The Convergence between Visual Syntactic Text Formatting and Human Cognition Perceptual Preferences

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Abstract

Reading is a very complex and challenging process for learners that demands the orchestration of a number of cognitive processes for it to be accomplished successfully. Based on that, researchers made several attempts to decrease the complexity of the reading process. The attempts fall into three types, reader-directed where the focus is on the reader and finding ways to develop his/her cognitive abilities, text-directed where a change is made to the text format to make the reading process less difficult and less complex, and teacher-directed where the effort is made to increase the awareness of teachers of how to present the reading material. In this study, the aim is to tackle the text-directed attempts, specifically, Visual Syntactic Text Formatting suggested by Walker et al. (2005) adopting a cognitive approach. The study is set to account for the benefits of such a format for learners by answering the question Why does VSTF text improve learners' abilities in reading? To find an answer to this question, the study investigates the possible convergence between the features of the under-focus text format (VSTF) and the perceptual preferences of the human cognition. The study has found a good amount of compatibility between the two which can assist in justifying the need for making text-directed alterations for improving reading abilities.

Keywords: *Reading, VSTF, learners, perceptual preferences, human cognition, text format.*

1. Introduction

This study concentrates on the human perceptual system and the points of convergence between the human cognition perceptual preferences, which is responsible for interpreting the upcoming visual signals of the reading text, and the features of the adopted text design. This study tackles, specifically, the text design suggested by Walker et al. (2005), the Visual Syntactic Text Formatting (VSTF). The previous studies tackling this text design have focused on its benefits for readers and on the way it affects the human processing system. But no study tackles its effects on the perceptual system which is a gateway through which information passes first before being received by the processing system. Therefore, this section is set to go through the perceptual underpinnings of this text format and the possible compatibility between it and the preferences of human cognition. To fulfill this aim, the study is set to find an answer to the question Why does VSTF text improve learners' abilities in reading? Accordingly, the pursuit of this study is to unveil the reasons that justify the need for the departure from the traditional text formatting towards transformed text formats such as VSTF.

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2. Visual Perception

Perception represents an operation responsible for analysing any stimulus whether visual or auditory. It is related, specifically, to bottom-up processes where the recipient of a language decodes the information found in a reading text or in an auditory signal. Based on that, there are two types of perception, visual perception, such as in reading, and auditory perception, such as in listening (Field, 2004, p. 204).

The most prominent work tackling visual perception is Gestalt Theory. Since the time of its inception, Gestalt theory inspired significant contributions to the study of perception, learning, and social psychology, contributions that have a far-reaching influence. This theory has a great influence on visual perception getting a foothold in the perceptual studies.

A major goal of Gestalt theory is to specify the brain processes that can account for the perceptual organisation rejecting the earlier assumptions that it is the result of learned relationships or associations (Britanica, 2020). The theory also suggests that perceptual orgnisation reflects innate properties of the human brain, and that studying perception means studying the brain (ibid). The word Gestalt is a German word meaning "form", "shape", pattern", or "configuration" (Collins Dictionary). Evans (2007) states that a gestalt is "an organised whole or unit" (p:90).

Gestalt theory sprung from psychology in the early years of the 20th century by Austrian and German scholars who were interested in the human mind, specifically in 1912, when Wertheimer published a paper on a visual illusion called "Apparent Motion". Apparent motion is "the perception of movement that results from viewing a rapid sequence of stationary images", as in the movie, or objects, as when someone is in a train, for example, and the train passes by a number of lamp lights, the human mind would perceive them as being one light flashing right and left (Rock and Palmer, 1990, p.86). Other scholars followed the footsteps of Wertheimer such as Kohler and Koffka, whose contributions to the Gestalt legacy would be introduced in the following section related to the principles of Gestalt theory.

Rock and Palmer (1990, p.84) state that many of the concepts first suggested by Wertheimer in 1912 were later adopted by researchers and incorporated into the understanding of thought, perception, and learning. For example, the gestalt principles were used to increase the understanding of the perception of visual characters in reading (Carter,1969; Chiarenza et al.,1993), to increase the understanding of cognitive perception (Todorovic, 2008), and to understand the learning process of language (Celikoz et al., 2019).

3. Principles of Human Perception

Gestalt psychologists' main thrust is to set laws or principles that have the potential to describe the complex process of human perception. The principles are based on the human natural tendency to seek order in disorder, a process that takes place in the brain where those principles are employed making an individual perceive uniform forms instead of mere collections of unrelated images. Gestalt principles (or Gestalt laws) can be defined as "rules for the organisation of perceptual scenes" (Todorovic, 2008, p.1).

Human cognition perceives complex images as composed of groups of objects against a background, and those objects are also composed of parts, which, in turn, may be composed of even smaller parts. The question that calls for an answer here is how the perceptual system manages to accomplish visual perception knowing that the visual stimuli are merely a spatial distribution of differently coloured individual points. Another question is how images on the retina are organised into the objects of perceptual experience (Palmer, 2002, p.101).

The answer is represented by a number of principles intended to account for the perceptual process set forth by Gestalt psychologists who sought to understand those principles in physiological terms. Gestalists were not only the first to answer those questions, but also they were the very first to unearth such queries.

3.1 The Grouping Laws

Wertheimer presented the laws of grouping in 1912. Wertheimer's idea of how individual objects are perceived as belonging together is based on the conception that the visual system organises the parts into wholes based on laws of grouping (Rock and Palmer,1990, p.84).

 Based on that, the integration of individual components into a larger inclusive one can be accounted for by a number of principles, one of them is the proximity principle. According to this principle, elements are grouped perceptually as a whole, constituting one and the same object, if they are close enough to each other, (Todorovic, 2008, p.2). The second principle of the grouping laws is the similarity principle where objects are perceived as belonging to the same group based on an affinity in shape, colour, size, and any other features that could bring objects together (Rock and Palmer, 1990, p.87). A third principle adopted to account for the tendency of the human perception to perceive visual signals as groups is moving in the same direction which is called the common fate principle. Based on this principle, elements are perceived as belonging to the same group if they move together in the same direction (Todorovic, 2008, p.2).

The closure principle is also a principle determining the elements that would be perceived as grouped together. Elements are perceived as belonging together if they constitute a closed figure. When certain information is missing from a perceived visual stimulus, human minds compensate for the missing parts by familiar colours, lines, or patterns (Bustamante and Mcleod, 2022, p.6). The gestalt principles remained the same until Palmer (1992) added another principle. The principle is called enclosure or common region which refers to the perceptual tendency to group the elements enclosed within a common region.

Palmer (1992) adds another principle, which is called enclosure or "common region". According to this principle, the elements are perceived as belonging together based on being within the same area, it refers to the perceptual tendency of the human cognition to group the elements enclosed within a common region into one larger unit.

In a later work, Palmer and Rock (1994) suggest another principle of grouping which is called connectedness, where any group of elements, if connected, are perceived as belonging to the same group, whether a spot, a line, or a more extended area.

3.2 Other Principles

Gestalt theorists suggested other principles, such as Pragnanz which is based on the assumption that the perceptual organisation of any set of stimuli will form a good gestalt as the conditions allow (Britanica, 2020). The human brain would converge towards a state of minimum energy via simplifying perception. Rock and Palmer (1990, p.86) explain this phenomenon by stating that when stimuli are ambiguous, the perceptual system would resort to the available information being registered by the eye's retina. Obviously, it is not that the visual system converts the perceived information into the simplest pattern, but in the case when the information is ambiguous, such as in the case of a partly revealed figure, the viewer tends to perceive the simplest shape compatible with the available information.

Gestalt theorists also added the principle of figure-ground. Abiding to this principle, when a visual field is homogeneous, it is perceived as having no internal organisation. Based on that, Gestalt theorists state that with a lack of homogeneity, the visual image would be perceived as having two main components, a figure and a ground. This conception of

field organisation was first described in the work of Rubin (1921), where the visual field is perceived as being composed of two components differing in many aspects, a figure with an object-like character, and a background with less salient features appearing as a mere background. The area of the figure and ground does not appear as being adjacent, but as being stratified with the figure being perceived as positioned in front of the ground, and the ground is perceived as lying at a further depth. Another difference perceived by the figure-ground characters is that the border lines separating the figure from the ground are perceived as belonging to the figure rather than to the ground, contouring the figure and deciding its shape (Todorovic, 2008, p.1).

4. Gestalt and Reading

Reading is usually defined as "a purposeful process of identifying, interpreting, and evaluating symbols, words, and ideas in the light of the experiential background of the learner" (Carter, 1969, p.1). This implies that without mental background accumulating from bodily experience, symbols, words, and ideas would be of no sense to the reader. As mentioned above, Gestalt is a theory of the whole, not the parts, it focuses on the united elements and evaluates them based on the resulting whole. It assumes no individual features, instead, the whole is interpreted as having features that do not completely match the features of the constituting elements.

Gestalt theory describes the reading process as a united process where the individual sub-processes, such as identification, interpretaion, and evaluation involved in reading, lose their identity forming a new whole. Also, perception is viewed in a unique way, where it is seen as a result of sensory receptors and is interpreted based on the individual's experience and knowledge of the world leading to a creative process providing new whole units that hold features more than the features of their constituting parts. Carter (1969) also believes that Gestalt theory can be a good guide for determining reading problems as well as the best way the reading process can be taught.

According to Boder (1973, p.663), reading is performed in two ways based on the knowledge of the individual reader. There is an analytic-phonetic process which is the main process in the reading of novice readers, and the visual gestalt with experienced readers where whole words are recognised rather than individual constituting elements. Border believes that reading requires visual perception and discrimination, visual sequential memory and recall, and directional orientation, as well as cross-modal integration, including the translation of visual symbols into auditory equivalents.

In short, Gestalt conceptions and perceptual laws can be used in many aspects related to the reading process, starting from instruction design, to increasing learner's achievement, to assigning problems in reading abilities of learners.

5. Text Formatting

Language is usually produced and perceived as a linear structure. This fact limits the capacity of language for conveying its multidimensional, hierarchical structures of which it is composed. Advanced learners can read better due to their ability of rapid online processing and computation of such relations among the linguistic constituents being produced or perceived. The problem arises with learners who have weaker abilities on all linguistic levels than the more proficient ones. In an attempt to improve reading, many topics have been investigated, such as interaction techniques (Chen et al., 2008), active reading support (Schilit et al., 1998), and the influencing factors on reading (Protopsaltis and Bouki, 2006).

Accordingly, many attempts were made for enhancing the reading ability of learners, which fall into three general categories, targeting the reader, the text, or the teacher.

Based on McMaster et al. (2012, p.108), reader-oriented attempts focus on enhancing the learner's word decoding strategies as well as comprehension strategies, while text-oriented attempts are more focused on the comprehensibility of the text and how to increase it through optimising the grammatical as well as the semantic contents of a text, as well as enhancing the global and local structure, and the layout of a text, for instance, a study by Al-salami (2006) states that the way a reading book is designed and the visual effects used as well as the simplicity and clarity of the presentation of the material are important factors in developing reading abilities of Iraqi learners. Concerning the teacher-based studies, the focus is on the way a teacher presents the material, such as a study by Abdul-Majeed (2019) which compared between the teaching methods of reading stating that reciprocal teaching technique is more effective than the presentation practice production teaching or the Lecture Method teaching. The current study focuses on one of the attempts targeting the reading-text design, that is the VSTF method.

The need for text re-design is justified by the fact that reading is difficult to be acquired. The source of such difficulty arises from the need for precise time-based coordination between perceptual, linguistic, and cognitive mechanisms (Rayner,1998, p.372). The ignition for this change is the many problems encountered with traditional block formatting. Demb et al. (1997, p.13336) point out one of those problems stating that due to the limited eye fixation span of humans in general, only nine to fifteen characters can be seen at a time before moving to the next fixation and that may cause, according to Walker et al. (2007, p.1) the readers of block texts to get confused and lost in a vast sea of words. Even proficient readers might get confused when they encounter a text with a wide block of text and very small margins.

Another problem with traditional block formatting texts is that when reading, the reader's glance moves from one fixation to another (saccade), but sometimes it is required to regress for re-examining previous words. This regression occurs for two reasons, either due to interference with working memory (Garrod,1992, p.4) or because some words at the edge of fixation are skipped (Ryner and Sereno, 1994). Such aspects might impact reading comprehension and lead to a slower reading. A skilled reader can resolve this problem by computing syntactic relations among units in a sentence which helps in anticipating how words, phrases, and clauses are interconnected within sentences for figuring out meaning. In oral language, this is resolved by having different cues, from pausing to changes in pitch, pacing, etc. In written texts, this is not the case. Most of those cues are missing, increasing the potential for misunderstanding (Ashby,2006, p.331).

5.1 The Features of Visual Syntactic Text Formatting (VSTF)

VSTF is one of the methods that has been suggested for improving learners' achievement in terms of reading skills. Over 15 years, a number of researchers including Mark Warscauer, Youngmin Park, and Randall Walker, have investigated the possibility of altering texts with the most benefits to readers until their efforts were rewarded with the presentation of their method (VSTF) in 2005. The problem that drew their attention is that natural language is produced, perceived, and interpreted linearly with its items being organised linearly, one after the other, limiting the capacity of manifesting its hierarchical structure.

Walker et al. (2005, p.1096) point out that their method is designed based on natural language processing techniques segmenting a text in a way that highlights the meaning and the hierarchical structure of a text. They attempt to prove that everyone can read better if the text is presented in a way consistent with human perceptual and processing mechanisms.

Warschauer (2011, p.256) argues that the VSTF method is a promising method for increasing the accessibility of a text for learners. Kanda (2012) points out that the VSTF method offers three main advantages, one through providing meaning cues by adopting a

syntactic structure-based text design, another vantage point is decreasing the time of fixation, and a third, related benefit, is causing less eyestrain.

VSTF has the feature of altering the design of the text based on the syntactic structure of the text via, according to Walker et al. (2005, p.1), computer-based algorithms which can not only analyse the syntactic structure of a text but also detect word difficulty and patterns of punctuation which govern the details of the resulting format such as line segmentation and indentations. Put another way, VSTF conducts a parsing process that segments the text into short lines compatible with human cognition features.

Walker et al. (2005) designed the VSTF in a way that organises the text to match eye perception capabilities and brain perceptual preferences by including short lines that match the visual eye span by breaking the text into syntactically meaningful segments and by indenting the lines to signal the relative importance between phrases in a sentence. The aim is to reveal the underlying syntactic relations for highlighting meaning. The segmentation is done at the salient phrase and clause boundaries, arranging the lines in a cascaded manner with different indentations. The end product is a streamlined column of a text allowing more efficiency of eye movement and syntactic processing (Warschauer et al., 2011, p.255). The length of the lines is fit to one or two eye fixation spans arranged in a cascaded way denoting a hierarchical structure.

In some cases, sentences have a simple structure, making the comprehension of what is perceived goes by easily, but with more complex structures the interpretation becomes harder as it needs computing the syntactic relations among the constituents. Grodner and Gibson (2005, p. 265) argue that when sentences become longer and more complex, a memory overload occurs decreasing the efficiency of a learner's comprehension causing a breakdown in comprehension. The exact source of the problem is that a hierarchical linguistic structure must be computed based on linear input, therefore, it would be better to design the text in a way that helps learners through cues of those relations. As mentioned in the previous sections above, several attempts have been made to fulfill this task, yet the results did not rise to the level of expectations.

Walker et al. (2005) argue that the VSTF method is the key as it reformats a text and presents it in a way that emphasises phrasing by indenting short syntactic units. VSTF text is manifested as a cascaded format visualising the underlying syntactic relations. Walker et al. (2007, p.4) confirm that their method is intended to build a diagram representing the sentence using only the words of the sentence itself as building blocks, positioning the words into precise locations in relation to the other words, and producing an extra-linear structure which reflects the hierarchical relations among them.

Another syntactic aspect made visual in VSTF text design is the hierarchical relations where phrases and clauses are revealed as being part of a higher-level syntactic unit. Walker et al. (2005, p.1096) point out that the VSTF method is designed based on natural language processing techniques segmenting a text in a way that highlights the meaning and the hierarchical structure of a text. They attempt to prove that everyone can read better if the text is presented in a way consistent with human perceptual and processing mechanisms. The hierarchical structure is revealed by using different-sized indentations leading to a cascaded pattern. The cascaded pattern of a VSTF text allows more efficiency of eye movement and syntactic processing (Warschauer et al., 2011, p.255). The length of the lines is fit to one or two eye fixation spans arranged in a cascaded way denoting a hierarchical structure.

Moreover, the VSTF method color codes active verbs for creating further highlighting of meaning (Walker et al., 2007, p.5). In psycholinguistic accounts of language production and processing, a verb is assumed to have a critical role in being responsible for the basic structural form (Levelt, 1989). This assumption is supported by later empirical eye tracking and priming studies (Pickering and Branigan, 1998; Melinger and Dobel, 2005; and Hwang and Kaiser, 2014). According to Hudson (2007), the importance of the verb is

also based on its valence properties and its specific role in the sentence where a finite verb is responsible for expressing a sentence predicate which is a crucial element in the meaning of a sentence. Therefore, highlighting the verb in a sentence creates further highlighting of meaning.

Adding to that, highlighting the main verb of a sentence or a clause (the most crucial part) makes the parsing of a sentence easier. This indicates that making the identification of the main verb of a clause or a sentence easier is a key to decreasing the load on the parser saving more cognitive resources for other processes such as making sense of a text which enhances comprehension.

6. Points of Convergence between VSTF and Human Perceptual Preferences

The designers of the text formatting method VSTF claim that their method is designed to render texts in a brain-friendly way and that it illuminates the structures and meanings of language that are masked by the dominant traditional text formatting through realigning the words in a sentence into powerful, compact, and well-organised visual information, it is necessary to verify those claims. Therefore, this study is intended to find a reasonable verification to this claim. For this purpose, the study investigates reading passages chosen from Select Readings: Teacher-approved Readings for Today's Students (2nd edition) (Lee and Gundersen, 2011).

Basically, the study aims to reveal the link between the features of the VSTF method and Gestalt principles to help bring forth the inseparable relationship between the two, and by that, touching on profound aspects that can justify the possible benefits of the VSTF text formatting method. In other words, the study aims to reveal the adherence of the investigated method to the perceptual tendencies of human cognition. The end-purpose of bringing forth such a relation is to find an answer to one of the main questions in the study: Why does VSTF method affect Iraqi EFL learners' fluency?

To reveal the perceptual basis of the difference occurring in the results of reading performance of learners when reading a VSTF text design, the study shows the convergence between the features of the VSTF text and the Gestalt principles that describe the human perceptual tendencies. The more convergence there is to the matter, the stronger it would be to prove that VSTF benefits readers through adhering to the natural laws of perception. This adherence leads to gains in cognitive load where less load is needed to perceive visual forms from the reading passage. Abiding by the human perceptual laws, a text can be easier to perceive.

One of the salient principles of Gestalt theory is suggested by its name Gestalt meaning whole forms not parts. The perceptual system prefers to receive whole units rather than parts with each eye fixation span. The visual perceptual system focuses on whole units that are composed of elements united by certain connections and evaluates them based on the resulting whole. The same is with a VSTF text where the whole text is organised into units (phrases and clauses) and that the line truncation is made at salient phrase and clause boundaries. This indicates that VSTF adheres to the principle of wholeness set by Gestalt theory. For example, the following is a sentence from a passage entitled Private Lives:

(1)   My parents and I moved from North Carolina to St. Petersburg, Florida, when I was just about to start my senior year of high school. It was a difficult time to be uprooted; I had lived in North Carolina all my life.

The sentences above are transformed, using the ClipRead programme, into a VSTF design. The transformed text is as follows:

My parents and I
    moved
      from North Carolina
        to St. Petersburg,
          Florida,
           when I was just about
        to start my senior year
         of high school.
It was
    a difficult time
      to be uprooted;
  I had lived
    in North Carolina all my life.

In the sentences above, each phrase starts at a new line, such as "My parents and I", "moved", "from North Carolina", "to St. Petersburg", and "Florida". Each line included a phrase, whether a noun phrase, verb phrase, prepositional phrase, or adverbial phrase and the phrases constitute a whole clause and form a cascaded pattern of their own. With the end of a complete sentence and the beginning of another, a new cascaded pattern is initiated, as in the case of the compound sentence "It was a difficult time to be uprooted; I had lived in North Carolina all my life". This arrangement highlights the constituency structure and sheds light on whole units.

Another principle set by Gestalt theory is closure where the perceptual system prefers to receive complete visual units rather than fragments. One of the salient features of VSTF design is shorter lines. Unlike random truncation made in traditional block formatting where the end of the line does not coincide with the end of a whole unit, VSTF clips the lines in a carefully planned way at salient phrase and clause boundaries. The VSTF text form gives the impression of closure to the mind leading to the perception of complete units. By that, VSTF assists the reader's mind in computing the boundaries of the perceived units with the end of the line operating as a cue signalling the phrase or clause boundary.

Wertheimer's idea of how individual objects are perceived as belonging together is based on the conception that the visual system organises the parts into wholes based on laws of grouping. The laws of grouping in Gestalt theory are proximity, similarity, and common fate. Concerning the VSTF text, the components of each line belong together based on proximity, where a group of components are arranged close to each other in each line as well as having similar function and arranged within the same larger component. For example, the following sentence is adopted from a passage entitled Culture Shock:

(2) The pressing problem for Blackmore was making a quick adjustment to the American lifestyle that felt like it was run by a stopwatch (a watch which can be started and stopped by pressing a button).

After transforming the sentence using the ClipRead, the following is the result:

```
The pressing problem
      for Blackmore
    was making
        a quick adjustment
          to the American lifestyle
  that felt like it
   was run
     by a stopwatch
      (a watch which
        can be started
          and stopped
            by pressing a button).
```

It is obvious to the eye that the words that constitute the same unit are closer to each other than the ones constituting other units. For example, the words in the noun phrase "the pressing problem" constitute a whole phrase and are close enough to each other signalling that they belong to the same unit, unlike the words in the other units which are located in a different line. This gives the perceptual system a cue to proximity based on the horizontal distance between the units. Another principle of grouping adhered to in this phrase is that the words are similar to each other in terms of position being on the same line giving the impression of positional similarity. Moreover, the words on the same line are directed rightwards giving the impression of common fate where the arrangement of the words of the same unit departs from left to right. By that VSTF adheres to the Gestalt grouping laws based on which the components of each line are perceived as one unit and serving the same function.

In a VSTF text, each sentence is presented in several short lines that are indented variably giving the text a cascaded pattern that swiftly guides the eyes from one row to the next. This gives the sense of continuity (Gestalt principle) with each line constituting the same sentence beginning closer to the end of the previous line. The process of organising a new sentence starts with an indentation similar to that of the first line of the previous sentence. For example, the following sentences (adopted from a passage entitled Private Lives:

(3) Almost daily, I swam and sunned there. I watched the sun set.

The sentences mentioned above are transformed into the VSTF text design using the ClipRead programme, and the following design is the result:

```
Almost daily,
  I swam
    and sunned there.

I watched
      the sun
  set.
```

The extract above includes two sentences, each sentence is composed of several units (phrases) and each phrase starts on a new line with an indentation different from the line that preceded it giving the text a cascaded manner which highlights the hierarchical structure of the sentence. And each sentence has its own cascaded pattern. This gives the human cognition a cue that the units that continue within the same cascaded pattern belong together.

Thus, reading a VSTF text helps the cognition in deciding what to be perceived as a whole unit. By that, less effort is needed in parsing the perceived language into smaller

units. Moreover, the cascaded pattern helps in computing the hierarchical relations through variable indentations. This gives the mind a sense of connectedness (Gestalt principle) among each group of rows that constitute a whole sentence. Yet again, this would be compatible with the nature of the mind and the perceptual process leading to less consumption of cognitive effort and by that it would save more cognitive resources for other processes.

Visualising the syntactic relations among the phrases and clauses that constitute whole units (sentences) helps in decreasing syntactic complexity. This is compatible with the nature of the human cognition based on a principle called pragnanz (precision), which states that the human cognition attempts to take the visually-perceived units as simple as possible. The human brain would converge towards a state of minimum energy via simplifying perception and using the least amount of available inofrmation. The simplification is done through helping the mind in computing the syntactic relations among those constituents. There is no need for the mind to compensate for the missing cues, and by that less effort is exerted saving time and resources for other higher order processes such as comprehension.

In a VSTF text, each sentence is given a unified cascaded pattern. This unravels a link between VSTF and one of the gestalt principles of human cognition's perceptual tendencies. It gives a sense of enclosure (Gestalt principle) with the constituting units of each sentence being enclosed within the same cascaded pattern. By that, the eyes of a reader easily organise the perceived visual data into units. This is illustrated in the following extract taken from the reading passage Cultural Shock:

(4) As soon as she landed in Boston, Blackmore could feel the tension in the air. She was about to taste (to experience) a lifestyle far more hectic (very busy) than the one she left. "Driving in Boston is crazy," says Blackmore. "It took me a while to get used to the roads and the driving style here.

The same text in a VSTF format takes the following form:

```
As soon as                                    sentence 1
  she landed
    in Boston,
  Blackmore
    could feel
    the tension
    in the air.

She was about                                 sentence 2
  to taste
    (to experience)
      a lifestyle far
        more hectic
      (very busy) than the one
        she left.

"Driving                                       sentence 3
  in Boston
 is crazy,"
  says Blackmore.

"It took me                                    sentence 4
    a while
    to get
  used
    to the roads
      and
    the driving style here.
```

Colour coding the active verb is also another feature of a VSTF text, where the active verb is given saliency as being the figure and the rest of the sentence as the ground. This is one of the defining features of human cognition as deciphered by the Gestalt theory. The verb is the milestone of each sentence and the other constituents are assigned functions based on their position relative to the verb. Adding to that, the verb has a crucial role in building the basic structure of a sentence, as well as being part of the predicate of the sentence. Therefore, the perceptual system gives the verb saliency, and by highlighting it with a different colour, lower effort is needed for assigning its position. For example, the following sentence from a passage entitled Student Working Team:

(5) When students work effectively in a supportive group, the experience can be a very powerful way to improve academic achievement and satisfaction with the learning experience.

When students
    work effectively
     in a supportive group,
  the experience
   can be a very powerful way
 to improve academic achievement
     and satisfaction
  with the learning experience.

Viewing the VSTF text as a whole sends a message to the mind that every several lines have the same pattern of a cascaded form, a pattern that is broken at some point with a new pattern beginning with the next group of lines which signals a connection among each similarly-patterned lines and gives a cue that they represent one whole unit (Gestalt).

7. Conclusions

In terms of the aims of the study as for the reasons that underlie the benefits of VSTF texts and the need for the departure from the traditional to the invented methods of text formatting, the study concluded, based on the results of this study, the following:

1- There is a good deal of convergence between the human perceptual preferences represented by Gestalt Principles and the features of VSTF texts.

2- Due to the visualised syntactic relations and hierarchical structures in a VSTF text, this method of text formatting is a good way for improving the reading abilities, especially that of learners who learn the English language as a foreign language.

3- Based on the compatibility between the features of the VSTF texts and the perceptual preferences of the human cognition, the study concludes that using a VSTF text may need less effort from the perceptual system to be read. This implies that using a VSTF text is more suitable for people having eye-sight issues.

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