

Flashing Highlighting versus Inverse Highlighting as a Cueing Strategy: Effects on Comprehension and Reading Rate

閃爍及反白螢幕強調技巧對英文閱讀速率
及印象強化程度的影響

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Abstract

The purpose of this study is to compare the degree of effectiveness of flashing and inverse highlighting techniques on the retention and reading rate for reading a text on a computer screen. A 1410 words reading passage was used for this experiment. The readability analysis shows that the passage was under an 11-12th - grade reading level. The experimental results show that both highlighting techniques improve the retention of the reader on a highlighted part of the text. However, the degree of improvement is not at a significant level on the statistical point of view. The flashing highlighting technique interrupts and monopolizes the attention of the reader. Some factors that can influence the effectiveness of highlighting techniques are discussed in the text.

摘要

本文說明閃爍及反白螢幕強調技巧應用於閱讀電腦螢幕上的英文文章時對閱讀速率及閱讀印象影響的程度。使用壹篇含有1410字，可讀性分析為11~12級的文章對英專四年級程度以上的學生進行實驗。實驗結果顯示運用此二種技巧於文章重點部份可以改善讀者對文章重點部份的注意力及閱讀印象。不過從統計學的觀點來看，這種改善程度還沒有達到顯著差異的程度。閃爍螢幕強調技巧會干擾讀者對文章的注意力並使讀者對文章重點部份的注意力偏極化。本文中對影響閃爍及反白螢幕強調技巧有效性的一些因素有詳細的探討。

INTRODUCTION

The number of people using computers is increasing greatly. Concern for screen design of computer Assisted Instruction (CAI) has also risen dramatically. The design of effective computer screens requires knowledge of the special characteristics of computer-driven screens, an artistic sense of layout and balance, creativity, and sensitivity to the characteristics of the people who will be viewing the screens. In this study the screen design strategies of some characteristics of computer display were emphasized. Computers can communicate to students through three basic channels: sound, graphics, and text. The major communication channel between computer and students is text. This text must be written very clearly and well. When textual material is difficult or lengthy, some form of attention-stimulating and cueing devices are necessary because attention-directing cueing can improve learning.

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Typographical cueing systems arise from the text itself. Typographical cueing as used here, refers to the emphasis of various words in the context of printed material which appear on the computer screen. Among the popular techniques of these cueing systems were the use of highlighting, asterisks, checkmarks etc., usually in a color or brightness level that contrasted with the text print. The most recent isolation method in widespread use in the textbooks examined is highlighting. Highlighting changes the background color of a line of black-on-white print.

This study was devoted to comparing the effectiveness of two highlighting techniques with a non-highlighting text condition. The two techniques were: flashing and inverse of writing which appeared on the computer display. Both flashing and inverse attributes lend emphasis to keywords on the screen and change the appearance of the screen. Flashing refers to "the intermittent display of a graphic entity" (Heines, 1984). Texts under flashing code will actually appear or disappear in an on/off manner. Inverse refers to dark characters in light background of a line of monochrome display screen.

Comparing these two highlighting techniques, flashing is in an on/off manner, inverse is in a steady condition. Both of them have significant visual value. A detailed analysis implied that highlighting improved retention of selected material, and highlighting seemed most effective when the reader had maximum faith that the highlighter could discriminate between important material and trivia (Fowler & Barker, 1974). In Fowler and Barker's experiment, the test items based on material highlighted were passed significantly more often than were remaining items in every comparison performed. Klare et al. (1955) found that highlighting selected words improved immediate retention scores for more able readers but could hinder less able ones. Also Glynn (1978) found that highlighting intentional information provides nonverbal cues which readers used to help define their decision criteria. All the above studies accumulate evidence that highlighting does facilitate learning under certain conditions. However, there is no research to compare the effectiveness of flashing and inverse highlighting techniques in improvement of retention.

The first purpose of this study is to compare the degree of effectiveness of flashing and inverse highlighting techniques in improvement of retention. This purpose will be referred to as hypothesis 1 in the discussion part. Alessi and Trollip have suggested that flashing is the most significant form of highlighting. Though flashing type are the strongest visual attributes used in text because they immediately catch viewers' eye, designers are cautioned that flashing should be used sparingly and never flash two separate areas of the screen at the same time (Heines, 1984). This is because the continuous use of flashing would fatigue the viewer (Heines, 1984). Stammerjohn, Smith, and Cohen (1981) found that 68% of the Cathode-Ray-Tube (CRT) operators complained of flashing. Flashing is a temporal luminance change of a luminous field caused by the fading and sequent regeneration of that field on the display. This condition may result in operation of the internal and external muscles of the eye in excess of that required for normal levels of focusing and eye movement. Such excess muscular

activity may be perceived as visual fatigue or eyestrain by the operator. Smith and Goodwin (1972) conducted research where the entire screen display blinked or was steady while the subject read the text for "typographical errors". They found that the rate with the flashing text display was 10% slower than the non-flashing display. Frantz (1985) found that a little decrease in reading rate when subjects were given a text screen using flashing as highlighting.

However, no definitive conclusion about the flashing effect on reading rate has been made in the literature. In this study, the flashing and inverse highlighting effect on reading rate will also be studied. This study will be referred to as hypothesis 2 in the discussion part.

Experimental Method

Subjects

Forty-five 4th and 5th year students participated this study. Since the article "Points of origin" was not an easy passage for students to read, students who were interested in this study had to be good at English. In order to diminish the effect of the difference in English reading ability of students in this study, the students who met the following requirements were chosen to take the test.

For 4th year students, the grade of the course "English Reading and Conversation" during their third-year study must be in the range of top 1/3 of the class. For 5th year students, the grade of the course "English Reading and Conversation" during their third-year study must be in the range of top 1/2. The score curve of post-test showed a near Boltzmann distribution characteristic (see fig. 1). This result suggested that the influence of "the difference in English reading ability" of students on the test was effectively reduced under these criteria. Sessions were held in a normal microcomputer lab containing 6 IBM compatible personal computers. The distance between the monochrome screen and subjects was about 20 inches.

Materials

A 1410-word reading passage was used for this experiment. The article "Points of Origin" was from the magazine, Smithsonian. Appendix A contains the entire passage. The passage describes techniques and artifacts that helped settle the American West that were originated by European lower classes of the Middle Ages. The article has very interesting information that students might get knowledge about the life style of American West, thereby providing a motivational basis to read the passage with interest and care.

Furthermore, the subjects were faced with a body of "brand new" information that they probably had never considered about the relationship between the American West and the Middle Ages of Europe.

A readability analysis which used six readability scales was conducted on the body of the passage. The results are summarized in Table 1. The results show that an 11 to 12th-grade reading level should be sufficient for subjects in reading and comprehending this article.

TABLE 1: Readability Analysis on Six Scales of "Points of Origin"

Readability Scale	Approximate Grade Level
1. Dale-Chall :	12.3
2. Mclaughlin-SMOG :	12.5
3. Raygor :	11.0
4. Fry :	8.7
5. Gunning-Fog :	13.1
6. Flesch Reading Ease Index :	56.3
7. Grade equivalent :	11.1
Sample Size: 418 words	

Text was displayed on monochrome monitor. Display of text was controlled by an IBM personal computer with an upper and lower case character generator. It comprised 15 frames, having an average of 93 characters among 44 and 127 words, with an average of 4 words flashed or inversed per display. Three kinds of frames contained flashing phrases of text (treatment group), inverse phrases of text (the other treatment group), or non-flashing and non-inverse phrases of text (control group). Frames #1, #7, #15 were held steady for the three treatments. The ratio of flashing (inverse) to non-flashing (non-inverse) words ranged from 0.021 (#13) to 0.113 (#3). On frames #2, #3, #4, #5, #9 an "excessive flashing (inverse)" strategy was used (ratio greater than 0.057). On frames #6, #8, #10, #11, #12, #13, #14 a "minimal flashing (inverse)" strategy was used (ration less than 0.053). The experiment was to have three alternating versions of text screens, one containing the "flashing" words, one containing the "inverse" words, and the other one without. The words which flashed or were inverse are highlighted. This method ignored the number of flashing or inverse words appearing in a frame, and the flashing rate. The words which were chosen for highlighting in the flashing or inverse treatment emphasized central concepts and key words (Glynn, 1978; Ausubel et al, 1978)

Text was delivered in full-page form. A new page was presented whenever the ENTER key on the keyboard of the computer terminal was pressed. Text appeared in standard order: left-to-right and top-to-bottom. There are two parts in the program, reading and testing. The testing part contains 16 multiple-choice questions derived from the reading part.

Criterion Measure

Subjects are randomly assigned to three groups, two experimental groups and a control group. No subjects participated in more than one group. A sixteen-question, multiple-choice

post-test administered immediately following the reading passage was the criterion used to measure the retention of textual material. The time taken in answering questions was not recorded.

Questions #1, #2, #4, #6, #8, #10, #12, #14 contained the same words or a similar paraphrase of concepts that had flashed or inversed. The other 8 items (#3, #5, #7, #9, #11, #13, #15, #16) contained non-highlighted points of the article. Those points may have been ignored or passed over by the subjects because their attention was drawn more to the highlighted material. Subjects were asked 16 questions post-test plus one further question.

Question 17 asked the subject about the degree to which they felt the flashing or inverse helped or hindered their understanding. Time spent to finish the reading and the scores from the testing part were recorded. For each display, timing occurred from the beginning of the display's appearance to when the ENTER key be pressed. For each individual, total time consumption was the sum of time for all 15 text displays.

Procedure

At the beginning of each session, subjects were told that they would read a passage that would tell them about the similarity between the American West and the Middle Ages of Europe. They were told that they were participating in a research study concerned with screen design. The program did not allow any review of previous frames once the reading began. The new screen was presented after ENTER keypress. The program recorded 1) the time taken to read the essay, and 2) each answer selected on the post-test. The end page of the program showed each subject the total time usage of reading text and the sum of correct answers selected by him or her.

Results and Discussion

Hypothesis 1

Most forms of highlighting have been proved that are effective in improvement of retention. So, the content of hypothesis 1 is "the reading text with salient information inverse highlighted would recall the same degree of information as well as the flashing highlighting."

The results of individual scores are recorded in Appendix B. Results of subjects' comparisons on post-test mean are summarized in table 2, table 2-1, table 2-2. The results of the 16-item post-test show higher than expected means. Comparing the performance of the three groups, there are no significant results obtained. Over all items, the flashing group obtained the highest mean score (12.00), the control group had the lowest mean (10.67).

When the items regarding highlighted points are separated from the items regarding non-highlighted points, the mean score for the inverse and flashing group increases more (from 4.53 to 6.13; from 5.66 to 6.33) than the control group (from 5.33 to 5.80). However, the difference was not at a significant level ($F=0.74$; $df = 2.42$). Several factors can influence the

effectiveness of highlighting techniques. Some possible factors are suggested as follows:

(1) The items were not related well to the passage.

To determine the relationship between test and passage, I had a pilot test to 7 volunteers to answer my pre-designed essay questions. From this pilot, I threw away the inappropriate questions and rewrote the statements until the items were proved to be appropriate to the passage. Therefore the first possibility was ruled out.

(2) The items of post-test were too easy.

The items of my study appear easy to answer. "The degree of item difficulty is 0.75 which means that the items were easier than best level of difficulty (0.5 to 0.7). However, the average discrimination of this test was 0.2 which suggest that the items are clear enough to discriminate the good readers and poor readers. Figure 1 illustrates the score curves for three groups. A negative skew is found which means that the test items are too easy. This is consistent with the calculated degree of item difficulty. When the test items are too easy, students do not need to memorize items, whether they are highlighted or not. Therefore, the highlighting technique lost its effectiveness.

(3) Subjects did not trust the highlighted points of passage.

Fowler and Barker pointed out (1974) "The degree of enhanced retention of isolated material by passive readers may ultimately depend on the amount of faith they have in the judgment of the person who did the highlighting." In fact, bias may develop when the student notices there is a discrepancy between the prehighlighted text and his judgment of what is important. In this case, the highlighting technique loses its effectiveness. The last two reasons are possible explanation for why the results were not significant.

Hypothesis 2

Because flashing would fatigue the viewer's eye and none of the literature mentioned that inverse highlighting also slow down the reading rate, therefore, the content of the hypothesis 2 is the flashing technique will slow down the reading rate on highlighted text, but not with inverse.

Results of time viewing are summarized in Table 3, Table 3-1, Table 3-2 and Table 3-3, which show the mean viewing times in seconds obtained from the two experimental groups and control group.

There are no statistical significant differences found comparing the three separate groups. A higher F value was obtained when the mean of time viewing the five excessive frames for the flashing group and inverse group were compared to the control group mean of time viewing for the same frames ($F=0.89$; $df = 2,42$). In this study, flashing is in an on/off manner and used in different areas in the same screen.

Question 17 asked the subject about the degree to which they felt the flashing or inverse helped or hindered their understanding. From the reaction of subject, they feel flashing

interrupts and monopolizes their attention. In such a situation, subjects lose motivation to read carefully and hope to read quickly to move to the next screen. This may explain why the F value is higher in the excessive frames condition. In minimal frames condition, the usage of highlighting is low. So there might still be the same effect, but not detectable.

TABLE 2 : Among Subjects Comparison on Post-test Means.

	N	All Items	Highlighted Items	Non-highlighted Items
Flashing	15	12.00	6.33	5.66
Inverse	15	10.67	6.13	4.53
Control	15	11.13	5.80	5.33

TABLE 2-1 : Outcome of One-Way Analysis of Variance of All Items.
Among Subjects of Three Groups comparison on Post-test

Source	df	SS	s2	Cal'cd Value of F	Crit. Value of F (a=0.05)
Among Groups	2	13.7	6.9	1.81	3.22
Within Groups	42	159.0	3.8		
Total	44	173.0			

TABLE 2-2 : Outcome of One-Way Analysis of Variance of Highlighted Items
Among Subjects of Three Groups Comparison on Post-test.

Source	df	SS	s2	Calc'd Value of F	Crit. Value of F
Among Groups	2	2.2	1.1	0.74	3.22
Within Groups	42	61.5	1.49		
Total	44	63.7			

TABLE 3 : The Mean Viewing Time (in seconds)

	N	All Frames	Excessive	Minimal
flashing	15	558.4	169.9	275.3
Inverse	15	553.4	176.1	281.1
Control	15	581	208.9	283.2

TABLE 3-1 : Outcome of the One-Way Analysis of Variance of All Frames Among Flashing, Inverse and Control Groups

Source	df	SS	s2	Calc'd Value of F	Crit. Value of F
Among Groups	2	2.2	1.5	0.89	3.22
Within Groups	42	54.1	1.7		
Total	44	57.1			

TABLE 3-3 : Outcome of the One-Way Analysis of Variance of Minimal Frames Among Flashing, Inverse and Control Groups.

Source	df	SS	s2	Calc'd Value of F	Crit. Value of F
Among Groups	2	0.14	0.07	0.03	3.22
Within Groups	42	102.3	2.3		
Total	44	102.44			

Response to Question 17

TABLE 4 shows that a negative attitude toward flashing highlighting, but a positive attitude toward inverse highlighting. There was no correlation between the attitude of a subject and either his score or time.

TABLE 4 : Effective Response Toward Flashing Highlighting or Inverse Highlighting (Question 17)

Valuation	Frequency(Flashing)	Frequency(Inverse)
A : It was quite help	0	4
B : May have helped	1	10
C : More of a hinder	6	1
D : A real nuisance	8	0

Conclusion and Suggestion

Based on both literature and the results reported here, we can draw the following conclusions :

1. Under our experimental condition, the flashing technique and inverse technique did not produce any significant difference of reading rate on highlighted text.
2. When test items are too easy, both inverse highlighted and flashing highlighted techniques showed the same degree of salient information as non-highlighting condition.
3. A negative attitude toward flashing highlighting, but a positive attitude toward inverse highlighting. Following the results of this work, we found some interesting questions and would like to suggest some experiments which may be helpful in further understanding of the flashing or inverse highlighting technique. (1) Inverse can sometimes have a better effect by Assigning both the inverse videos and boldface attributes simultaneously (Heines, 1984). Will they cause better effectiveness if the flashing and inverse attributes were assigned simultaneously? (2) A direction-menu usually help subjects to know the objective of passage. Will a direction menu to tell subjects that flashing or inverse highlighted points are related to the items of post-test cause better effectiveness too? (3) According to the results of this study, the highlighting technique was not useful for easy test items (item difficulty value is 0.75 in this study). Does the highlighting technique result in better effectiveness for harder test items and less effectiveness for easier test items? There are many answers waiting to be found.

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Appendix A : The article "Points of Origin" (The underlined parts are highlighted)

The scene has a haunting familiarity. In a desolate landscape, a band of 50 men, mounted and armed to the teeth, awaits a lonesome traveler, a treasury agent. Closer, closer

the rider comes, and as he clears the last hillock and descends into a little draw, the ambush is on ...

The locale here could well be Tombstone, Arizona, or Dodge City, Kansas-the American Wild West of the 19th century. But it's not. This action was played out in Leicestershire, England, a few miles from the sleepy village of Melton Mowbray. The date was January 19, 1326. And the gang was that of the notorious Folville brothers-Eustace, Robert and Walter-who were about to dispatch an unscrupulous tax collector, a baron of the exchequer named Roger Bellers.

Still, *the similarity to the Wild West* is striking. In both periods, men (gunfighters and knights) rode about on horses, drank booze, played cards-and faced the threat of death at every turn. In 1350 and 1850, many facets of life were similar.

Actually, this observation is not new. Back in 1965, UCLA historian Lynn White jr. wrote an essay in the medieval journal *Speculum* pointing out that much of the technology of the American West was derived directly from the Middle Ages. After noting that most of the ideas and artifacts that helped settle the West were brought over by European lower classes, White went on to suggest that even today we are closer to the Middle Ages than Europe is.

This was news to me, but it made sense. White had taken a number of disparate facts about the West and fashioned them into a challenging thesis. Take the *log cabin*. This was a typical medieval Scandinavian construction, first brought to Delaware by the Swedes. Similarly, the Conestoga wagon was originally the *Longa Caretta* of the 12th century.

The stage coach was first depicted in an Anglo-Saxon manuscript of the early 11th century.

In 1931, the Great Plains chronicler Walter Prescott Webb showed how three inventions were critical to opening up our Western frontier: *the revolver, barbed wire and the windmill*. White agreed with this, but went on to demonstrate that all three were dependent on technology essentially developed in Europe between 1100 and 1500. Or consider spurs. Modern Swedish archaeology shows that simple, pointed spurs with a loose ball or small plate (11th century) and then by rowel spurs, with the disk first horizontal, then vertical (13th century). Apparently, the Western buckaroo and the wandering knight both "jingled" as they rode.

The saloon of the Old West traditionally served whiskey, a 14th-century invention. Alcohol had been distilled from a wine base to make brandy in 12th-century Salerno, and from a grain base as usquebaugh (whiskey) in Celtic lands. ScotchIrish immigrants brought the technique to Pennsylvania in the 18th century.

The cowboy's staple pastime, the card game, was also a late-medieval invention. Introduced in Italy in the early 15th century, card playing quickly spread to France, Spain and England.

In fact, when you think of the two ages, it is not too fanciful to see the Western gun-fighters as a knight in mufti. The two had a lot in common. Each earned his livelihood on horseback in a violent society, the sword of one being the six-shooter of the other. Each had a personal code of honor quite apart from the law. At times, each was a symbol of order and of protection; at other times, of carousing and anarchy. And while knighthood was often a lordly estate, in some periods the knight was simply a mercenary of no special status.

In the American West, there was no greater crime than stealing a man's horse. The penalty was death and it was usually immediate. Theft of cattle received a much lighter punishment because cattle were viewed simply as private property, whereas a man's horse was life itself. The lawlessness of the West arose partly because contemporary laws had so little application. As Webb wrote, "Each man had to make his own law because there was no other to make it. He had to defend himself and protect his rights by his force of personality, courage, and skill at arms. All men went armed and moved over vast areas among other armed men. The six-shooter was the final arbiter, a court of last resort, and an executioner."

We like to think of the frontier in 19th century America as a uniquely new challenge to mankind. But in medieval Spain and Portugal, another frontier played a crucial role in the life of the people. There, in the 12th century, the no-man's land was a huge zone between the Christian north and the Moorish-dominated south of the Peninsula. Curiously, this was a place somewhat akin to the Americans, where the contest was not with the Moors but with the Indians. The land scope appeared the same: High plains and brush vegetation with grass in season. Water was scarce. It was, in fact, ideally suited to sheep and cattle ranching.

With *the reconquest of Spain* vast new areas were opened up to ranching, the first time that beef and hide raising had been tried on a large scale in Europe. The 12th-century experiment that began on the northern meseta flourished on the Andalusian plain, reaching its height in the 16th century. This, according to D.J. Bishko of the University of Virginia, gave rise to the greatest cattle industry in history, ranging from Argentina to Canada. For Andalusia, Bishko writes, saw the very invention of cattle ranching, with its long overland drives to new pasturage, round-ups for branding in the spring, slaughter in the fall. Here, too, were the origins of the traditional cowpuncher's skills-roping, riding, bulldogging.

There was another side, though. In medieval Spain, the vaqueros (cowhands) were usually accompanied by pastoral military escorts who slept dressed and armed, ready to mount and ride after the raiding Moors. Eventually, as the cattle industry prospered, the Moors were not the only problem. Instead, a familiar litany of complaints began to appear: disputes over grazing rights, ownership of mountain passes, brand changing, crop damage, killing another's stock. Cattlemen and plains men began to fight among themselves, and special courts and laws were established to handle their disputes.

It remains only for the badlands of medieval England to donate the single remaining element to this portrait of the Old West. That is the sheriff, or shirereeve, a sort of tax of-

ficial and justice of the peace, originally appointed by the king as his personal representative in the county(shire). Although the sheriff's title has been traced back to the reign of Ethelred the Unready (978-1016), he was most powerful in the 12th century. After that, he became increasingly a minor official, except in the American West.

It was the medieval sheriff who collected all revenues due the Crown, presided at the shire courts, proclaimed all royal statutes and acted as game warden. The sheriff also called out the posse comitatus, a force of men from the county whose duty was to round up and detain evildoers. Unfortunately, one of the problems with the medieval sheriff was that *he was prey to corruption*, often falling under the control of a single influential family. although no historical Robin Hood has been found, the Sheriff of Nottingham in folk ballads is a stock figure of grasping medieval officialdom.

To be sure, the sheriff's job was a difficult one, for this was a great age of outlaw gangs. There were, for example, the Coterels of the Midlands, who had at least 20 recruits at one point, including a university teacher and a counterfeiter, and were charged with murders, robberies and acts of wanton destruction.

The Coterels occasionally joined forces with the Folvilles, the gang previously mentioned. Oddly, their father was a knight, one brother a priest, another a keeper of the peace. On January 14, 1332, they captured Sir Richard Willoughby, an important justice of the king's bench. A ransom of 1,300 marks was paid to release him. Willoughby, like Roger Bellers before him, was said to be a scoundrel who "sold" the laws "like cows."

The world had to wait until the 19th century, on our Western frontier, to see these conditions return. And then it was not the coterels or Folvilles who would take matters into their own hands, but people with names like James, Dalton and Younger.

Appendix B : Raw data of 45 subjects

	Control Group		Inverse Group		Flashing Group	
	Time	Score	Time	Score	Time	Score
1.	10.08	14	9.63	12	10.08	11
2.	8.56	13	9.73	10	11.31	10
3.	12.20	11	8.24	10	11.31	10
4.	8.66	11	8.55	13	9.18	13
5.	9.62	15	13.58	13	12.03	10
6.	9.07	12	8.95	13	8.82	10
7.	14.56	6	18.13	14	7.92	12
8.	6.87	14	3.82	11	12.44	11
9.	8.14	12	11.36	14	8.97	10
10.	7.10	7	7.78	13	7.36	9
11.	4.63	13	6.61	14	6.51	9
12.	10.16	11	7.65	9	7.35	9
13.	9.93	11	5.74	13	7.71	12
14.	7.46	8	9.20	11	11.35	11
15.	18.12	9	9.39	10	9.96	11

Appendix C : 16 Multiple-Choice Post-test

1. According to the article, what was the similarities between knights of 1350 and gunfighters of 1850?
 - (A) Horseback riding and code of honor.
 - (B) Rode horses, drank booze, and played card
 - (C) Spurs, weapons, and life style of drinking
 - (D) None of the above

2. What is the main point of the essay by Lynn White, published in the medieval journal *Speculum*?
 - (A) Much of the technology of the American West was derived indirectly from the Middle Ages.
 - (B) Much of the technology of the American west was derived directly from the Middle Ages.
 - (C) Much of the technology of the American West was derived directly from the higher classes of the Middle Ages.
 - (D) Much of the technology of the American West was derived directly from the higher classes of the Middle Ages.

3. Walter Prescott Webb was
 - (A) a chronicler
 - (B) a writer
 - (C) a historian
 - (D) an archaeologist

4. Describe the origins of the log cabin as mentioned in Dr. White's thesis.
 - (A) The log cabin was the *longa carretta* of the 12th century.
 - (B) The log cabin was first depicted in an Anglo-Saxon manuscript of the early 11th century.
 - (C) The log cabin was derived from Spain.
 - (D) The log cabin was typical medieval Scandinavia construction.

5. Describe the three types of spurs discovered by modern Swedish archaeology
 - (A) Straight spurs; barbed with horizontal wheels; barbed with vertical wheels.
 - (B) Simple , point spurs with a loose ball or small plate; rowel spurs with the disk first horizontal then vertical.
 - (C) Spurs with a chain; spurs with a ball and single blade spurs.
 - (D) None of the above.

6. The three critical inventions of the Western Frontier influenced by the technology developed
 - (A) between 1300 and 1500 in Europe.

- (B) between 1350 and 1850 in Old West.
(C) between 1100 and 1500 in Europe.
(D) between 1200 and 1800 in Old West.
7. How was the technique of producing Whiskey brought to Pennsylvania?
(A) Scotch-Irish immigrants brought it to Pennsylvania in the 19th century.
(B) Italian immigrants brought it to Pennsylvania in the 18th century.
(C) Scotch-Irish immigrants brought it to Pennsylvania in the 18th century.
(D) Scandinavian immigrants brought it to Pennsylvania in the 19th century.
8. Which country's experiment on ranching in 12th century gave rise to the greatest cattle industry in history?
(A) United Kingdom
(B) Italy
(C) Spain
(D) Sweden
9. Which country played card game at first?
(A) United Kingdom (B) France (C) Italy (D) Spain
10. What were three inventions which were critical to opening up the Western frontier?
(A) The log cabin, conestoga wagon and the stage coach.
(B) Whisky, the card game, and the sheriff.
(C) The revolver, barbed wire, and the windmill.
(D) Roping, riding and bulldogging.
11. Stealing someone's cattle received lighter punishment than stealing horses. Why?
(A) Cattle were viewed simply as private property.
(B) Cattle were viewed a man's life.
(C) Cattle couldn't bring money to cowboys.
(D) Cattle were pets to cowboys.
12. What was the greatest crime in the American West?
(A) Stealing someone's cattle.
(B) Stealing someone's horses.
(C) Stealing someone's property.
(D) Stealing someone's revolver.
13. What are the traditional cowpuncher's skills?
(A) Planting, riding and bulldogging.
(B) Roping, riding and bulldogging.
(C) Farming, roping and riding
(D) Farming, planting and roping.

14. What caused the corruption of the medieval sheriff?
(A) Too much power and authority.
(B) Often influenced by powerful court.
(C) Often fell under the control of a single influential family.
(D) Often received bribes from people.
15. Why was the sheriff's job a difficult one?
(A) There were too many criminals.
(B) Sheriff was only a minor
(C) Sheriff himself committed crimes sometimes.
(D) None of the above.
16. According to the writer, scoundrel is
(A) a person who sells the laws like cows.
(B) a person who has right to sell cows.
(C) a person who knows how to sell cows with a great amount of money.
(D) a person who grows cows in ranching.

Fig. 1. Graph of score curve

