Highlighting for reading comprehension: Is two better than one?

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ABSTRACT Reading Comprehension is a crucial part of our everyday lives. Reading is the most commonly utilized mode we use to obtain knowledge. If we are unable to comprehend what we read, then we are unable to learn the information we read. Regardless of how critical the skill of comprehension is to our education, there are few known ways to improve our competence in this area. Highlighting is a popular method among college students of marking material that they feel they need to memorize in order to perform well in their courses. However, it has been shown that highlighting does not improve comprehension unless the material is considered difficult, and only when the specific piece of information that is inquired about is physically highlighted (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013). The purpose of the current study was to determine if dual color highlighting could help to improve comprehension more than that of the traditional single color highlighting method. The hypothesis was that highlighting text in two colors would force the reader to understand the text enough to make a judgment as to which color should be used to highlight each segment, if any. Presumably, this form of active reading would be expected to create meaning and organization of the material that would aid in the comprehension of that material, as well as simplifying the review of material. Contrary to that hypothesis, we found that dual highlighting did not improve or decrease comprehension compared to single color highlighting of text–although we found improved comprehension for the highlighted information regardless of highlighting method. Additionally, we concluded that training people to highlight effectively is necessary to improve the comprehension of texts.

Reading is arguably the most utilized method for acquiring knowledge. Accordingly, reading is a point of emphasis in someone's education since an early age. Yet, it is often taken for granted that readers will absorb what they read. Relative to the mechanics of reading, there is little focus on instructing young readers how to understand the information provided in written form. It seems to be ubiquitously assumed that as children grow and their domain knowledge increases, so does their comprehension. However, if they are unable to fully comprehend what they read, then their domain knowledge may not be increasing at a satisfactory rate.

In other words, students are expected to know the text material without specific guidance on how to learn it, and, hence, are left to discover their own methods to comprehending written text. Highlighting is commonly a part of their solution to improving comprehension, due to its convenience and apparent ease. Trouble arises, however, because students use highlighting as a study aid without any clear instructions or training on how to do so effectively. For example, Dunlosky, Rawson, Marsh, Nathan, and Willingham (2013) suggested that highlighting effectiveness can improve as one's knowledge in a particular domain increases. Therefore, before a subject matter becomes familiar, it could be more difficult to pinpoint the pertinent information that should be highlighted. Proper training on how to identify important ideas within novel content areas could help make highlighting more efficient.

Identifying important information is a skill needed for minimizing the amount of information one is trying to retain and, thus, for optimal learning and understanding to occur. Those individuals who cannot identify the important details that should be highlighted, tend to "over-highlight", which hinders comprehension (Dunlosky, Rawson, Marsh, Nathan, and Willingham, 2013). Ozcelik, Karakus, Kursun, and Kursat (2009) conducted a study that showed color coding a picture to match relevant material in a text helped to improve comprehension of the material (2009). This is accomplished by making meaningful connections of the visual and written information. Reisberg (2013) further bolstered this argument when he showed that making meaningful connections helps to enhance memory and understanding through relational rehearsal. Thus, making meaningful connections with a particular manner of highlighting should reduce a persons need to over-highlight.

The goal of this study was to find a way that could make highlighting more useful, even in the absence of extensive training. Previous research has supported that active reading can help to improve the use of appropriate highlighting (Gier, Herring, Hudnell, Montoya, &Kreiner, 2010) Therefore, implementing a method of

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highlighting that promotes active reading could prove to be beneficial to comprehension. It is feasible to believe that when students take enough time to think about and judge the information as they read it, in order to color code the relevant text, they should then be simultaneously enhancing their comprehension of the material by making meaningful connections through active reading. Furthermore, the highlighted text would then be color-coordinated and organized for a quick and meaningful review of material. Comprehension would be aided by the need to understand to which main topic the text is referring, so that they may assign the correct color. Comprehension would then further be aided through the rehearsal and review of the understood material as it is meaningfully connected together. Peterson conducted a study where 65% of participants reported that highlighting serves as a way to improve their encoding and review of material (1991). This would make this method a popular choice among students as it allows for encoding while reading and also organizes material for a meaningful review. Another study showed improved comprehension of color coded material (Oczelik et al., 2009). With these things in mind, it was hypothesized that using a dual color highlighting technique would enhance comprehension more than what occurs with the use of the traditional single color highlighting method. The organization and thought processes used to highlight with dual colors are likely to enhance encoding and review processes, which should lead to better comprehension of the material.

A second hypothesis is that training people to highlight with a dual color method would be more beneficial than training people to highlight with the traditional single color method. Regardless of whether or not dual-color highlighting helps to improve comprehension through enhanced encoding processes, previous research has still shown that the most pertinent information needs to be physically highlighted in order to improve comprehension (Peterson, 1991; Dunlosky, Rawson, Marsh, Nathan, and Willingham., 2013). Therefore, the use of a dual color method, for which a critical analysis of what is read occurs, could lead to a better discrimination method for determining relevance and the need for specific ideas to be highlighted.

Methods

Participants

The sample consisted of 217 undergraduate students (with 31 excluded from analyses: 28 for not following instructions, four for ineligibility) ages 18 – 47 (M=19, SD=4.23) recruited from introductory psychology and social work courses over the span of three semesters at the Lima campus of the Ohio State University.

Design and Materials

We used a 2 x 2 within-subjects design. The independent variables were highlighting condition (with one or two highlighter colors) and article topic (Contribution and Selection).

We used two one-page passages, excerpts from mid-level psychology courses' textbooks, titling them "Emotional Contributions of the Left and Right Hemispheres" (excerpted from Kalat, 2013, and herein referred to as the "Contribution article") and "Early and Late Selection" (excerpted from Reisberg, 2013, and herein referred to as the "Selection article"). Yellow and pink highlighters were chosen for participants to highlight the articles. Yellow and pink highlighters were selected because the two colors are unlikely to be confused due to color blindness.

To control for any order effects that might have occurred from article order presentation, half of the participants were presented with the Selection article first and followed by the contribution article. The other half were presented with the Contribution article first and secondly being presented with the Selection article. In addition, we aimed to control for highlighting method order. We manipulated the order of highlighting condition so that one half of the participants used the single-color method to highlight the first article and the dual- color method for the second article. The other half of the participants used the dual-color method for the first article, followed by single-color highlighting the second article. Note that a neutral control group, in which no highlighting was used, although plausible, was not necessary. Previous research has shown that regardless of effectiveness, students still choose to highlight (Dunlosky, Rawson, Marsh, Nathan, and Willingham, 2013). If highlighting is ubiquitous, this study intended to contrast two highlighting methods to ascertain if one could enhance comprehension more effectively than the other, such that highlighting training could focus on the most effective method.

Two crossword puzzles were used as filler tasks in the packets. A filler task is to prevent participants from ruminating about what they had just read in order to keep the article's information within their working or short-term memory storage for quicker retrieval. Participants were informed that their participation would earn them two extra credit points and their performance would earn them 0.1 extra credit points per correct answer for a maximum of four points. The extra credit points were incentives so that participants would perform using their best effort as if they were actually studying for a real exam.

Each packet contained a consent form to be signed before starting the study. The packets would either ask the participants to highlight any important information with the yellow highlighter or highlight any important information involving one topic in yellow and important information involving another topic in pink. For the dual color, where both yellow and pink highlighters were used, the participants were free to choose which two topics they judged to be important. This was to ensure that their judgment on what to highlight in the articles was generalizable to their actual studying method to comprehend the material. Next, the packets contained a crossword puzzle and participants were advised to complete as much of a crossword puzzle as they could within the allotted time.

A ten-question quiz followed and participants were instructed to complete the quiz without flipping back and forth between pages to ensure that their performance would be based solely on the highlighting method and comprehension level. Again, before completing the quiz the participants were advised that their performance would determine the number of extra credit points they would receive. Once finished, the participants began the same process over again with a new article, crossword puzzle, and quiz questions. The packets were randomized among the participants. The two texts and highlighting colors were alternated to identify any order effects that might have occurred. Yellow and pink highlighters were used and two different crossword puzzles were alternated within the packets. The packets were randomized among the participants. The two texts and highlighting conditions were alternated to identify any order effects that might have occurred.

There were four conditions; (1) Selection article with dual-color highlighting first and the Contribution article with single-color highlighting second, (2) Selection article with single-color highlighting first and the Contribution article with dual-color highlighting second, (3) Contribution article with single-color highlighting first and the Selection article with dual-color highlighting second, and (4) Contribution article with dual-color highlighting first and the Selection article with single-color highlighting second.

Procedures

Each participant was instructed to read the consent form, which informed them that their participation was voluntary and that their performance would determine the amount of extra credit points they would receive, should they agreed to participate. Participants began the study by highlighting one of two one-page passages that were drawn from mid-level psychology course textbooks for 8 minutes. They highlighted either using a dual-color technique or a single-color technique. In the dual-color highlighting condition, participants highlighted relevant information that fell under one main idea in yellow, and then used the pink color to highlight relevant information that related to a separate idea in the text. In the single-color highlighting condition, participants used only the yellow highlighter to identify any important information in the text.

Participants then worked on one of two crossword puzzles for 3 minutes. The allotted time that the participants had to work on the crossword puzzle was chosen so that the participants would not continue to rehearse the information they previously highlighted and reviewed in the articles, which would enhance memorization of that material and interfere with what we were trying to study. By working on a crossword puzzle the short-term memory rehearsal of the highlighted information would be dismissed shifting the focus to the puzzle and its content. The participants were instructed to turn back to their previously highlighted text and review it for 6 minutes. Participants then continued working on the crossword puzzle for 3 minutes and finally completed a 10-question quiz pertaining to the information in the highlighted text. Next, participants read a second text highlighting in the opposite manner as they had for the first text and repeated the same procedures of highlighting, crossword puzzle, reviewing, crossword puzzle, and finally completing the quiz. At the end of the study participants were debriefed and completed a short questionnaire pertaining to their experience and

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thoughts about the study.

Measures

Comprehension performance was measured by the change between the single-color highlighting condition and the dual-color highlighting condition. The number of questions the participant correctly answered for the single-color highlighting condition were subtracted from the number of questions the participant correctly answered for the dual-color highlighting condition. This new value became the comprehension performance score for each participant.

According to Ozcelik et al. (2009) color-coding illustrations of the nervous system and color-coding information in a text that related specifically to that illustration facilitated memory improvement. Moreover, Peterson (1991) found that comprehension levels improved as long as the information being highlighted directly relates to the comprehension questions being asked. Assuming that using two colors to highlight would facilitate the ease of distinguishing between two separate ideas in a text, comprehension levels should have improved. Highlighting efficiency was measured by the number of words each participant highlighted in either text contrasted to our ideal rubric, assuming that the rubric was valid. In accordance with Ozcelik et al. (2009) and Peterson (1991), the rubric, a continuous scale with a 1.0 score indicating perfect performance, emphasized the material that should be highlighted (1) to answer the comprehension questions correctly and (2) to discern between the two main topics of each passage articles.

This rubric was used as a basis for comparing the number of words highlighted in the article to what should be highlighted in order to answer the comprehension questions correctly. The rubric also emphasized the material that should be highlighted to discern between the two main topics of the articles. The rubric and the comprehension questions were designed by the first author, who was familiar with the content area, and then revised by the supervising professor, who is an expert in the content area. Therefore, the level of importance of the highlighted text within the rubric and the corresponding comprehension questions are believed to be relevant items to the understanding of the content, within the article text. Each quiz question corresponded to one or several lines of information in the text. When contrasted against our rubric, words highlighted in the article with the correct color and within what should be highlighted were counted as +1, +2, et cetera. Words that were either highlighted in the wrong color or outside what should be highlighted were counted as -1, -2, and so on until the entire article was analyzed. A participant's highlighting efficiency performance was based on the sum of correct and incorrect words from the participants' article divided by the number of words that should be highlighted in our rubric. This produced a score below, at, or above 1.0 on a continuous scale.

Results

We used a z-test to determine whether highlighting in two colors was better than in one color, based on the mean difference in quiz scores between dual-color and single-color highlighting. Across participants, we found no evidence to support that the difference between dual-color and single-color highlighting was greater than zero (M=0.043, z=0.254, p=0.400).

The two texts, however, were not of the same difficulty to the participants. Text 1, the Contribution article, was found to be the more difficult text of the two, based on the mean differences between the two texts. Participants performed below the average with Text 1 with a negative mean score while they performed slightly above the mean with Text 2. The significance between negative and positive scores is that a positive score shows better performance in the dual highlighting condition and the negative score shows better performance in the single highlighting condition. A score of zero would suggest no difference between the two highlighting methods. Therefore, we conclude that the level of difficulty of the Contribution article was the main contributor to the mean score differences, rather than the method of highlighting. .

The order the articles were presented in the packets did not show any significant differences in performance among the participants, based on a within-subjects ANOVA (F(1,185)=0.170, p=0.679). Likewise, the highlight order did not to show any significant differences in performance (F(1,185)=0.635, P=0.426).

We used a t-test to determine whether highlighting was useful at all for the participants and found that highlighting efficiency correlated positively with the quiz scores from both conditions for Text 1 ((t(94) = 1.723, p = 0.044, r_single = 0.175); (t(88) = 1.833, p = 0.035, r_dual = 0.192)), but not for Text 2. Therefore, highlighting was useful to improve comprehension scores only on the more difficult text. Highlighting efficiency was measured to investigate whether how well someone highlights effects their performance. Our analyses show that among good highlighters using two colors is no better than using one color (t(25.097)=-1.885, p=0.965 (M=-1.250)). Similarly, highlighting in two colors is no better than in one color for Text 1 among poor highlighters (t(21.892)=-1.357, p=0.906 (M=-0.813)).

Discussion

Highlighting is one of the key tools students use (Dunlosky, Rawson, Marsh, Nathan, and Willingham., 2013). Based on the advantages of processing information beyond a superficial level to retention, we hypothesized that dual-color highlighting would improve comprehension levels beyond that of single-color highlighting. We found, however, that highlighting with two colors was no better than highlighting with one color.

Consistent with Peterson (1991) and Dunlosky, Rawson, Marsh, Nathan, and Willingham (2013), we found that highlighting was useful for improving reading comprehension scores, as long as the text was relatively difficult and specific relevant information was highlighted. Each text consisted of the same length and the amount of lines that needed to be highlighted in order to answer the questions on our test quiz correctly. Text 1 (Contribution article) was found to be the more difficult text. However, both texts are considered to be relatively difficult, as the information presented would have been novel information to the majority of entry level psychology students, as this particular material is part of the upper level psychology courses. In either highlighting condition, participants consistently performed poorly on the quiz questions for Text 1(Contribution article) than they had for Text 2 (Selection article). As a follow-up, we hypothesized that good highlighters would outperform poor highlighters in the dual-color highlighting condition. Regardless of highlighting efficiency, the data showed that dual-color highlighting was no better than single-color highlighting. Considering highlighting efficiency, training to highlight with two colors would be no more beneficial than training to highlight with a single color.

In order to revise the uncertain highlighting methods students are acquiring, studies such as this are vital for the improvement of the technique and for the students' enhanced performance. Highlighting is critical beyond the years of education. It is a method that more than students trust, and creating a better understanding of the study method will enhance our knowledge of what may or may not improve comprehension levels. We conclude that dual-color highlighting is not necessary for improved comprehension, but it may be preferred by some individuals. Improved highlighting efficiency would be a valuable interest among students given that Dunlosky, Rawson, Marsh, Nathan, and Willingham (2013) reported students commonly rely on highlighting as a study method. The focus, however, should be on the common single-color method of highlighting.

This study has added to the current evidence suggesting that comprehension improves for material that is physically highlighted within a text (Peterson, 1991; Dunlosky, Rawson, Marsh, Nathan, and Willingham, 2013). Therefore, future research should combine the ideas that highlighting specific items is useful for comprehension and the preference that students have for highlighting material while learning (Dunlosky, Rawson, Marsh, Nathan, and Willingham, 2013) to develop and test a training program that focuses on highlighting efficiency. Such research would be a great contribution to education by increasing the acquisition of knowledge.

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Appendix

Text 1
Early Selection and Late Selection

In several paradigms, then, it's clear that people are oblivious to stimuli directly in front of their eyes –whether the stimuli are simple displays on a computer screen, photographs, movies, or real-life events…there are two ways we might think about these results: These studies may reveal genuine limits on perception, so that participants literally don't see these stimuli; or these studies may reveal limits on memory, so that people do see the stimuli but immediately forget what they've just seen.

Which proposal is correct? One approach to this question hinges on when the perceiver selects the desired input, and (correspondingly) when the perceiver ceases the processing of the unattended input. According to the early selection hypothesis, the attended input is identified and privileged from the start, so that the unattended input receives little (and maybe even zero?) analysis (and so is never perceived). According to the late selection hypothesis, however, all inputs receive relatively complete analysis, and the selection is done after all of this analysis is finished. Perhaps the selection is done just before the stimuli reach consciousness, and so we become aware only of the attended input. Or perhaps the selection is done later still –so that all inputs make it (briefly) into consciousness, but then the selection is done, so that only the attended input is remembered.

It turns out that each hypothesis captures part of the truth. On the one side, [there are many previous cases where] people seem genuinely unaware of the distractors but are nevertheless influenced by them [people will make decisions based on the influence of the distracters, even when they seem shocked to learn the distracters were in the images they saw] (pp. 124-125). This seems to be the case of a late selection, with the selection done after the distractors were perceived, but before they made it to consciousness. On the other side, though, we can also find evidence for early selection, with distractor stimuli receiving little analysis and indeed falling out of the stream of processing at a very early stage. Relevant evidence comes, for example, from studies that record the electrical activity of the brain in the milliseconds after a stimulus has arrived. These studies confirm that the brain activity for attended inputs is distinguishable from that for unattended inputs just 80 ms or so after the stimulus presentation –a time interval in which early sensory processing is still under way (Hillyard, Vogel, & Luck, 1998). Apparently, in these cases, the attended input is privileged from the start.

Other data also provide evidence for early selection. For example, recordings from neurons in Area V4 of the visual cortex show that these neurons are more responsive to attended inputs than to unattended ones, almost as if attention made the light areas seem brighter and dim areas seem darker (Carrasco, Ling, & Read, 2004; Carrasco, Penpeci-Talgar, & Eckstein, 2000; McAdams & Reid, 2005; Reynolds, Pasternak, &Desimone, 2000). Other studies suggest that attention may modulate neural events even earlier in the stream of visual processing – perhaps as early as the lateral geniculate nucleus (O'Connor, Fukui, Pinsk, &Kastner, 2002; also see Yantis, 2008). These results argue powerfully that attention doesn't just change what we remember or what we're aware of. Attention can literally change what we perceive.

Source: Reisberg (2013). Cognition: Exploring the Science of the Mind. 5th ed., p. 128. W.W. Norton & Company: New York.

Text 2
Emotional Contributions of the Left Hemisphere and the Right Hemisphere

One hypothesis relates the two hemispheres of the brain to different categories of emotion. Activity of the left hemisphere, especially its frontal and temporal lobes, relates to what Jeffrey Gray (1970) called the Behavioral Activation System (BAS), marked by low to moderate autonomic arousal and a tendency to approach, which could characterize either happiness or anger. Increased activity of the frontal and temporal lobes of the right hemisphere is associated with the Behavioral Inhibition System (BIS), which increases attention and arousal, inhibits action, and stimulates emotions such as fear and disgust (Davidson & Fox, 1982; Davidson &Henriques, 2000; F.C. Murphy et al., 2003; Reuter-Lorenz & Davidson, 1981).

The difference between the hemispheres relates to personality: On average, people with greater activity in the frontal cortex of the left hemisphere tend to be happier, more outgoing, and more fun-loving. People with greater right hemisphere activity tend to be socially withdrawn, less satisfied with life, and prone to unpleasant emotions (Knyazev, Slobodskaya, & Wilson, 2002; Schmidt, 1999; Shackman, McMenamin, Maxwell, Greischar, & Davidson, 2009; Urry et al., 2004).

The right hemisphere appears to be more responsive to emotional stimuli than the left. For example, listening to either laughter or crying activates the right amygdala more than the left (Sander &Scheich, 2001). When people look at faces, drawing their attention to the emotional expressions increases the activity in the right temporal cortex (Narumoto, Okada, Sadato, Fukui, &Yonekura, 2001). People with damage to the right temporal cortex have trouble identifying other people's emotional expressions or even saying whether two people are expressing the same emotion or different ones (H.J. Rosen et al., 2002).

In one fascinating study, people watched videotapes of 10 people. All 10 described themselves honestly during one speech and completely dishonestly during another. The task of the observers was to guess which of the two interviews was the honest one. The task is more difficult than it might sound, and most people are no more correct than chance (about 5 of 10). The only group tested that performed better than chance was a group of people with left-hemisphere brain damage (Etcoff, Ekman, Magee, & Frank, 2000). They got only 60% correct –not great, but at least better than chance. Evidently, the right hemisphere is better not only at expressing emotions but also at detecting other people's emotions. With the left hemisphere out of the way, the right hemisphere was free to do what it does best.

In another study, 11 patients went through a procedure in which one hemisphere at a time was anesthetized by drug injection into one of the carotid arteries, which provide blood to the head. (This procedure, called the Wada procedure, is sometimes used before certain kinds of brain surgery.) All 11 patients had left-hemisphere language, so they could not be interviewed with the left hemisphere inactivated. When they were tested with the right hemisphere inactivated, something fascinating happened: They could still describe any of the sad, frightening, or irritating events they had experienced in life, but they remembered only the facts, not the emotion. For example, one patient remembered a car wreck, another remembered visiting his mother while she was dying, and another remembered a time his wife threatened to kill him. But they denied they had felt any significant fear, sadness, or anger. When they described the same events with both hemispheres active, they remembered strong emotions. So evidently, when the right hemisphere is inactive, people do not experience strong emotions and do not even remember feeling them (Ross, Homan, & Buck, 1994).

Source: Kalat (2013). Biological Psychology. 11th ed., p. 351. Cengage Learning International: China.

Quiz 1.1
Questions for Early and Late Selection

1. Julia was closely watching her favorite team play football. Her team was on defense. When the play ended, medical staff stepped onto the field to help a player on the other team. Julia had no idea what had happened to the player. In line with the information in the article, Julia is likely to have…
A. Not seen the player get injured because she was looking at the scoreboard.
B. Seen the player get injured, but not fully processed this because she was not focusing her attention on the players from the other team.
C. Seen the player get injured but blocked it out because it was such a violent hit.
D. Seen the player get injured but forgotten about it already.

2. According to the information in the article, paying attention can…
A. Be like turning on a light bulb.
B. Exhaust the mind.
C. Make the attended object blend with surrounding objects.
D. Be similar to enlarging an object.

3. In late selection the brain _____ all stimuli, and then _____ the relevant stimuli.
A. Ignores; processes
B. Processes; ignores
C. Attends to; ignores
D. Processes; attends to

4. All else being equal, when neurons in the V4 area are less responsive to visual information, it is most likely due to…
A. Bright lighting.
B. Shadows.
C. Focused attention.
D. Distracted attention.

5. According to the early selection hypothesis, when someone reaches an intersection where he would like to turn right and then fails to stop at the red light before making the desired turn, he most likely…
A. Noticed the road name on the sign, recognized that this is where he wished to turn, and proceeded to turn without noticing the red light.
B. Noticed the road name on the sign, noticed the red light, and also noticed that no cars were approaching the intersection, proceeding to turn right.
C. Ignored the light because he was running late
D. Ignored the light because he wanted to arrive early.

6. According to the late selection hypothesis, when someone reaches an intersection where she would like to turn right and then fails to stop at the red light before making the desired turn, she most likely…
A. Noticed the road name on the sign, recognized that this is where she wished to turn, and proceeded to turn without noticing the red light.
B. Noticed the road name on the sign, noticed the red light, and also noticed that no cars were approaching the intersection, proceeding to turn right.
C. Ignored the light because she was running late
D. Ignored the light because she wanted to arrive early.

7. Josh was walking to work along his usual route. A reporter was doing a piece on a new restaurant that had opened. Josh walked around the cameraman to avoid being in the shot. He saw the report on the news that night and was amazed that he remembered nothing about the event, given he walks by the restaurant every day. According to late selection, Josh most likely…
A. Saw the cameraman but did not recall the event because it was unconsciously processed.
B. Saw the cameraman but did not recall the event because too much time had passed until the newscast.
C. Saw the cameraman, walked around him, but had determined the cameraman was unimportant to his walk and therefore did not fully process the event related to the cameraman.
D. Saw the cameraman, walked around him, but had determined the cameraman was unimportant to his walk and therefore did not store the event in memory.

8. In early selection, the brain processes _____ stimuli, after _____ other stimuli.
A. Unimportant; Focusing on
B. Important; Focusing on
C. Unattended; Ignoring
D. Attended; Ignoring

9. Late selection supports the idea that people…
A. Unconsciously determine what to pay attention to and what to ignore immediately.
B. Unconsciously processing all stimuli before focusing their attention.
C. Consciously determine what to pay attention to and what to ignore immediately.
D. Consciously process all stimuli before focusing their attention.

10. Unconsciously ignoring an object within 80 ms of encountering the object is an example of…
A. Selective Attention Theory.
B. Early Processing Theory.
C. Early Selection Theory.
D. Early Attention Theory.

Quiz 1.2
Questions for Emotional Contribution of Left and Right Hemispheres

1. Jennifer was lost in the park when she was 8 years old. When a security guard found her, she was crying hysterically. When Jennifer was an adult, she and her mother were reminiscing about the day she was lost. Jennifer tells her mother that she was not crying when the security guard found her. Jennifer most likely…
A. Did not remember that she was crying.
B. Blocked out the bad memory.
C. Has some damage in her left hemisphere.
D. Has some damage in her right hemisphere.

2. As Daniel hears a woman laughing on the radio, which part of his brain should be responding to that sound?
A. Right Hippocampus
B. Left Hippocampus
C. Left Amygdala
D. Right Amygdala

3. Carter is 16 years old. He stays in his room often. At the dinner table, he rarely has much to talk about. He tends to look down a lot and often mopes around the house. He rarely smiles. Carter most likely has…
A. An inactive right hemisphere in the prefrontal cortex.
B. An inactive left hemisphere in the prefrontal cortex.
C. A relatively hyperactive right hemisphere in the prefrontal cortex.
D. A relatively hyperactive left hemisphere in the prefrontal cortex.

4. The Behavioral Inhibition System (BIS) is associated with the _____ hemisphere and increases _____
A. Right; Attention
B. Left; Attention
C. Right; Action
D. Left; Action

5. Julia was watching a horror flick when she heard a noise outside. She felt frightened. Julia has most likely received a signal from the…
A. Behavioral Activation System (BAS)
B. Behavioral Inhibition System (BIS)
C. Left Amygdala
D. Right Amygdala

6. Greg sees a good-looking girl and he wants to ask her out. He is nervous, but he walks right up to her and starts a conversation. It is likely that Greg has received a signal from the….
A. Behavioral Activation System (BAS)
B. Behavioral Inhibition System (BIS)
C. Left Amygdala
D. Right Amygdala

7. Teri turned in a report to her boss. She did not realize she had missed the deadline by two days. Her boss frowned at her and said, "Thanks a lot", in a stern voice. Teri proudly responded, "You'rewelcome". Teri most likely has…
A. Lefttemporaldamage.
B. Right temporal damage.
C. A relatively hyperactive right hemisphere.
D. A relatively hyperactive left hemisphere.

8. When the left hemisphere is inactivated, and the right is relatively hyperactive, what is a likely behavior?
A. Dancing
B. Sleeping
C. Hugging
D. Ignoring People

9. When the right hemisphere is inactivated, and the left is relatively hyperactive, what is a likely behavior?
A. Fighting
B. Sleeping
C. Hugging
D. Studying

10. Kelli received a letter saying she had been denied a position that she applied for. Kelli immediately calls the company and expresses her anger at their decision. Kelli is most likely experiencing high levels of activity in her…
A. Hippocampus.
B. Amygdala.
C. Right hemisphere.
D. Left hemisphere.

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