitions than the list and elaboration relations we propose in this paper. Any reference to the RST definitions will be provided in block capitals, in the style of the original paper. The important element here is the presence or absence of a relation holding (represented in RST by a line with an arrow) between segments 2 and 1. In elaborations, this relation holds. In list relations, it is absent; both segments stand alone within the larger context of the list. This immediately produces a difference in complexity between the two structures, as CIRCUMSTANCE or elaboration relations only have two elements, while JOINT or list relations arguably have three. In lists, you not only have to deal with the two (or even more) segments of the list, but also the implicit topic they both refer to. In larger texts multiple segments may even relate back to a single earlier segment that establishes the context of the list, which would produce the structure shown in Figure 2.2, resulting in three segments explicitly being part of the overall list.

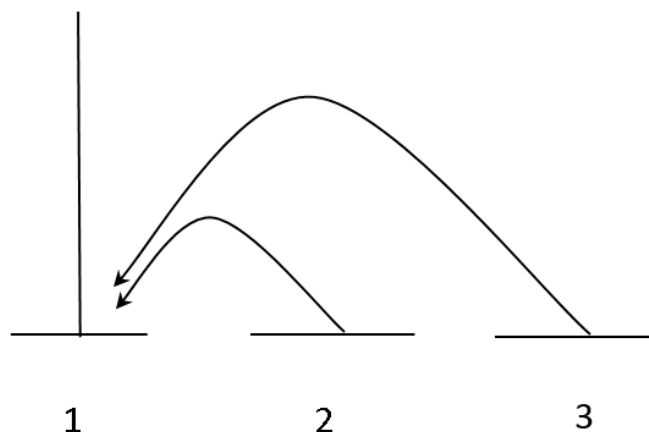


Figure 2.2. A List relation holds between segments 2 and 3 in this larger structure.

This structural distinction is the primary motivation of our definitions. In a structurally motivated account, Kleijn et al.'s (2019) definitions based on topical level still hold, but they hold as a result of the structures that the CRs are forming. This approach provides a system that can be applied to any text and furthermore can very easily interface with predictive theories to provide us with predictions on how readers are likely to process lists and elaborations differently.

RST does also use its own system of categorisation for CRs. In the original paper (Mann & Thompson, 1988) there were 24 relations, although this has since been expanded to 30 (Mann, 2005). These relations are defined by a number of constraints: on the Nucleus(N) and Satellite(S), which are the two segments between which the relation holds, and on the effect intended. An example of such a CR and its constraints is provided in Figure 2.3, below.

relation name: EVIDENCE
constraints on N: R might not believe N to a degree satisfactory to W⁷
constraints on S: The reader believes S or will find it credible
constraints on the N + S combination: R's comprehending S increases R's belief of N
the effect: R's belief of N is increased
locus of the effect: N

Figure 2.3. The definition of the 'Evidence' relation from the 1988 paper (p.251).

This provides a comprehensive definition of the relations available, but suffers in that the constraints provided are not consistent between relations; two different relations will hold entirely different constraints. This makes the system as a whole very resistant to broad analysis as it is possible to make observations about how people process the EVIDENCE, ELABORATION and BACKGROUND CRs, but there is very little leeway within the framework to group these together, even if they show very similar behaviours. Some relations are considered to share constraints and so are grouped, but this is limited to items that are already extremely similar. The approach taken here has been to identify CRs, and then to provide descriptive definitions for them using the set of constraints above. This is descriptively functional, and to some degree allows for grouping of relations where constraints are considered to be similar or identical, but is forced to deal with new CRs by inventing new constraints, as evidenced by the 6 additional relations added to RST by later works.

To illustrate why this approach is problematic, consider our elaboration/list distinction. In an elaboration, the constraint on N+S in most of these might be to improve the reader's (R) understanding of N by providing example or specification, but it may instead be to justify the claim of N by providing a convincing example, and so would in fact be an Evidence relation. This would be further complicated in relations with an implicit higher topic, and so without a nucleus, as then constraints would have to operate on a non-existent segment. As a result, it is difficult to argue that RST's categorical approach is robust for the elaboration/list distinction because the same relation appears to require multiple constraints, and the same relation may operate under different constraints in different circumstances. However, RST's structural systems are excellent for our purposes, as not only do they allow the development of structures to explain the distinction between lists and elaboration relations, they allow easy interfacing with predictive theories. Accepting that RST will form the structural basis of our definition, but will not be used for defining the nature of the relation itself, we must move on to considering our definition of the additive CRs themselves.

2.2. Sanders, Spooren & Noordman, Coherence Primitives

The next categorical system we will consider here is that proposed by Sanders, Spooren & Noordman (1992), which does not consider CRs to be themselves primitive, but instead formed by four primitives shared by all CRs: Basic operation (additive or causal), Source of Coherence (Semantic or pragmatic), Polarity (Positive or negative) and Order (Positive or negative). This is a valuable approach because it attempts to categorise CRs using only four discrete variables each with only two 'settings', and so is far more systematic than other categorical approaches - it takes a finite number of values and attempts to capture every CR within them. Figure 2.4, below, provides an overview of how the system works and the relations generated by it.

Overview of the Taxonomy and Prototypical Relations

Basic Operation	Source of Coherence	Order	Polarity	Class	Relation
Causal	Semantic	Basic	Positive	1.	Cause-consequence
Causal	Semantic	Basic	Negative	2.	Contrastive cause-consequence
Causal	Semantic	Nonbasic	Positive	3.	Consequence-cause
Causal	Semantic	Nonbasic	Negative	4.	Contrastive consequence-cause
Causal	Pragmatic	Basic	Positive	5a.	Argument-claim
				5b.	Instrument-goal
				5c.	Condition-consequence
Causal	Pragmatic	Basic	Negative	6.	Contrastive argument-claim
Causal	Pragmatic	Nonbasic	Positive	7a.	Claim-argument
				7b.	Goal-instrument
				7c.	Consequence-condition
Causal	Pragmatic	Nonbasic	Negative	8.	Contrastive claim-argument
Additive	Semantic	—	Positive	9.	List
Additive	Semantic	—	Negative	10a.	Exception
				10b.	Opposition
Additive	Pragmatic	—	Positive	11.	Enumeration
Additive	Pragmatic	—	Negative	12.	Concession

Figure 2.4. - A layout of relation types as categorised by Sanders et al.(p.11)

Of the systems discussed here, our approach does fit most cleanly into the system proposed by Sanders et al., which is not surprising given that it was developed as a system to try and include all existing CRs. However, while it is an example of exactly the sort of systematic, taxonomic approach

that the inclusion of RST or an RST-like system of structural analysis would be particularly able to support and improve, it goes into substantially greater depth than we need to consider here, and yet simultaneously fails to capture the proposed list/elaboration distinction. This is not entirely surprising as our distinction is structural and this system is not. Nonetheless, the semantic/pragmatic distinction is not necessary for the list/elaboration distinction; it is enough to consider them generically additive. In this vein, we will adopt a simplified version of these definitions; we define additives in this particular paper as being additive, positive relations under Sanders et al.'s taxonomy: this excludes all forms of causal, as well as contrastives (which are considered negative-polarity additives). As an additional measure to ensure this paper is in line with Kleijn et al. (2019), we will also exclude any CR with a temporal element. While temporal CRs are considered to be additive under the categories seen in Figure 2.3, they were considered separate in Kleijn et al. and so will also be separated here.

At this stage we have a definition of lists and elaborations that revolves around generic additive relations using a simplified version of Sanders et al. (1992) with the additional exclusion of temporal CRs, combined with the structural system from RST. Lists are additives where the CR holds either to an implicit higher topic, or to a common earlier segment, while elaborations are more straightforward additive CRs that hold to the immediately preceding segment.

The definition at this stage is functional, but there is one more theoretical approach we will consider here which can help deal with the problem that emerges when considering that it is perfectly reasonable to have lists of causes, or a list of counter-arguments against an original point. These issues raise the question of whether lists are truly additive.

2.3. Asher & Lascarides, Formal Semantics of Discourse

Asher & Lascarides (1993) developed a semantically-driven system of CRs to particularly discuss temporal relations. The CRs themselves are not particularly relevant to our distinction, but their system can be used to provide a minor modification to our list definition that makes it much more robust. In particular Asher and Lascarides' system becomes relevant to the structures we propose because their system considers it possible for a relation to hold across multiple segments. Specifically, they argue that 'elaboration is both transitive and distributes over states' (2003, p. 161). Formally, they define this as:

$$(\text{Elaboration } (\pi_1, \pi_2) \wedge \text{Elaboration } (\pi_2, \pi_3)) \rightarrow \text{Elaboration } (\pi_1, \pi_3)$$

In other words, if an Elaboration holds between A and B and also B and C, then it must hold between A and C as well. This is particularly interesting if we consider a list structure like Figure 2.2 where a list is formed of multiple segments elaborating on a common previous segment. Figure 2.2 is repeated below for clarity.

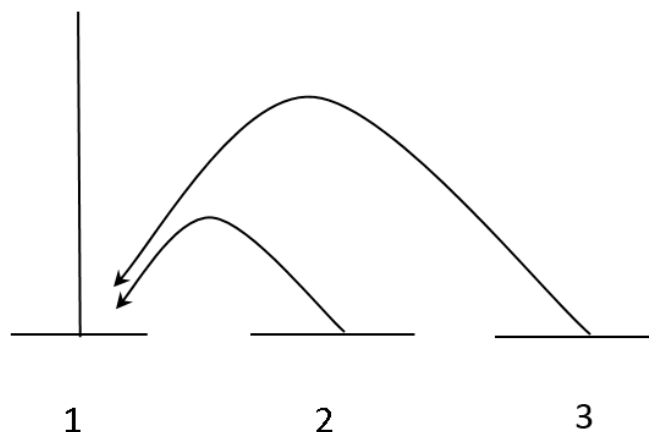


Figure 2.2. A List relation holds between segments 2 and 3 in this larger structure

A problem with this structure for us is in the apparent absence of a connective between segments 2 and 3. That the additive relation holds between 1 and 2 as well as 2 and 3 seems functional, but it so raises the question of why can additive connectives be inserted between items of a list, like in Example 4 below:

4: [1]I have two main hobbies at the moment. [2]I really like playing the Jazz saxophone, [3]and also rock climbing.

Under an analysis that allows for relation distributing over multiple segments, we could therefore argue that there is a relation holding between segments 2 and 3, though it may be weaker than the primary relations between segment 1 and the other two segments. Such an analysis is even more important in an example with a structure like 6 but where the list items hold a causal relation to the first segment, such as:

5: [1]There's two reasons rock climbing is good for you. [2]The physical activity builds full body strength and flexibility, [2]and also it teaches you balance and confidence.

The reason this would otherwise cause a problem is that the relations at play are causal, but there does still appear to be an additive element between segments 2 and 3. Asher & Lascarides' definition above would not strictly speaking apply here; the relation between segment 1 and the other segments is not the same as the relation that holds between segments 2 and 3. Nonetheless, they should be credited for establishing a system whereby distributed relations can hold across the structures we are proposing here, allowing for a segment to hold multiple relations. If we interface such a proposal with our proposed RST structures, we could argue a list may look like Figure 2.5:

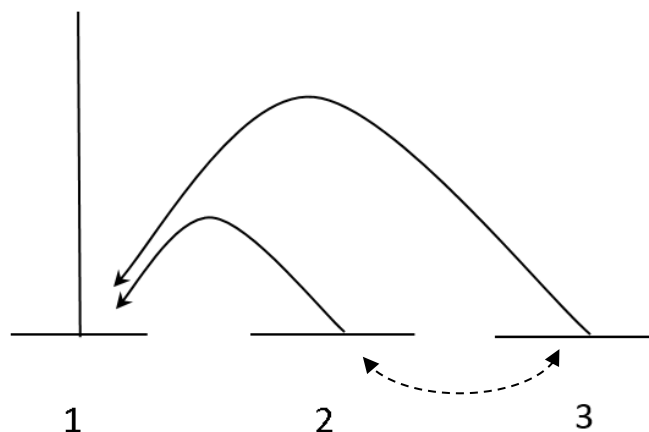


Figure 2.5. A list relation with a distributed additive element between the items of the list

This is an interesting consideration not only because it solves the problems discussed above but also because it provides a further explanation of the complexity of lists; that readers have to process not only the primary relation to the nucleus, but also the distributed relation between the items of the list.

Having established that; RST provides a solid basis for a structural distinction between lists and elaborations; Sanders et al. provides a broad definition of additive relations we can apply; and Ascher & Lascarides' notion of distributivity provides an explanation of potential issues with lists as a CR, the question becomes how we can practically test for a list-elaboration distinction and what effects we may expect the differences between the relations to have on readers. The next sections will consider previous experimental work to determine what the best system would be for actually testing this distinction, as well as investigating in more detail the influence of connectives have been found to have in previous research.

2.4. Measuring the effects of Coherence Relations

We have argued that there are variations in complexity between CRs: in the context of the list/elaboration distinction, we argue that the more complicated structure of lists inherently means that list relations are not only less directly linked but also more complex. To give an example of even greater CR complexity, two of the relations discussed so far include: two things both being true with no further interaction; and an event happening despite having been expected to be prevented by another event. It is not enough, however, to simply take the difference in complexity on faith: it is important to have mechanisms to test and evidence variations in complexity, ease of reading, and comprehension.

So far, a number of references have been made to how CRs may impact the processing of text by readers. This section will discuss how this can actually be tested and measured. For processing, reading time is the favoured approach, under the logic that the actual act of reading will speed up or slow down in response to the difficulty of the text being processed. Eye-tracking methodologies allow larger texts to be presented to participants as the eye-tracker enables the experimenter to see relatively precisely where in the text the participant is looking, and so are an established and popular method of comparing Coherence Relations (cf. Sanders & Noordman, 2000; Louwerse, 2001; Traxler & Bybee, 1997). This also provides more data than a technique that only measures reading time, such as self-paced reading (cf. Haberlandt & Bingham, 1978), because it allows the researcher to determine where readers look after reading a segment. If the reader moves onward, the segment has likely been

understood, but if the reader has difficulty, eye-tracking captures re-reading behaviour, also known as regressions.

Sanders & Noordman (2000) provides an applicable example for us as they compared a type of causal relation (problem-solution) to a type of additive relation (list). The definition of list here is the one defined in Sanders, Spooren & Noordman (1992), which while not quite the same as our proposed list relation, is still a useful point of comparison. Sanders & Noordman found that the causal relations were read faster, and led to better recall and verification than the list relations. Similar results have been found by other researchers (Black & Bern, 1981). Causals being read faster and understood better does produce some issues with their claim that ‘causal relations presuppose additive relations and are therefore more complex than additive relations’ (p. 39) when taken in combination with the argument that easier texts are read more quickly, because it leads to the conclusion that in fact more complex relations are easier to read and understand than simpler ones. To address this, the causality-by-default hypothesis (Sanders, 2005) was proposed, suggesting that readers presuppose that any given relation will be causal until proven otherwise, and so readers tend to pre-emptively generate causal CRs. As a result, readers find causals easier to process than the simpler, but less preferred additive relations.

A more applicable predictive approach for the list-elaboration distinction is the continuity hypothesis (Murray, 1997), which states that CRs differ in how strongly they link their relevant segments, and that readers prefer CRs with better links, or higher continuity. In Murray’s own work this is largely a case of assigning a degree of continuity to any given CR (contrastives have low continuity, causals have high, for example). When it is combined with RST however, the degree of continuity can very easily be linked to the flow of the structure. The CIRCUMSTANCE relation is clearly more continuous as it has a direct relation between the two segments, while the JOINT relation does not. Applying this to lists and elaborations this would therefore predict a distinct preference when reading for the more continuous elaboration CRs over lists, resulting in easier and more effective processing.

However, the causality-by-default hypothesis does offer something useful in that it clearly sets out a ‘default’ position taken by readers; this is predictively valuable as it means not simply that readers will have an easier time with such relations, but that they will have to reconstruct their mental representation should they encounter a different type of relation, explaining more directly why the readers would experience a slowdown. While defaulting to causals is not particularly relevant in a study about additives, it does raise the possibility of other default structures: in our case, we can argue that under Murray’s continuity hypothesis (1997), readers’ preference for continuous relations may result in them defaulting to an elaboration relation when they start constructing additive structures.

In summary, previous research suggests that additives are generally a less preferred CR type, with readers showing weaker comprehension and generally slower reading when reading additives than causals, but there is limited prior research that is directly applicable to the list-elaboration distinction as most previous research compares additives generally to other types, if additives are included at all. However, the use of eye-tracking mechanisms is well established, and so they were chosen for this experiment to allow for easy comparison to existing research. The next section will consider the effects of explicitly marking CRs in text on reader comprehension and processing.

2.5. Measuring the effects of Coherence Marking

Our second research question revolves around the impact of coherence marking - that is, the use of connectives to highlight to the reader what CR is intended. Research has produced a somewhat mixed set of results from CR marking. On a general level, sentences that include connectives typically provide readers with the information required to construct the correct Coherence Relations and structures.

This reduces the need to infer the relation, so can result in an immediate but temporary facilitation of processing (Cozijn, 2000; Sanders & Noordman, 2000).

Beyond this immediate facilitation, when CRs are correctly marked the results can be summarised to be either positive: that CR marking improves reading speed and/or comprehension (Loman & Mayer, 1983; Van Silfhout, Evers-Vermeul & Sanders, 2015); or ineffectual: that there is no noticeable effect from CR marking (Meyer, 1975; Sanders & Noordman, 2000). However, there are dissenting voices. McNamara, Kintsch, Songer, & Kintsch, (1996) argued that readers engage in more ‘active processing’ when texts are more challenging, for example when CRs are not explicitly marked. When successful, active processing is argued to result in a better understood ‘situation model’, which is referred to in this paper as the mental representation. Similarly, Millis, Graesser & Haberlandt (1993) found that readers were better able to recall texts that were not CR marked than those that were, and as already discussed Kleijn et al. (2019) found comprehension scores suffered when additives were CR marked compared to when they were not.

While these appear to be contrasting claims, if processing and comprehension are considered separately, it is possible to suggest a general pattern laid out by these studies. In this, readers must first parse the text itself, and for this processing stage correct CR marking is at least benign; it may help, but it does not hinder. In comprehension however, where readers convert the processed text into a mental representation, the results are less clear-cut. On the one hand, a text that is harder to parse may result in a stronger mental representation as the reader has put more energy and thought (active processing) into its development. On the other hand, if the processing is so difficult that the reader is unable to correctly do so, the risk of an incorrect mental representation being developed is great. In this paper, focus will be kept on processing, but it is important to bear in mind that there is a comprehension element that is not tracked in eye-tracking studies such as this one.

On the matter of incorrect connectives, only some research has also been done into the impact of incorrect connectives over correct connectives or unmarked CRs. Murray (1997), while testing his continuity hypothesis, found that using incorrect connectives increased reading times (and that incorrect non-continuous connectives increased reading times the most) over correctly marked or unmarked CRs. This is not surprising, as incorrect connectives mislead the reader and are liable to increase the processing power required to parse the text.

The results above obviously produce a slightly muddled picture; connectives may facilitate processing but inhibit comprehension, or they may improve comprehension, while incorrect connectives inhibit processing, but that hasn’t been very thoroughly tested. Given that this experiment is a processing study, we shall for the purposes of our predictions condense this research down to the two fundamental predictions that correct connectives have generally facilitative or minimal impact on processing, and that incorrect connectives have an inhibitory effect. The next section will build upon this summary to lay out our more specific hypotheses as regards lists and elaborations.

3. Eye Tracking Experiment

We have established a proposed elaboration/list distinction on the basis of structural differences, with lists using a more complicated and less continuous structure to form a distributed additive relation and elaborations using a more straightforward and directly related structure. We have also begun to discuss a number of predictions we can make regarding the way these differences will manifest in the processing of these relations, and how connectives will influence that behaviour. Building on these, we can propose the following hypotheses.

3.1. Hypotheses

The formal hypotheses produced from these predictions are listed below.

Hypothesis 1: *Lists pose readers greater difficulty than elaborations, as readers prefer continuous structures and lists are much more discontinuous than elaborations.*

This predicts that elaboration relations will be more easily processed by readers than lists, under the continuity principle (Murray, 1997). To illustrate, consider the examples below.

Elaborative: The shop's **clothes** are known for being very expensive. Their most popular *hat* costs €2000.

List: The shop's **coats** are known for being very expensive. Their most popular *hat* costs €2000.

The continuity is much higher in a text that talks about the clothes generally and then the hats specifically, than it is in a text that talks about the coats specifically, and then the hats. Hats are a subset of clothes, and so the steady increase in specificity results in continuity in the elaboration condition. The list condition, conversely, has no such steady pattern, as the hats do not specify anything about the coats. We therefore expect to see slower reading times and increased regressions in the list conditions as participants will expect a continuous structure of ever increasing specificity and will need to alter the structure of their mental representation once they realise this is not the case. If we consider the bolded and italicised words in the examples, we can see there is one 'keyword' where the structure of the text becomes obvious to the reader: In this case, the effect will manifest as a difference in reading times once the reader reaches 'hats', as this is where the relation is established, and so we can expect reading times to slow at this point in the list condition compared to elaborations.

Connectives provide the less predictable element to this study. The immediate but temporary facilitation of processing (Cozijn, 2000; Sanders & Noordman, 2000) is expected in the correct connective conditions, and possibly in the early reading in incorrect conditions as participants quickly generate the wrong structure. While the immediate effect is typically found at the connective itself, as the structural distinction of the texts is concentrated at the keyword, it is not unreasonable to assume that the connectives will influence how easily readers integrate the structures once they reach the keyword. As such, we expect a generally facilitative effect of connectives, which will vary between marker types on the basis of their informational payload:

Hypothesis 2: *The greater specificity of elaborative connectives over list connectives results in greater facilitation for elaborations than lists when correctly marked.*

The facilitation effect is expected to be stronger in the elaborative connective conditions as the elaborative connectives such as 'for example' or 'more specifically' are more specific than the list connectives like 'furthermore' and 'and also'. To illustrate, compare the examples below.

6: The shop's **clothes** are known for being very expensive. **For example**, their most popular **hat** costs €2000.

7: The shop's **coats** are known for being very expensive. **Furthermore**, their most popular **hat** costs €2000.

The greater specificity of 'for example' means that the participant needs to infer less to generate their mental representation, because the participant will already know at that stage that the next segment will provide an example of clothing, while 'furthermore' does not provide so much information. As such, in the correct connective conditions, we predict faster reading times than the conditions without any connectives, with a stronger effect in the elaborative relations.

Alternatively, it is also possible that the elaborative relations, which are very simple CRs, are in fact so simple that when processing them readers are already at a processing 'ceiling', and so will not benefit from connectives because the relations are already so easy that adding more support won't help. This produces H3.

Hypothesis 3: *The simplicity of elaborations limits the potential facilitation effect of connectives, resulting in greater facilitation for lists than elaborations when correctly marked.*

This would occur because there is not much information the reader would need to infer anyway in elaboration relations, as they are the presupposed additive relations. In this case, the list condition (which may otherwise be interpreted as contrastive or temporal), may show a stronger effect as the connective limits potential participant uncertainty. This will manifest at the keyword, where we expect a potential re-structure of the mental representation (which connectives may assist with).

To further test the influence of these connectives, we also swapped the two structures' CR marking to investigate the effect of incorrect marking on lists and elaborations. The differing complexity of the structures themselves, as well as the CR markers, produce hypotheses 4 and 5.

Hypothesis 4: *The greater specificity of elaborative connectives over list connectives results in greater inhibition for lists than elaborations when incorrectly marked.*

The incorrect condition is arguably the most interesting of the three connective conditions. In theory, given that the connectives should suggest the wrong structure to readers, we would expect readers to prepare that structure in response to the connective. Then, they will have to decide whether to attempt to restructure the representation when they discover it to be incorrect. This will result in major slowdowns once readers reach the key word. Following the logic of H2, we can predict that the slowdown will be proportionate to both the specificity of the connective and complexity of the relation, leading to H4. This is a natural extension of Hypothesis 2: given that the list connectives are typically less specified, they could be expected to have less of an effect when incorrectly applied. Consider an incorrectly marked elaboration relation:

8: Their **clothes** are known for being very expensive. **?Furthermore**, their most popular **hat** costs €2000.

This is a poor connective here, but is not as overtly incorrect as the next example, and so we predict a weak inhibition effect. It is possible that the use of an even slightly incorrect connective on a highly simple relation may be so unusual as to cause a slowdown effect, but we expect list relations to be much more highly impacted by the use of incorrect connectives, manifesting once the key word is reached. Consider an incorrectly marked list condition:

9: Their **coats** are known for being very expensive. #**For example**, their most popular **hat** costs €2000.

This is entirely incorrect, much more so than Example 8. It does provide a clear example of why ‘hat’ in this case is the keyword: the sentence is perfectly acceptable until ‘hat’ is reached. This will likely exacerbate an already more challenging Coherence Relation type and pose real difficulty for the participant in forming the correct relation type, leading to the 5th and final hypothesis:

Hypothesis 5: *The greater complexity and ambiguity of list relations over elaborations makes repairing list relations much more difficult than elaborations.*

Given that Hypotheses 4 and 5 both expect greater inhibition in the incorrect list condition, it may not be clear which effect is at play should such an effect be found. Having the two hypotheses separate is helpful however due to the link between Hypotheses 4 and 2. If the results do not support Hypothesis 2, but we do see an inhibition effect, it will be argued that this is due to the effect proposed in Hypothesis 5: that the issue is the difficulty in repairing a complex relation, rather than in the specificity of the connective.

What effects are expected, what hypotheses relate to these effects, and where they are expected to manifest are all summarised in the table below, along with the collected hypotheses for ease of reference.

Hypothesis 1: *Lists pose readers greater difficulty than elaborations, as readers prefer continuous structures and lists are much more discontinuous than elaborations.*

Hypothesis 2: *The greater specificity of elaborative connectives over list connectives results in greater facilitation for elaborations than lists when correctly marked.*

Hypothesis 3: *The simplicity of elaborations limits the potential facilitation effect of connectives, resulting in greater facilitation for lists than elaborations when correctly marked.*

Hypothesis 4: *The greater specificity of elaborative connectives over list connectives results in greater inhibition for lists than elaborations when incorrectly marked.*

Hypothesis 5: *The greater complexity and ambiguity of list relations over elaborations makes repairing list relations much more difficult than elaborations.*

Table 3. List of Hypothesis predictions by connective type

Coherence Marker	Effect
Absent	Elaborations are read faster than lists (H1)
Correct	Elaborations are read faster than lists (H2)
	Lists are read faster than elaborations (H3)

Incorrect

Elaborations are read faster than lists

(H4, H5)

3.2. Method

3.2.1. Materials

The formal variables of the experiment are: Structure (List, Elaborative) and Connective (Correct, Incorrect, Unmarked), which forms a 2x3 design. 30 experimental texts were developed, each of which had 6 variants, one for each combination of the two variables above. 12 of these items had simple validation questions attached to ensure participants were actually reading the text. These texts were generated to a template, which is below.

Sentence 1&2: Introductory Sentences

Sentence 3: Positioning Sentence (contains connectives and the list/elaboration variation)

Sentence 4: Critical Sentence

Sentence 5: Conclusion

15 additional items were developed to serve as fillers; these followed the same structure as experimental items but contained causal or contrastive relations. The fillers had connectives in the same even distribution as the experimental items: 5 correct, 5 incorrect, and 5 unmarked. Texts were originally developed in English and then translated into Dutch. A full list of items used, both filler and experimental in both English and Dutch, is available in the Appendix. Experimental items were divided into lists and elaborations by an alternating keyword in sentence 3, such as the **clothes/coats** distinction in the item below. This item has been numbered to indicate how items are divided for analysis.

[1]Het designerlabel is drie jaar geleden voor het eerst bekend geworden. Het vond al snel een publiek van popsterren. Hun [2]**kleding/jassen** [3]staan er om bekend dat ze erg duur zijn. **Ø/Bijvoorbeeld/Bovendien**: Hun populairste [4]*hoed* kost €2000. [5]De eigenaars hebben [6]uitbreiding naar meer [7]betaalbare kleding uitgesloten.

In English:

[1]The designer label first rose to fame three years ago. It rapidly found an audience with pop stars. Their [2]**clothes/coats** [3]are very expensive. **Ø/For example/Furthermore**: Their most popular [4]*hat* costs €2000. [5]The owners have [6]ruled out any [7]expansion into more affordable clothing.

When correct and incorrect connectives were used they were placed in region [3]. In this case, **For example** in the correct elaborative and incorrect list conditions, and **Furthermore** in the correct list and incorrect elaborative conditions. Each connective appears twice because to generate incorrect items we swapped the connectives: the correctly marked list condition for example would talk about expensive **coats**, and **furthermore**, the €2000 *hat*. Meanwhile, the incorrectly marked list would talk about **coats**, **#for example**, the €2000 *hat*.

The target regions are [4], [5], and [6]. These are short 3-word segments extending from the keyword, where we expect the possible differences in reading times to manifest. The Structure conditions are established by the alternation of **clothes** and **coats**. As discussed in section 3.1, this alternation allows the condition to be changed between constructions with a minimal change to the text itself. The use of a keyword, in this case *hat*, provides a focal point for the structural difference; it should become clear to the reader at that word what structure is needed, which is why the measured regions extend from it.

Initially the location of the keyword was positioned as close to the centre of each item's third sentence as possible. The items were originally produced in English, and in English this positioning was relatively easy due to flexible sentence structures. During translation however the keyword sometimes had to be moved. As a result, across all items the location of the keyword varies substantially. This means the content and location of the measured regions also varies. In isolation, this could be problematic because it varied how far from the keyword was from the connective (sometimes even between conditions). Beyond that, it also meant that between items the measured regions varied substantially – some regions crossed sentence or line boundaries, some contained mostly function words and some contained more marked language.

This variation was however considered acceptable because it is unlikely to push the results in favour of a particular hypothesis, as the variation does not favour any particular structure or connective. Instead, it is liable to create a substantial amount of variation in the measured regions between items, which may make it harder to detect subtle effects.

The other notable design issue was that slight differences in word order meant that items which had previously varied only in one or two words at single locations now had variation throughout the section immediately preceding the keyword. There was no variation between measured regions, but this issue did prevent any measures from being taken directly after the connectives, as connective location varied.

Items were divided into 6 lists, with each list containing each item in a different condition, so that each participant read each item in only one condition. Item lists were presented in a fixed order, the order having been determined by an initial randomisation of item numbers followed by a manual re-ordering to ensure that participants first saw a filler item and that the first two items presented to participants both had validation questions (if participants learn that questions never come in pairs, some participants will skip the items immediately after a question as they believe there will not be a 'test' on those items, so they do not matter). Further, items were rearranged so that no more than 3 experimental items came in a row, that no list had two items in the same condition in sequence, and that questions were spread throughout the list. Finally, each of the six lists was inverted to mitigate training effects (all the above constraints held in both directions), for a total of 12 item lists which were presented to participants sequentially (participant 1 saw list 1, participant 2 saw list 2, participant 13 saw list 1, and so on). Each item list was piloted separately using native speakers as test participants.

3.2.2. Participants

40 participants took part in this study, recruited from the Uil-OTS participant pool. Participants were paid for their time. 9 out of 40 participants were male, and the average age of participants was 26 years, with a range from 18-57. All participants reported normal or corrected to normal vision, and none reported dyslexia. After testing, only one participant was close to guessing the purpose of the study; they suggested that the texts had 'different structures'. When further questioned the participant only made reference to their expectations being subverted when encountering incorrect connectives. They did not suggest that there was any more systematic division of all items into structures, and their data was investigated to ensure it was not materially different from other participants. It was not, and so their data was kept in the overall analysis.

3.2.3. Procedure

The equipment used in this study was a computer in a sound-proofed booth, a 3-button input box placed on the table in front of the computer to collect participant responses and an EyeLink 1000 placed directly below the computer screen to collect eye-movement data. Typically the participants'

right eyes were tracked, however the left eye was used where participants' glasses or hairstyles made tracking of the right eye unreliable. Participants were positioned roughly 60cm from the computer screen on which the items were presented, although they were free to move their heads and so their distance from the screen typically varied from 70-50cm during the experiment. Two practice items were presented prior to proper testing to ensure participants understood the nature of the study. Having read each item, the participant used the button box on the table in front of the computer to proceed to the next item. In one third of items, the item would be followed by a simple true-or-false question to encourage the participants to actually read the texts, answered by pressing the left or right button on the input box, which corresponded to the answers on the left or right of the screen. Once the participant had read all items they were debriefed and asked whether they had any idea what the study had been about and whether they had any particular issues with the study.

The three durations measured were First Fixation (FF) (the duration of the first fixation in a region), Regression Path (RP) (the time from the first fixation in a region until the participant progresses to a region on the right), and Total Fixation (TF) (the total time spent reading that region). These three measures have been selected to give insight into a number of reading processes: the First Fixation duration gives an idea of how well the participant is actually parsing the text, as it ends as soon as the participant shifts their gaze: if the gaze 'sticks' in a region, it suggests that they have immediately encountered something difficult or unexpected. Regression Path is suggestive of the difficulty of integrating the segment being read into the existing mental representation, as it is the total time before the participant feels ready to move onto the next segment. Finally, Total Fixation is useful to catch segments that are problematic for the participant's final mental representation; they may for example struggle with a segment but move onwards in the hope that later segments will help them understand, and then return later. In such a case, RP would not pick up this difficulty, and so TF gives us a second chance to detect areas that readers find problematic.

3.3. Data Clean-up

Once all the data was collected, it was processed to ensure that gaze location was correctly assigned to the segment of the text being read. A very light-handed approach was taken: where participant gaze formed clear lines, fixations were where necessary reassigned vertically to the appropriate lines of text, but fixations were never moved horizontally. Blinks were assigned like normal fixations unless they showed extreme behaviour, such as a blink starting towards the centre of the text and finishing at the end of it. In such cases, the entire blink was unassigned. Return sweeps, where the participants reached the end of the line and returned their gaze to the left end of the next line, would sometimes result in a brief fixation in the centre of the next line. This meant that when the participant then began to read the line in earnest, the software would capture the reading as being Regression Path rather than the first pass. In these situations, the centrally placed fixation was raised to the previous line if it was more than 3 words into the sentence. Otherwise, the fixation was left as a potentially valid first fixation.

Following the data processing, the vast majority of data was good quality; 30 items were seen by 40 participants, and of those 1200 measured items, only 11 were discarded across 2 participants. In some items there were regions that had no fixations and so had a recorded fixation time of 0ms. Across all items and measures, this occurred 96 times, 60 in the elaboration condition, and 36 in the list condition. This is somewhat in keeping with expectations, as the simplicity and ease of elaboration relations would mean participants are more likely to read faster and potentially skip regions of text. However, it is not true to say the regions were entirely unread, merely skimmed, so these regions were coded as missing data and not included in the full analysis. Only one other outlier was removed; a single Regression Path duration of over 15 seconds. Regression Path durations varied substantially,

with a reasonably steady distribution up to around 8000 milliseconds; as 15 was roughly twice as long as the next highest duration, it too was removed. All measures showed a very strong positive skew, and so were log transformed.

3.4. Results

Data were analysed using a Linear Mixed Effect Regression (lmer) analysis. Connective (Correctly marked, Incorrectly marked, and Unmarked) and Structure (List or Elaboration) were taken as fixed effects, while item and participants were taken as random effects. As the experiment was a 2x3 design, every combination of base level was used for each analysis. Unless otherwise stated, the numbers reported here use List as the base level of Connective, and Unmarked as the base level of Structure, as this analysis was the most productive and using Unmarked as the base level of connective allows the easiest comparison to correct and incorrect marking. Discussion will be made of how modifying base levels changes significance where appropriate. Each region and measure was tested first for interaction effects, then for main effects. Focus here will be made on the particularly notable results; significant effects, and in some cases the notable lack of significance.

3.4.1. Region 4

Region 4 consists of the keyword and the two words thereafter. Mean reading times and standard deviations are presented in Figure 3.1.

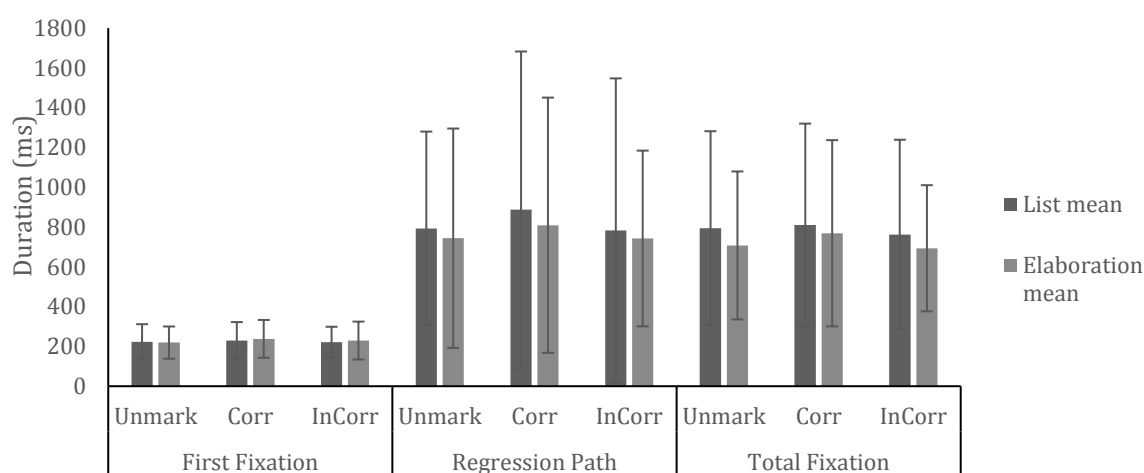


Figure 3.1. Mean reading times in milliseconds in region 4. Error bars represent standard deviation.

There are very large standard deviations in Regression path and Total Fixation durations, most obviously in the former. This is the case for all regions and will be discussed in more detail in the discussion.

First Fixation

There is a main effect of Connective in First Fixation durations in Correct conditions ($\beta = 0.072$; SE = 0.034; df = 1104; $t = -2.092$; $p = 0.037$), showing an increase in reading times over unmarked conditions. This only reached significance if Elaboration was taken as the base level of structure.

Regression Path

There is a main effect of Structure in Regression Path duration ($\beta = -0.060$; SE = 0.028; df = 1103; $t = -2.136$; $p = 0.032$), with Lists being read more slowly than Elaborations.

Total Fixation

Similarly, there is a main effect of Structure in Total Fixation durations ($\beta = -0.070$; $SE = 0.024$; $df = 1100$; $t = -2.218$; $p = 0.026$), again showing Lists being read more slowly.

Notably, there was no effect of Incorrect connectives on reading times in any of the measures as FF ($\beta = 0.015$; $SE = 0.024$; $df = 1108$; $t = 0.607$; $p = 0.5443$), RP ($\beta = 0.005$; $SE = 0.035$; $df = 1103$; $t = 0.151$; $p = 0.879$), and TF ($\beta = -0.014$; $SE = 0.030$; $df = 1103$; $t = -0.462$; $p = 0.644$) all show no effect.

3.4.2. Region 5

Region 5 consists of the first three words after Region 4; it begins with the 3rd word after the keyword. Mean reading times are presented in Figure 3.2.

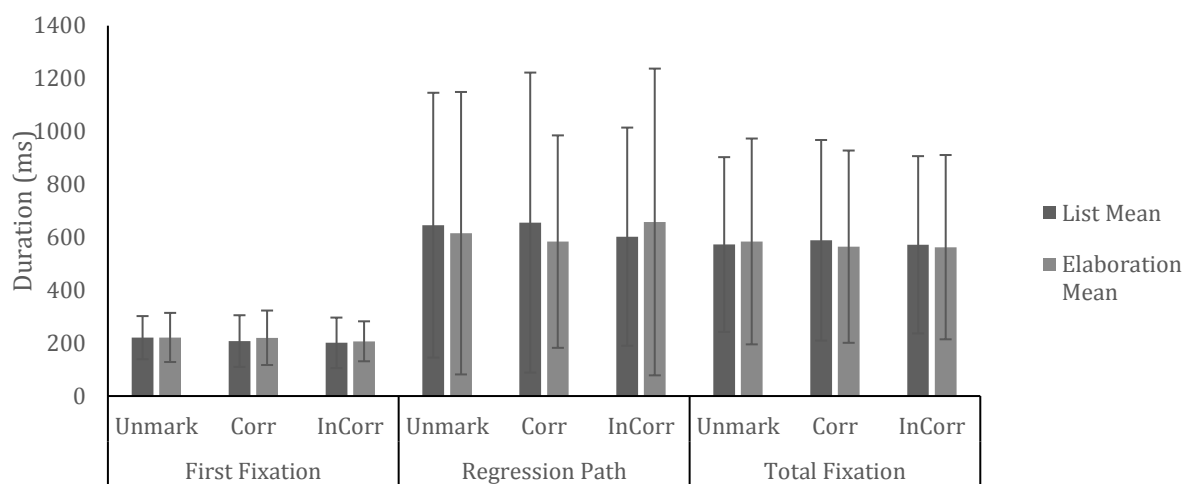


Figure 3.2. Mean reading times in milliseconds in region 5. Error bars represent standard deviation.

First Fixation

A main effect was found for Incorrect ($\beta = -0.137$; $SE = 0.039$; $df = 1091$; $t = -3.560$; $p = 0.0003$) connectives, showing a speed-up effect compared to unmarked conditions.

A main effect was also found for Correct connectives ($\beta = -0.087$; $SE = 0.038$; $df = 1091$; $t = -2.287$; $p = 0.022$), also showing shorter durations than unmarked conditions.

Regression Path

An interaction effect is present here; while there is no main effect of incorrect connectives when compared to unmarked conditions ($\beta = -0.084$; $SE = 0.058$; $df = 1088$; $t = -0.600$; $p = 0.548$), there is an interaction effect in Incorrect Elaboration structures ($\beta = 0.184$; $SE = 0.082$; $df = 1088$; $t = 2.264$; $p = 0.024$), suggesting that Elaboration structures are sensitive to incorrect connectives but Lists are not.

Total Fixation

No effects were found in TF times.

3.4.3. Region 6

Region 6 consisted of the first 3 words after region 5; it begins with the 6th word after the keyword. Mean Reading times are presented in Figure 3.3.

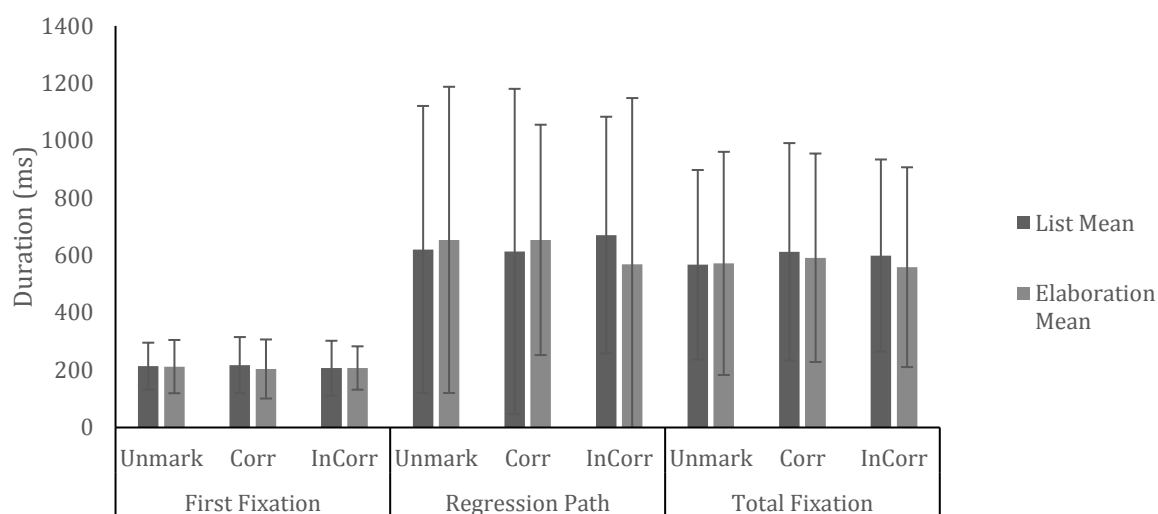


Figure 3.3. Mean reading times in milliseconds in region 6. Error bars represent standard deviation.

First Fixation

If Correct is used as the baseline of Connective, there is an effect of Structure. In such an analysis, Elaboration relations show a main effect in First Fixation durations ($\beta = -0.076$; $SE = 0.037$; $df = 1099$; $t = -2.052$; $p = 0.040$), with Elaboration conditions being read faster than List conditions.

Regression Path

No effects were found in RP times.

Total Fixation

No effects were found in TF times.

3.4.4. Summary

The clearest result here appears to be an effect of Structure, with Elaboration relations being read faster than Lists in Region 4 in both Regression Path and Total Fixation measures. This effect appears to have already faded by Region 5; although Region 6 First Fixation times also showed slightly faster reading times for Elaborations, this was not a strong effect and only emerged in certain analyses.

Connectives show a more varied picture. Region 4 Correct conditions produce slower First Fixations while Region 5 Correct conditions produce faster First Fixations. In Region 5, analyses show First Fixation reading times are faster in Incorrect conditions than in unmarked ones. The only interaction effect was found in Region 5 Regression Path durations; Elaboration structures show a slowdown in Incorrect conditions, while Lists do not.

4. Discussion

In this paper, two types of additive relation have been proposed: lists and elaborations. The proposal, based upon structures generated using RST (Mann & Thompson, 1988) was that lists were more complex and less continuous than elaborations, and so readers would show greater difficulty with lists under Murray's (1997) continuity hypothesis. Following previous research on the influence of connectives on CR processing, it was generally predicted that that correct connectives would have a facilitative or ineffectual impact on processing, and that incorrect connectives have an inhibitory effect. To build upon these general expectations, the following hypotheses were proposed and tested using an eye-tracking experiment to determine readers' processing ease when presented with list and elaboration items using correct, incorrect, or no connectives.

Hypothesis 1: *Lists pose readers greater difficulty than elaborations, as readers prefer continuous structures and lists are much more discontinuous than elaborations.*

Hypothesis 2: *The greater specificity of elaborative connectives over list connectives results in greater facilitation for elaborations than lists when correctly marked.*

Hypothesis 3: *The simplicity of elaborations limits the potential facilitation effect of connectives, resulting in greater facilitation for lists than elaborations when correctly marked.*

Hypothesis 4: *The greater specificity of elaborative connectives over list connectives results in greater inhibition for lists than elaborations when incorrectly marked.*

Hypothesis 5: *The greater complexity and ambiguity of list relations inhibits attempts to repair the structure, resulting in much greater inhibition in incorrect list conditions than incorrect elaboration.*

Given that H1 focusses uniquely on structure and is the most directly supported of these hypotheses, while H2-5 all make predictions about connective effect, the results of which are much less straightforward, the discussion will initially be split into a consideration of structure and connectives separately.

4.1. The Effect of Structure

Hypothesis 1 appears validated by the results; a reading time difference emerged at the keyword (region 4), with list relations showing significantly longer reading times than elaboration relations, an effect that weakly re-emerged in region 6. It isn't greatly surprising that this effect should be strongest at the keyword. While lists are more complicated than elaborations, they are still relatively simple relations as their 'complexity' comes primarily from their degree of underspecification and unusual structure rather than a complex or information-rich relation. As such, the effect here was not expected to be particularly large and it is unsurprising that most participants seem able to resolve any difficulties reasonably quickly, although the weak effect at region 6 does suggest that the impact of list's complexity may be great enough for some readers to still be experiencing a slowdown up to 9 words after the structure emerges.

However, a persuasive alternative explanation for the slower reading of lists could potentially be that elaborations are being interpreted as causal; most of the items in this study make a general point, and then give a specific example. Consider a segment of the elaborative version of item 3:

[1]His **upper** body exercises alone take over 2 hours a day. [2]He does 150 *push-ups* every day before bed.

It is possible that readers interpret this not as an additive relation but a causal: in such an interpretation, the reader interprets [1] as a claim and [2] as the justification for making it. In such an

interpretation this CR would be a speech act causal (Sweetser, 1990) or a consequence-cause relation (Sanders, Spooren & Noordman, 1992). If this is true then not only would the results be influenced by the increased continuity as predicted by Murray (1997) but also the causal preference effect (Sanders, 2005). This may be an unavoidable element of the proposed relations; they may in their nature look more like causals than lists, but it may also be that there is not a meaningful difference in additive structure, and instead additive processing is facilitated or inhibited by how similar the relations are to causals.

In general, these results do support the predicted effects of Hypothesis 1, but there is a risk that a degree of inferred causality is contributing to or responsible for the effects found, making it difficult to strongly conclude from these results alone that the list-elaboration distinction is valid on the basis of structure.

4.2. The Effect of Connectives

While the predicted effect of structure did manifest (although it may not in fact be due to structure), the results of connectives were largely unexpected: where effects were found, they were often in the opposite direction of what was predicted, and many effects that seemed inevitable did not emerge at all. This begins immediately; Region 4 FF times show slower reading times in correct conditions, which contradicts with previous research regarding the beneficial effect of correct marking on immediate processing (cf. Cozijn, 2000, Sanders & Noordman, 2000). However, once we reach Region 5 the results become even more complicated.

Both incorrect and correct connective conditions showed faster first fixations than the unmarked conditions in Region 5. While reduced reading times were expected for correct items they were certainly not for incorrect ones, yet here the effect seems greater and is more significant in the case of incorrect items. From a processing perspective, this is difficult to reconcile with previous research; most research found correct connectives to be facilitative or un-impactful and yet here obviously wrong connectives are behaving similarly to correct ones.

The main question to be addressed is whether the reduction in reading times means the same thing in both correct and incorrect conditions. The obvious approach when comparing to studies such as Sanders & Noordman (2000) is to suggest that the decrease in reading time is indicative of the facilitation of processing. This is perfectly sensible when participants are given a correct CR marker. However, this is obviously problematic when applied to incorrect relations like the examples below.

Incorrect List: [1]The shop's **coats** are known for being very expensive. [2]#For example, [3]their most popular *hat* costs €2000.

Incorrect Elaboration: [1]The shop's **clothes** are known for being very expensive. [2]?Furthermore, [3]their most popular *hat* costs €2000.

The use of 'for example' here renders the first example nonsensical. The idea that such an obviously incorrect connective could somehow facilitate processing is difficult to maintain. While the argument may be made that, being an effect in FF, this may simply be due to the immediate effect connectives have on reading (Cozijn, 2000; Sanders & Noordman, 2000), this would not explain why the effect is stronger in incorrect items as both correct and incorrect are sharing the same connectives, nor why the effect of incorrect items only manifests in Region 5, rather than Region 4, which is closer to the connective.

Here McNamara, Kintsch, Songer, & Kintsch, (1996) and their concept of active processing may bear fruit, alongside Millis, Graesser & Haberlandt (1993)'s findings that CRs inhibited comprehension. Let

us assume that the reading times here don't correlate to processing difficulty but instead to degree of active processing. In such a situation, the increased reading speed of both connective conditions occur because readers are engaging in less active processing in response to the connective: they are thinking less. In such an analysis the correct items correspond to the predictions of theories of both processing ease and active processing; the CR is made explicit, reducing the difficulty and therefore the amount of work required to produce a mental representation. In incorrect items however, the inherent lack of information available in additive CRs may combine with the obviously incorrect coherence marker to provoke the reader into abandoning active processing altogether. The major weakness of such a proposal is that here the effect is manifesting only in FF times, while we would most likely more expect to see active processing effects in RP or TF times; a decrease in FF times would suggest this effect is strong enough to prevent even first-stage processing, which is an extremely strong claim as it would indicate that textual coherence is being processed at a similar stage to lexical comprehension. While FF times are reduced in Region 5, the less immediate RP times show Elaborations being read more slowly in Incorrect conditions, but no such slowdown is present for List relations.

These effects all appear to directly contradict hypotheses H4 and H5, which generally predicted inhibition effects in incorrect conditions, yet we see a speed-up effect in First Fixations, and further predicted that lists would be more sensitive than elaborations, yet the only interaction effect found suggests elaborations are more sensitive. This does support the idea of participants abandoning active processing, because as in the examples, the incorrect list items are much more obviously incorrect than the elaboration items, and so participants may be less likely to abandon active processing in elaborations. By this argument, the comparative slowdown of elaboration items would in fact indicate less inhibition: the proposed total abandonment of active processing in lists supports the claim in H5 that lists are harder to repair, because participants abandon any attempt to do so.

The next question is why these effects would be limited to Region 5. If an item is so wrong it causes the reader to abandon hope of comprehension, why would this be limited only to 3 words? It is possible that the large standard deviations are concealing effects in other regions, but Region 5 would still contain the strongest effect. It may be that connective repair is a high-level process, and errors take some time to be identified, resulting in a slight delay of the effect of connectives, but this does not explain why the speed-up effect would be so short lived. More research is clearly required.

The absence of any substantive comprehension element to this study is most obvious here; the highly simple validation questions do not suffice to test whether incorrect elaborations were better understood than lists, which the abandonment of active processing would strongly predict. There is also decidedly little previous research to draw on here, especially as regards additives; Murray (1997) found that incorrect connectives led to slower reading speeds and worse comprehension, he was interchanging connectives between causal, additive and adversative (contrastive) relations; and Millis et al. (1993) found that both correct and incorrect connectives inhibited recall, but were dealing with temporal, causal, and intentional (arguably also causal) connectives. There is a substantive paucity of research into within-additive variation, and no apparent precedent for connectives providing such a degree of inhibitive effect that active processing should be abandoned.

Finally, the presence of only a very minor facilitative effect from correct connectives in Region 5 FF, an inhibitory effect in Region 4 FF, as well as the total lack of any interaction effects of correct connectives all contradict H2 and H3. H3 may be along the right lines, though not strong enough: it appears that the processing of not only elaborations but also lists are very limited in their facilitation from CR marking. This may be because, despite their potential structural complexity, they are still not so complex that readers particularly benefit from CR marking at a processing level. It is interesting regarding both the proposed differences in structural complexity as well as the obvious differences in

connective specificity that there is no apparent differences between lists and elaborations in the effect of correct marking. It raises the question of whether either benefits at a comprehension level, and the results of Kleijn et al. (2019) suggest they do not, with lists possibly showing greater inhibition. Unfortunately, these results fail to shed any light on the issue. It may mean that additive connectives are in fact a nuisance to readers, or perhaps such additive connectives need to be saved for exceptionally complicated scenarios. It may be that while causal markers for example make a complicated relation explicit, thereby decreasing overall complexity, additive markers take a simple, underspecified relation and make it more precise, thereby increasing complexity, processing difficulty, and potential for misunderstanding. In such an analysis, these connectives should only be used when the intended CR is very difficult to infer from an implicit presentation, which poses its own set of challenges as this threshold is liable to vary between readers of different skill levels.

4.3. Conclusion

The distinction between list and elaboration relations is arguably supported by the results of this study, although there is space for a persuasive causal-interference interpretation of the results. Nonetheless, lists are shown to be read more slowly than elaborations, supporting the claim that they are more difficult for readers, whether that is because of their structure or because they are so purely additive. The use of connectives produced some surprising results: elaborations appear more sensitive to connectives despite being structurally less complicated than lists, while incorrect connectives cause a general speed-up effect, which under many analyses would imply facilitation. We suggest that under an active processing analysis (cf. McNamara et al., 1996; Millis et al., 1993) the decrease in reading times may indicate an abandonment of processing, rather than a facilitation of it, and in such an analysis the general trend of effects found do indeed suggest that lists are more sensitive to incorrect connectives as proposed in H5. However, the apparent shortage of positive effects under such an analysis raises questions as to the value of additive connectives generally, and directly contradicts Hypotheses 2 and 3, and lack of evidence for H2 severely undermines H4.

While it is difficult to declare with confidence that these results strongly support any one proposal regarding the structure of additives, we propose in response to the connective effects that additives generally may be operationally different from other relation types. We suggest that connectives may increase rather than decrease the complexity of additive relations and therefore may only be facilitative in scenarios where the desired CR is difficult to infer without a connective. Further, we suggest that when incorrectly used, additive connectives risk participants abandoning the effort to properly integrate the relevant CRs into their mental representation. Given the lack of any such behaviour found in previous studies, it may be that this risk is particular to or most obvious in additive relations.

4.4. Further Research

This study provides a number of avenues for further research. Partly these are suggested by the results found here. Partly, they are suggested by the weaknesses and issues in the methodology and material design.

The experiment was held in Utrecht, Netherlands, using Dutch students, and so was run in Dutch. However, the experiment was developed in English, and items were then translated. This is not such a grand problem in as of itself; readers and participants often commented on the quality of the items. However, this reduced a number of controls built into the original items, for example in item 6 in the elaborative, unmarked condition:

The regional heavyweight champion is expected to retire after yesterday's fight. His age and injuries have apparently caught up to him, as his performance was very poor. His **offence** was

exceptionally poor. Many noted that his **strikes** rarely landed and made little impact. He has called for a press conference early next week where he is expected to make the announcement.

While in Dutch:

De regionale zwaargewicht kampioen zal naar verwachting met pensioen gaan na het gevecht van gisteren. Zijn leeftijd en blessures staan hem in de weg, zoals te zien was aan zijn slechte optreden. Zijn **aanval** verdediging was uitzonderlijk slecht. Velen hebben opgemerkt dat zijn **aanvallen** zelden goed aankwamen en weinig impact hadden. Hij heeft een persconferentie aangekondigd voor begin volgende week, waarop hij het nieuws naar verwachting bekend zal maken.

Here we can see that in the English variant, the key word **strikes** is paired with **offence**; the use of a slightly archaic term was intended to reduce priming. However, in the Dutch variant the item uses **aanvallen** and **aanval**, in which the priming will obviously be stronger. All the items are listed in the Appendix, but this item is probably the worst offender for priming. We can fairly accurately predict how any priming effect may have manifested; a localised, short term facilitation of word recognition (cf. Ratcliff et. al, 1985, Bentin et al., 1985). This means the effect should be limited primarily to Region 4 First Fixation durations, and in principle should only have sped up elaboration relations – an effect that was not found. As such it is reasonable to assume that priming did not materially impact the results found here, but it is nonetheless a point of weakness for the items of this study, and would ideally be improved upon in further research.

However, the most obvious consequence of the issues with the items used in this study is the extremely wide standard deviation seen in all RP and TF times. To some extent, large variance in reading times is to be expected, especially in measures such as Regression Path durations, as if the participant moves even slightly onwards from a given region the RP ends and later regressions will not be counted. However, this alone seems inadequate to explain the magnitude of the SD we see in RP and TF times. The variation in the location and content of the measured regions seems the most likely candidate; issues such as priming were mostly likely constrained to Region 4, as discussed, while regional variation was true across all items and measures, and so it is the most likely culprit for these very wide SDs. However, this is also probably the best of the potential issues to have interfered with the results, because it does not push the results towards any of the hypotheses. As such, while the magnitude of the SD does create substantial ‘noise’ in the experiment, it does not undermine the results found. Nonetheless, future research would certainly benefit from much greater regional control. This would both reduce the SD, potentially allowing more subtle effects to be detected, and would also ideally enable the measurement of regions directly after the connective, which would allow for some degree of disentanglement of the effects of these connectives and the effects of the CRs themselves.

A final issue with this study’s materials is that our items are not fully representative of additive relations. There is at least one type of additive that does not allow for any connectives, and so did not fit into our experimental methodology, and had to be excluded. This is the relation in an example like 10.

10: [1]There is a high-capacity ferry along the coast. [2]Luxury cabins are available for wealthier passengers.

This relation cannot be anything but additive; it is a simple increase of information. Under the admittedly loose definitions used in this paper, it is elaborative because [2] provides more information

specifically about [1]. However, this CR resists just about every connective other than ‘and’ or ‘also’. Unlike the elaborative conditions presented in this paper, it does not build upon a point or provide examples, it simply adds information to a specific topic. This is a fascinating anomaly, especially in a field so interested in how connectives improve readability, but for the same reasons this makes it difficult to test; connectives here are inherently going to be incorrect and so inhibit the reader, rather than assist them. As a result, we have excluded them from this experiment, but remain keen to see their behaviour tested in ways that directly compare them to more conventional, easily marked relations. This is especially true given the findings of this paper and those of Kleijn et al. (2019), which cast into doubt the benefit of coherence marking in additive relations. Also, example 10 looks very similar to an elaboration as used in this study, but does not have the potentially causal element, making it a strong contender for future research. The absence of these particular additive relations is not a particular problem of this study, per se, but rather an acknowledgement that even here we are not fully exploring additive CRs; the very fact that there are additive relations that we cannot fit into the study supports in general terms our position regarding their variation and complexity. Further research into the different types of additives may further enlighten us as to whether lists and elaborations are core types of additive, or if other types are also required to fully capture additive relations.

Beyond the gaps inherent to this study, the results do raise a number of questions to be addressed in future research. The biggest of these is comprehension. A good deal of the discussion around the results found here involves the concept of active processing, where reading durations are not indicative of processing ease as much as the degree of mental engagement from the reader. The best mechanisms to test this are comprehension mechanisms, such as recall and cloze testing, and so research into how well participants score in such experiments when presented with robust comprehension testing.

Finally, there is a very real risk that the distinction between lists and elaborations is not structural at all, but instead a distinction between purely additive relations, and pragmatic or speech act causals. This may pose a challenge to disentangle, but the advantage of the structural system proposed in this paper is that while it has been proposed specifically to solve a problem around the list/elaboration distinction, it can be applied very easily to other relation types. Ascher & Lascarides (1993) were drawn upon to provide a distributed additive element to list relations specifically because lists can occur with other CR types. It may be that lists are not an additive relation at all, but a particular structure common across all CR types where multiple relations hold to the same explicit and implicit topic. This bears investigation; research into list structures compared to more continuous structures in causal, contrastive or temporal relations may shed light on whether the issues proposed in this paper are indeed specific to additives, or whether they hold across all relations. If indeed it is found that ‘list’ style relations show similar effects in other CR categories, it would support a structural approach to CRs, even if additives are resistant to testing due to their similarity to other CR types.

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Appendix

Full list of experimental items and translations

Items are presented in both English and Dutch. In the both versions, the **elaboration/list** conditions are indicated by the two versions (divided by ‘/’ in the first segment. In the English items, **connectives** are then also divided by ‘/’. As the Dutch translations have more variance in connective location, where applicable they are also shown as in the English version, but when they resulted in variant sentence structures they have been divided across three lines to show the full connective structure. In such cases, the elaborative connective is first, followed by the list connective, followed by the unmarked structure. The *keyword* is in italics, and as laid out in section 3.2.1, the 3 measured regions start with the *keyword* and extend for 3 words each.

Experimental Items

1.

The working environment of Burton hospital is difficult, according to staff. One nurse, Paul, discussed his relation with his supervisor. He claims she **intimidates/mocks** him in front of patients. **Ø/For example/And further**, She once publicly *threatened* him for being two minutes late. Management has yet to comment or respond to allegations of low employee morale.

De werkomstandigheden in het Burton ziekenhuis zijn slecht, volgens het personeel. Een verpleegkundige, Paul, besprak zijn relatie met zijn leidinggevende. Hij beweert dat zij hem **intimideert/bespot** in de aanwezigheid van patiënten.

Zij heeft hem **bijvoorbeeld** eens openlijk

En verder heeft zij hem eens openlijk

Zij heeft hem eens openlijk

bedreigd omdat hij twee minuten te laat was. De directie moet nog reageren op aantijgingen over de slechte werkmoraal.

2.

Sarah’s grandparents are a point of particular pride to her. She explains that they are selfless and generous. “They are really making an effort to give their **time/money** to the local community”, she says. **Ø/ “For example/And also,** “They are always *volunteering*, from litter picking to school events.” She hopes that they will receive the recognition they deserve, though admits they would probably be embarrassed by it.

Sarah’s grootouders zijn voor haar een grote trots. Ze legt uit dat zij onbaatzuchtig en vrijgevig zijn. “Zij doen echt moeite door hun **tijd/geld** te geven aan de lokale gemeenschap”, zegt ze.

“Zij doen **bijvoorbeeld**

“**En ook** doen zij

“Zij doen

altijd *vrijwilligerswerk*, van nestplukken tot schoolevenementen.” Ze hoopt dat zij de erkenning krijgen die ze verdienen, hoewel ze toegeeft dat zij daardoor waarschijnlijk in verlegenheid worden gebracht.

3.

Paul used to be dangerously overweight, but his friends are now worried he has taken his fitness goals too far. His workout regime has become increasingly intensive in the last two years. His **lower/upper** body exercises alone take over 2 hours a day. \emptyset /**For example/In addition**, He does 150 *push-ups* every day before bed. While he is undoubtedly extremely fit, his friends are concerned his workout obsession risks damaging his health.

Paul had gevaarlijk veel overgewicht, maar zijn vrienden zijn nu bezorgd dat hij te ver gaat in zijn fitness doelen. Zijn trainingsregime is veel intensiever geworden in de laatste twee jaar. Zijn onderlichaam/bovenlichaam oefeningen alleen nemen al 2 uur per dag in beslag.

Bijvoorbeeld: Hij doet

En verder doet hij

Hij doet

elke dag 150 *push-ups* voordat hij naar bed gaat. Hoewel hij ongetwijfeld extreem fit is, zijn zijn vrienden bezorgd dat zijn training obsessie een groot risico is voor zijn gezondheid.

4.

People who take up rock climbing typically invest in a pair of specialist climbing shoes. These shoes are designed to help you keep your footing on the small holds and surfaces.

You may notice differences in the rubber's **placement/softness** compared to normal shoes, which helps climbing. \emptyset /**More specifically/Beyond that**, there is rubber *above* the toes to help steep climbs. Most walls require these shoes to be worn to climb, but will rent them out to climbers who don't have their own.

Mensen die aan rotsklimmen doen investeren doorgaans in een paar gespecialiseerde klmschoenen. Deze schoenen zijn ontworpen om extra houvast te bieden op kleine en smalle oppervlakken. Je kunt verschillen merken in **de plaatsing/de zachtheid** van het rubber vergeleken met normale schoenen, wat helpt bij het klimmen.

Preciezer: er is

Verder is er

Er is

rubber *boven* de tenen geplaatst om te helpen bij steile hellingen. Bij de meeste klimmuren zijn deze schoenen verplicht, maar wie ze niet heeft kan ze ter plekke huren.

5.

How we spend our spare time has a huge impact on our health. Recently we have seen a rise in uptake and awareness of healthy leisure activities. **Hobbies/Yoga** can be beneficial both physically and emotionally. \emptyset /**For instance/In addition**, it has recently been shown that *painting* relieves stress. Local councils are urged to support community hobby groups to maximise uptake of beneficial pastimes such as these.

De manier waarop we onze vrije tijd invullen heeft een grote impact op onze gezondheid. Sinds kort zien we een toename in het ondernemen van en bewustzijn van gezonde vrijetijdsbesteding. **Hobby's kunnen/Yoga kan** voordelig zijn, zowel fysiek als emotioneel.

Bijvoorbeeld: het is

Daarnaast is

Het is

onlangs bewezen dat *schilderen* stress vermindert. De gemeenteraden worden aangespoord om gemeenschappelijke hobbygroepen te steunen om zo nuttige bezigheden zoals deze te vergroten.

6.

The regional heavyweight champion is expected to retire after yesterday's fight. His age and injuries have apparently caught up to him, as his performance was very poor. His **offence/defence** was exceptionally poor. **Ø/For instance/And further**, many noted that his *strikes* rarely landed and made little impact. He has called for a press conference early next week where he is expected to make the announcement.

De regionale zwaargewicht kampioen zal naar verwachting met pensioen gaan na het gevecht van gisteren. Zijn leeftijd en blessures staan hem in de weg, zoals te zien was aan zijn slechte optreden. Zijn aanval verdediging was uitzonderlijk slecht.

Velen hebben **bijvoorbeeld**

En verder hebben velen

Velen hebben

opgemerkt dat zijn *aanvallen* zelden goed aankwamen en weinig impact hadden. Hij heeft een persconferentie aangekondigd voor begin volgende week, waarop hij het nieuws naar verwachting bekend zal maken.

7.

A spate of vandalisms have museum curators extremely concerned. The vandals have caused great damage to a number of cultural artefacts. They have been particularly targeting high-value **paintings/statues**. **Ø/Most notably/Beyond that**, They tore a priceless 16th century *watercolour* last week. Police have not yet commented on the attacks.

Een golf van vandalisme heeft museumcuratoren buitengewoon bezorgd gemaakt. De vandalen hebben grote schade aangericht bij een aantal culturele artefacten Zij hebben zich vooral gericht op schilderijen/beelden van hoge waarde.

Het meest **opvallend:** zij hebben

Daarbij hebben zij

Zij hebben

vorige week een onbetaalbaar 16e-eeuws *schilderij* verscheurd. De politie heeft tot nu toe nog niet op de aanvallen gereageerd.

8.

Young people are increasingly turning away from living in the capital. Blame this is placed on their inability to afford it on junior wages. Due to inflation and social factors, the cost of **rent/tax** is higher

than ever. \emptyset /**For example/In addition**, the typical cost of a small *flat* is well over half the average earnings for 18-25 year olds. Smaller towns with lower living costs are increasingly housing younger generations.

Jonge mensen gaan steeds vaker buiten de grote steden wonen. Het probleem is dat zij zich stadswoningen niet kunnen veroorloven met hun starterslonen. Door de inflatie en krapte op de woningmarkt zijn **huurprijzen/belastingen** hoger dan ooit. \emptyset /**Bijvoorbeeld/Bovendein**: De standaardprijs voor een kleine *flat* is meer dan de helft van het gemiddelde loon van een 18-15 jarige. Kleinere steden met lagere woonlasten huisvesten steeds meer jongere generaties.

9.

Authorities have been alarmed by a recent increase in racism on the high-street. There are a large number of reports of shop owners racially profiling their customers. There have been cases where businesses have refused **entry/services** to minority customers. \emptyset /**For example/In addition**, a music store owner recently refused to *sell* any instruments to black customers. The government has issued a reminder that refusing service on the basis of race is illegal.

Autoriteiten zijn gealarmeerd door een recente toename van racisme in de winkelstraten. Er zijn een groot aantal meldingen van winkeleigenaren die hun klanten racistisch profileren. Er zijn gevallen geweest waarbij bedrijven **diensten/toegang** weigerden te leveren aan klanten van minderheidsgroepen.

Bijvoorbeeld: een eigenaar van een muziekwinkel heeft

En verder heeft een eigenaar van een muziekwinkel

Een eigenaar van een muziekwinkel heeft

onlangs geweigerd om instrumenten te *verkopen* aan zwarte klanten. De regering heeft nog benadrukt dat het weigeren van diensten op basis van ras illegaal is.

10.

Paul always plays the lottery. If he wins, he plans to buy a small seaworthy boat. He will sail it to all his favourite **islands/continents**. \emptyset /**For example/In addition**, He will certainly take it to *Fiji*, having not been for years. He has been playing for 10 years so far, and does not plan to stop.

Paul speelt altijd mee in de loterij. Als hij wint is hij van plan een kleine zeewaardige boot te kopen. Hij zal ermee naar al zijn favoriete **eilanden/continenten** varen.

Hij zal **bijvoorbeeld** zeker

En verder zal hij zeker

Hij zal zeker

naar *Fiji* varen, waar hij al jaren niet is geweest. Hij speelt al 10 jaar lang mee en is niet van plan om te stoppen.

11.

The tests of the new military cargo airships were a success. Despite adverse conditions, the aircraft completed the full test run. This is despite exceptionally strong **weather/winds** posing a serious

challenge. **Ø/For example/In addition**, The zeppelin was struck by *lightning* multiple times. The design has been highly praised for its ruggedness.

De tests met de nieuwe militaire vrachtluchtvaartuig waren een succes. Hoewel de omstandigheden ongunstig waren, heeft het vliegtuig de volledige testvlucht voltooid. Uitzonderlijk **zwaar weer/zware wind** zorde voor een serieuze uitdaging.

De zeppelin werd **bijvoorbeeld**

En verder werd de zeppelin

De zeppelin werd

meerdere keren door *bliksem* geraakt. Het ontwerp is enorm geprezen om zijn stevigheid.

12.

A new headteacher has been assigned to a local school near Derby. The school has been suffering in league tables recently. Student **exam/attendance** metrics show a worryingly downward trend. **Ø/For example/In addition**, the number of students *passing* core subjects is at a 10-year low. It is hoped the change of management can begin to correct this.

Een plaatselijke school in de buurt van Derby krijgt een nieuw schoolhoofd. De school deed het de afgelopen tijd slecht in de ranglijsten. De **examcijfers/aanwezigheidscijfers** van studenten laten een verontrustende dalende trend zien. **Ø/Bijvoorbeeld:/Bovendein:** Het aantal studenten dat de kernvakken *haalt* is op het laagste sinds 10 jaar. Het is te hopen dat de verandering in het management dit zal gaan verbeteren.

13.

Cows escaped from Willowbrook farm last tuesday. The ensuing bovine rampage is estimated to have caused €300,000 in damage. They have caused substantial harm to the local **townspeople/flowerbeds**. **Ø/For example/In addition**, the herd knocked a *cyclist* off his bike. The cows are believed to have escaped due to a passing driver opening a gate for unknown reasons.

Afgelopen dinsdag zijn er koeien ontsnapt van de Willebroek boerderij. De daarop volgende runderramp heeft naar schatting voor €300,000 schade gezorgd. Ze hebben aanzienlijke schade aangericht aan de lokale **dorpsbewoners/bloembedden**.

De kudde beukte **bijvoorbeeld**

En verder sloeg de kudde

De kudde sloeg

een *fietser* van zijn fiets. Men gelooft dat de koeien zijn ontsnapt door een passerende bestuurder die om onbekende redenen een hek heeft geopend.

14.

The designer label first rose to fame three years ago. It rapidly found an audience with pop stars. Their **clothes/coats** are known for being very expensive. \emptyset /**For example/Furthermore**, Their most popular *hat* costs €2000. The owners have ruled out any expansion into more affordable clothing.

Het designerlabel is drie jaar geleden voor het eerst bekend geworden. Het vond al snel een publiek van popsterren. Hun **kleding/jassen** staan er om bekend dat ze erg duur zijn. \emptyset /**Bijvoorbeeld:/Bovendien**: Hun populairste *hoed* kost €2000. De eigenaars hebben uitbreiding naar meer betaalbare kleding uitgesloten .

15.

Extreme sports are known for having an element of risk, but some other pastimes are just as risky. Dancing has recently been reported as the most dangerous indoor activity. **Latin/Ballroom** dances are particularly dangerous. \emptyset /**For example/In addition**, 12 were injured dancing the *Tango* just last month. Dancing instructors have seized this opportunity to highlight the importance of taking classes.

Extreme sporten staan bekend als risicovol, maar sommige andere bezigheden blijken net zo riskant. Dansen is onlangs bestempeld tot de meest gevaarlijke binnen-activiteit. **Latin/Ballroom** dansen zijn in het bijzonder erg gevaarlijk.

12 mensen raakten afgelopen maand **bijvoorbeeld**

En verder raakten 12 mensen afgelopen maand

12 mensen raakten afgelopen maand

gewond tijdens het dansen van de *Tango*. Dansinstructeurs hebben van de gelegenheid gebruik gemaakt om te benadrukken dat het belangrijk is om lessen te volgen.

16.

There has been a sizable upswing in use of eco-friendly power in the last decade. Many of these systems can be fitted to normal housing. **Renewable/wind** generators can provide a lot of power for reasonably affordable upfront costs. \emptyset /**For example/In addition**, the installation of roof mounted *solar-panels* can easily power a house. Some do say however that the best rates are in the past, so new uptake may be a worse deal.

Er is een aanzienlijke opleving van het gebruik van milieuvriendelijke energie in het laatste decennium. Veel van deze systemen kunnen worden aangesloten op normale huizen. **Natuurlijke bronnen/windbronnen** kunnen een grote hoeveelheid stroom opleveren tegen redelijk betaalbare kosten. \emptyset /**Bijvoorbeeld:/Bovendien**: De installatie van *zonnepanelen* op het dak kan gemakkelijk een huis van stroom voorzien. Sommigen zeggen echter dat de beste tarieven verleden tijd zijn, dus nieuwe investeringen kunnen een slechte deal zijn.

17.

While foxes are not considered endangered, zoologists are concerned they may be under threat. Urbanisation means many foxes are now living in cities. The urban **environment/diet** tends to pose many health risks. \emptyset /**For example/In addition**, The threat posed by *traffic* kills many foxes a year. Experts recommend the establishment of green spaces where foxes and other animals can live healthier lives.

Hoewel vossen niet worden beschouwd als een bedreigde diersoort, zijn zoölogen bezorgd dat ze misschien in gevaar zijn. Door de verstedelijking leven veel vossen nu in steden. De stedelijke **omgeving**/Het stedelijke **dieet** kan gezondheidsrisico's met zich meebrengen. **Ø/Bijvoorbeeld:/Bovendien:** De dreiging van het *verkeer* zorgt jaarlijks voor de dood van veel vossen. Experts raden aan om groene gebieden te creëren waar de vossen en andere dieren gezonder kunnen leven.

18.

Making and flying kites is a centuries-old tradition in England. It is a classic parent-child bonding hobby. It can also be a beautiful way to pass the time; some **landscapes/hills** make for very dramatic flying. **Ø/For example/in addition,** in England, the coastal *cliffs* are renowned kite flying locations. However, others prefer to fly in the quiet of their local park.

Het maken en vliegen van vliegers is een eeuwenoude traditie in Engeland. Het is een typische activiteit die ouders en kinderen met elkaar verbindt. Het kan ook een mooie manier zijn om de tijd te doden; sommige **landschappen/heuvels** zorgen voor zeer dramatische vluchten. **Ø/Bijvoorbeeld:/Bovendien:** De *kliffen* aan de kust van Engeland staan bekend om hun vliegerlocaties. Echter, sommigen vliegeren liever in de stilte van een plaatselijk park.

19.

In the 18th century, the upper classes had a lot of free time. This was because they often made their money from land ownership, rather than work. To pass the time, they were very keen on showing off exotic **food/dances**. **Ø/For example/In addition,** It was very popular to import tropical *fruits* to show off wealth and taste. Often the long distance required to move these goods meant they had gone off, but were served anyway.

In de 18e eeuw hadden de hogere klassen veel vrije tijd. Dit kwam doordat zij vaak hun geld verdienden met hun grondbezit in plaats door te werken. Om de tijd te doden, pronkten ze graag met exotische **gerechten/dansen**.

Het was **bijvoorbeeld**

En verder was het

Het was

erg populair om tropisch *fruit* te importeren om zo rijkdom en smaak te tonen. Vaak zorgde de lange afstand waarover de goederen vervoert moesten worden ervoor dat ze niet meer goed waren, maar toch werden ze geserveerd.

20.

For most of my life I have had a terrible diet. Recently, I've decided to start eating more healthily. I have been trying to eat more **fruit/nuts**. **Ø/For example/furthermore** I started eating *bananas* for breakfast. Now I just need to cut down the pizzas.

Het grootste deel van mijn leven heb ik erg ongezond gegeten. Recentelijk heb ik besloten om gezonder te gaan eten. Ik probeer om meer **fruit/noten** te eten. **Ø/Bijvoorbeeld:/Bovendien:** Ik eet *bananen* als ontbijt. Nu hoef ik alleen nog maar de pizza's te minderen.

21.

Brexit has resulted in notable changes in the shopping habits of Britons already. Many are now buying much more long-life food in case of no-deal shortages. While some sneer at it for not being ‘fresh’, tinned **food/fish** is an exceptionally useful cupboard staple, usable in many recipes. \emptyset /**For example/Furthermore**, you can use tinned *beans* to add protein to just about any meal. The government has not issued any recommendations to stock up, but many are doing so anyway, just in case.

De Brexit heeft gezorgd voor zichtbare veranderingen in de winkelgewoonten van de Britten. Veel mensen kopen nu meer houdbaar voedsel voor het geval er tekorten ontstaan wanneer de deal niet doorgaat. Terwijl sommigen spotten dat dit niet vers is, is **ingeblikt voedsel/ingeblikte vis** uitzonderlijk handig om op te stapelen in een kast en bruikbaar voor veel recepten. \emptyset /**Bijvoorbeeld/Bovendien**: Je kunt ingeblikte *bonen* gebruiken om proteïne aan je maaltijd toe te voegen. De regering heeft niet aanbevolen om in te slaan, maar velen doen dit toch, voor de zekerheid.

22.

Joining an army as a peasant in the middle ages was a bad job. Life as a soldier was not only dangerous, it could be very expensive. In medieval war, soldiers had to bring their own equipment, they were not provided with any. Most people did not own **weapons/swords** as they were hard to come by. \emptyset /**For example/Additionally**, Despite being reasonably cheap, *spears* were not common. Many had to march to war with farming tools instead.

Als Middeleeuwse boer kon je beter niet in het leger gaan. Het leven van een soldaat was niet alleen gevaarlijk, het kon ook erg duur zijn. Tijdens de middeleeuwse oorlog moesten soldaten voor hun eigen uitrusting zorgen, ze kregen niets. De meeste mensen bezaten **geenwapens/zwaarden** omdat deze moeilijk te krijgen waren. \emptyset /**Bijvoorbeeld:/Bovendien**: *Speren* waren redelijk goedkoop, maar ze waren niet gebruikelijk. Velen moesten daarom oorlog voeren met landbouwwerktuigen.

23.

After your dental check-up, please feel free to visit our shop. Your dentist may recommend some of our products. We offer a full range of **toothcare/toothpaste** options. \emptyset /**For example/Furthermore**, Our electric *brushes* are used by dentists worldwide. All of this is provided at affordable rates with satisfaction guaranteed.

Aarzel niet om na uw tandartscontrole onze winkel te bezoeken. Uw tandarts heeft wellicht sommige van onze producten aanbevolen. Wij bieden een volledig assortiment aan **tandverzorging/tandpasta's**. \emptyset /**Bijvoorbeeld:/Bovendien**: Onze elektrische *tandenborstels* worden wereldwijd door tandartsen gebruikt. Dit alles wordt tegen betaalbare prijzen en met gegarandeerde tevredenheid aangeboden.

24.

At the top of the hill near the campus, you may be able to see a small building. This building houses the astronomy department's telescope. The telescope is typically used to identify or inspect **objects/planets** in nearby space. \emptyset /**For example/In addition**, It has been \emptyset used to identify multiple *asteroids* as they have passed through the solar system. It can be used by staff and students, but individual usage is on a booked basis.

Op de top van de heuvel bij de campus zie je een klein gebouw. In dit gebouw staat de telescoop van de astronomie-afdeling. De telescoop wordt meestal gebruikt om **voorwerpen/planeten** in de nabije ruimte te identificeren of te inspecteren.

Hij wordt **bijvoorbeeld** zijn gegaan.

En verder wordt hij

Hij wordt

gebruikt om meerdere *astroïden* te identificeren die door het zonnestelsel zijn gegaan. Hij kan gebruikt worden door personeel en studenten, maar individueel gebruik kan alleen wanneer hij van tevoren wordt geboekt.

25.

I can't wait for summer to come. Early spring is the worst time of year, if you ask me. The **weather/wind** has been awful lately. **Ø/For example/On top of that**, while walking the dog I got *rained* on out of nowhere! The problem is, it's totally unpredictable; It was sunny when I left.

Ik kan niet wachten tot de zomer komt. De vroege lente is de slechtste tijd van het jaar, als je het mij vraagt. Het **weer/de wind** is de laatste tijd verschrikkelijk geweest. **Ø/Bijvoorbeeld:/Bovendien:** Ik *regende* doornat toen ik de hond aan het uitlaten was. Het probleem is dat het totaal onvoorspelbaar is; het was zonnig toen ik vertrok.

26.

As the country's biggest provider of reclaimed wood, we are experts on furniture that's good for the environment. We produce a full range of products in many materials and styles. We are very proud of the handmade, eco-friendly **furniture/tables** offered at the store. **Ø/For example/In addition**, A local artisan hand-crafts our *chairs* from driftwood. This month, we're offering 30% off all marked prices!

Als de grootste leverancier van hergebruikt hout in het land zijn wij experts op het gebied van milieuvriendelijke meubelen. Wij produceren een volledig assortiment van producten in vele materialen en stijlen. We zijn erg trots op de handgemaakte, milieuvriendelijke **meubelen/tafels** die in de winkel worden aangeboden.

E lokale ambachtsman maakt **bijvoorbeeld**

En verder maakt een lokale ambachtsman

Een lokale ambachtsman maakt

handgemaakte *stoelen* van drijfhout. Deze maand bieden we 30% korting op alle aangegeven prijzen!

27.

While I like all the seasons, spring is probably my favourite. The weather isn't always great, but I love the wildlife. During spring, I always enjoy the singing of **birds/thrushes**. **Ø/For example/Beyond that**, I find the song of *nightingales* is very distinctive and pleasing. I couldn't stand not living in the countryside; how would I hear the birdsong?

Hoewel ik alle seizoenen leuk vind, is de lente waarschijnlijk mijn favoriet. Het weer is niet altijd geweldig, maar ik houd van de natuur. In de lente geniet ik altijd van de zingende **Vogels/lijsters**.

Ik vind **bijvoorbeeld**

Buiten dat vind ik

Ik vind

het lied van *nachtegalen* erg onderscheidend en aangenaam. Ik zou er niet tegen kunnen om niet op het platteland te wonen; hoe zou ik het gezang van de vogels horen?

28.

The forest used to stretch right across the nation. Obviously, it has shrunk due to human expansion, but it still stretches for more than 100km. The forest is best known for its very large **deciduous/oak** trees. \emptyset /**For example/In addition**, It has the tallest *beech* in the country. The forestry commission is currently building a new set of bike trails for families.

Het bos strekte zich vroeger uit over het hele land. Het is duidelijk gekrompen door de uitbreiding van de mensheid, maar het strekt zich nog steeds uit over meer dan 100 km. Het bos staat vooral bekend om zijn zeer grote **loofbomen/eikenbomen**.

In dit bos vind je **bijvoorbeeld**

En verder vind je in dit bos

In het bos vind je

de grootste *beuk* van het hele land. De bosbouwcommissie bouwt momenteel een aantal nieuwe fietspaden voor gezinnen.

29.

We bought a new dog recently. My wife wanted to buy a pedigree, so we went to a local family she knows. The family have been breeding **dogs/retrievers** for many years and are renowned in competitions. \emptyset /**For example/And also**, I have been told that their *collies* have won the national dog show twice. I'm not entirely sure why we need a prize dog for walks in the park, though.

We hebben pas geleden een nieuwe hond gekocht. Mijn vrouw wilde een hond met een stamboom kopen, dus gingen we naar een lokale familie die ze kent. De familie fokt al vele jaren **Honden/retrievers** en zijn beroemd in competities. \emptyset /**Bijvoorbeeld:/Bovendien**: Hun *collies* hebben twee keer de nationale hondenshow hebben gewonnen. Ik weet alleen niet precies waarom we een prijzenhond nodig hebben voor wandelingen in het park.

30.

I find my music tastes are different depending on who I'm with. I really like listening to techno with others. However, If I'm just listening by myself, I'm really into any sort of **music/rock**. \emptyset /**In particular/Beyond that**, I've always had a weakness for listening to *pop* while out shopping. I'm not sure why listening on my own makes a difference, though.

Ik merk dat mijn muzieksmaak afhangt van met wie ik ben. Ik luister graag techno wanneer ik met anderen ben. Wanneer ik alleen ben luister ik graag naar elke vorm **muziek/rock**.

In het **bijzonder** heb ik

Bovendien heb ik

Ik heb

altijd een zwak voor *popmuziek* gehad tijdens het winkelen. Ik weet niet waarom het verschilt wanneer ik alleen luister.

Filler Items

1.

“The pacific region consists of 15 states. They have a combined area of 528 square kilometers. Their Exclusive Economic Zone is huge, stretched for 28 million square kilometers. Their key challenges include the low-lying nature of some of the islands. This makes them highly vulnerable to climate change.”

Het Pacific gebied bestaat uit 15 staten. Samen hebben zij een oppervlakte van 528 vierkante kilometer. Hun exclusieve economische zone is enorm, bij elkaar 28 miljoen vierkante kilometer. De belangrijkste uitdaging voor het gebied is de laaggelegen natuur op sommige eilanden. Dit maakt het erg kwetsbaar voor klimaatverandering.

2.

“Steven is running a marathon on Sunday. He has been training for six months, going to 3 runs a week. It’s actually been really annoying; he has been waking me up every day. He clatters around first thing in the morning getting ready. He then is smug for the rest of the day that he’s already run 10km before I got up.

Steven loopt op zondag een marathon. Hij traint als zes maanden en gaat 3 keer per week rennen. Het is eigenlijk best vervelend; hij maakt mij elke dag wakker. Hij maakt veel lawaai wanneer hij zich ‘s ochtend klaarmaakt. De rest van de dag is hij zelfvoldaan omdat hij al 10 km heeft gerend voordat ik ben opgestaan.

3.

I’ve started to hand-bind small books. I like to use real leather to make the covers; sometimes hard, sometimes soft covers. I find it very soothing. I’m hoping I can start selling them soon. I’ve sold a couple to friends, but I’m not confident enough to ask for much more than the material costs.

Ik ben begonnen met het met de hand binden van kleine boeken. Ik gebruik het liefst echt leer om de kaften te maken; soms hard en soms zachte kaften. Ik vind dit erg rustgevend. Ik hoop dat ik binnenkort kan beginnen met de verkoop. Ik heb er een paar verkocht aan vrienden, maar ik durf niet meer te vragen dan de kosten van het materiaal.

4.

Instant noodles are a renowned staple of students who are short on money. Generally they have had difficulty shaking this impression; of cheap, unhealthy food. However, the recent drive towards easy-to-make but quality foods has lead to a surge in ‘premium’ instant noodles. Several brands have emerged at the same time in response to this trend. Time will tell if it proves to be a profitable field.

Kant-en-klaar noodles worden vaak gegeten door studenten met weinig geld. De noodles hebben ze moeite om dit imago van zich af te schudden; van goedkoop, ongezond eten. Maar de recente drang

om makkelijk maar ook eten van kwaliteit te eten hebben geleid tot ‘premium’ kant-en-klaar noodles. Verschillende merken hebben ingespeeld op deze trend. De tijd zal het leren of het een winstgevend idee zal zijn.

5.

When minimum wages are increased, many businesses do not raise the wages of those workers who are above minimum wages. This can lead to an effective decrease in real income for many workers. Shops often raise their prices in response to a minimum wage increase, and so those workers who did not see their wages increase can find their costs rising without any change to their income.

Wanneer minimumlonen worden verhoogd, verhogen veel bedrijven niet de lonen van werknemers die net boven het minimumloon verdienen niet. Dit kan leiden tot een effectieve daling van het inkomen van veel werknemers. Winkels verhogen vaak hun prijzen naar aanleiding van een verhoging van het minimumloon, en zo hebben de werknemers die geen loonsverhoging hebben gekregen stijgende kosten zonder dat hun loon in verandert.

6.

“Many are turning away from the traditional television to more internet-based alternatives. Computers and games consoles have begun to offer streaming services, threatening to replace standard programming. Many TVs even now come with the option to link to the internet and stream these services without a console or digital box. Traditional programming may need to change its approach to survive.

Veel mensen kijken minder traditionele televisie en meer naar alternatieven op het internet. Computers en gameconsoles zijn begonnen met het aanbieden van streaming services die dreigen de standaard televisie te vervangen. Veel tv's hebben nu zelfs opties om verbinding te maken met het internet en om services te streamen zonder een console of digitale box. Traditionele programma's moeten wellicht hun aanpak aanpassen om t blijven bestaan.

7.

In a world of ever increasing globalisation, the entertainment of foreign cultures is often reaching whole new audiences. Often, these are translated, but there is a strong following for subtitled works. Localisation can pose a problem, however, with translators facing the issue of whether to leave obscure cultural references, explain them, or translate them to a similar cultural reference for the target audience.

In een wereld van toenemende globalisering bereiken buitenlandse televisieseries vaak een geheel nieuw publiek. Vaak worden deze vertaald, maar vaker wordt het werk ondertiteld. Lokalisatie kan een probleem vormen, waarbij vertalers voor het dilemma komen te staan of zij culturele referenties moeten weglaten, uitleggen of dat zij deze vertalen naar een vergelijkbare culturele referentie voor de doelgroep.

8.

I hardly think it's fair that I'm being blamed for this. I wasn't the only one to do it. I wasn't even the first! They've just picked on me because they know I can't fight back and they can't afford to punish everyone. It's ridiculous, but there's nothing I can do.

Ik denk niet dat het eerlijk is dat ik hier de schuld van krijg. Ik was niet de enige die het deed. Ik was niet eens de eerste! Ze hebben gewoon mij gekozen omdat ik niet kan terugvechten en ik het mij niet kan veroorloven om iemand te straffen. Het is belachelijk, maar er is niets dat ik kan doen.

9.

The downside to phones becoming waterproof is that the old plugs and ports that we used for headphones and things have to get sealed off. Now you can only use bluetooth headphones. I admit, sometimes you can charge it through the headphone port, but then the port tends to break. What was wrong with the old bricks? I only need to text and listen to music, I don't need a tablet computer.

Het nadeel van telefoons die waterdicht zijn is dat de oude stekkers en poorten voor koptelefoons afgesloten moeten worden. Nu kun je alleen een bluetooth hoofdtelefoon gebruiken. Ik geef toe dat je hem kunt opladen via de koptelefoonpoort, maar dan gaat de de poort vaak snel kapot. Wat was er mis met de oude elementen? Ik hoef alleen maar te kunnen sms'en en muziek te luisteren, ik heb geen tablet computer nodig.

10.

It is important not to leave all your work until the last minute. Once you have less deadlines, it can be tempting to think you have lots of time. This is dangerous because your tasks may take longer than you anticipate. If you start late, you may quickly find you don't have enough time to do them well. This is especially true if you run into problems you didn't expect.

Het is belangrijk om niet al je werk tot het laatste moment te laten liggen. Wanneer je weinig deadlines hebt, kan het verleidelijk zijn om te denken dat je veel tijd hebt. Dit is gevaarlijk omdat je je taken misschien langer duren dan je verwacht. Als je laat begint, kom je er misschien al snel achter dat je niet genoeg tijd hebt om ze goed te doen. Dit geldt vooral als je problemen tegenkomt die je niet had verwacht.

11.

Steven is strangely fond of his old bag. He's had it for years, and it is very worn. However, it has never broken. For example, it is very well made. He won't be able to replace it if it does break, because they stopped making them years ago.

Steven is erg gehecht aan zijn oude tas. Hij heeft hem al jaren en de tas is erg versleten. Hij is nooit kapot gegaan. Bijvoorbeeld, hij is erg stevig. Steven is niet in staat de tas te vervangen als die kapot gaat, want ze worden niet meer gemaakt.

12.

Walking in the local woodland is often described as highly soothing. There is a river hidden quite far in that makes an excellent place to relax. Additionally, the sound of the water is very restful. It's a bit selfish, but the villagers hope that the woodland is never discovered by the residents of the nearby city.

Lopen in het lokale bos wordt vaak beschreven als erg rustgevend. Er is een verborgen rivier, een prettige plek om te relaxen. Daarbij, het geluid van erg kalmerend. Het is een beetje egoïstisch, maar de dorpelingen hopen dat het bos nooit ontdekt wordt door de inwoners van de stad.

13.

Dylan really likes to play music. Unfortunately, nobody likes to listen to him play music. For example, he is terrible at it. This has not stopped him talking at length to anyone who will listen about how many requests he gets. Apparently, he often plays at campfires and other campers want him to play for them.

Dylan vindt het erg leuk muziek te maken. Jammer genoeg vindt niemand het leuk om naar hem te luisteren. Bijvoorbeeld, hij is niet erg goed. Dit houdt hem niet tegen om tegen iedereen die luistert te vertellen hoeveel verzoekjes hij krijgt. Blijkbaar speelt hij vaak bij kampvuren en horen omstanders hem graag spelen.

14.

Our product range is broadening out to target lower-income customers. We have identified that there is a gap in the market here. Additionally, the only existing competition is highly priced, so there is no budget offering. We expect our functional and affordable product offering to do very well in the target areas. Our shareholders are pleased with the initiative.

We breiden onze productlijnen uit om klanten met lagere inkomens aan te spreken. We hebben een gat in de markt ontdekt bij deze klanten. Daarbij, de enige bestaande concurrentie heeft een hoge prijs, dus er is geen goedkoop alternatief. We verwachten dat het aanbieden van ons functionele en betaalbare product het goed doet bij deze doelgroep. Onze aandeelhouders zijn erg tevreden met ons initiatief.

15.

Diet is very important to general health. A common phrase among fitness instructors is that “you can’t outrun a bad diet”. For example, the health impacts remain even if you try and run off the calories. While treating yourself is perfectly acceptable, it is important to consume sugar in moderation. Of course, those who exercise a lot will need to eat more.

Een dieet is erg belangrijk voor de algemene gezondheid. Wat veel fitness instructeurs zeggen is dat je niet tegen een slecht dieet op kan sporten. Bijvoorbeeld, de invloed op de gezondheid blijft, zelfs als je probeert de calorieën er af te rennen. Hoewel jezelf verwennen natuurlijk mag, het blijft belangrijk om suiker in gematigde porties te eten. Toegegeven, als je wel sport, moet een meer eten.

