A quantitative experiment: Do visual stimuli help comprehension of news announcement in second language learning?

量的研究：第二言語学習において視覚的刺激はニュース解説聴解を補助するか

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本論文は、大阪府内の2大学において192名の学生に行った実験的試みの報告である。１分間のニュースを流し、それに関連する地図を、視覚的状況と詳細の程度において３つの異なった状態でスクリーンに提示した。視覚的刺激は聴解テストのスコアを上げる、という仮説は完全には証明されず、むしろ、初級レベルの学生においては、視覚的情報はテストスコアを下げる結果となった。この結果から、次の結論が導き出された。視覚的情報が加わったときにおこる目の動きにより、初級レベルの学習者は、ニュース解説の聴解が妨げられる。一方、上級レベルの学習者は視覚的情報により聴解が補助される。

Keywords: Eye movement　comprehension　visual cues　foreign language proficiency　improved scores

1. Introduction

A blank look on someone's face can be disappointing. Hoped-for communication recedes. Focus shifts very slightly from following your expressions and your eyes. The focus shifts to your face as an object. It's a distinctly Gulliver-in-the-land-of-the-giants effect, when the traveler is held in the hand of a giant girl and sees not her whole fact but only a huge pore. Could this blank look return to engaged communication if the eyes were made to move about instead of merely stare? Can the instigation of movement of the eyes be used to extend the hard work of trying to understand language, especially n a language-learning environment of incomplete fluency? In other words, can visual cues improve comprehension?

2. Literature review

At times of problems in comprehending a foreign language, a learner shifts out of interactivity. A student's gaze, for example, may slightly change to looking at the teacher's face as an object. Individual tactics such as visual stimulation can have a small but measurable effect in enhancing comprehension, according to review studies of listening comprehension (Goh, 1998, in Berne, 2004, p. 528).

This study explores a method of visual stimulation designed to increase the attention span by preventing the static vision that is the onset of a "the blank look" of incomprehension.

Creating in subjects a "blank look feeling" might give an opportunity to investigate experimental effects on that lack of attention. The effects, if any, of the experiment on the blank look feeling could be measured. Presenting listeners with a difficult aural text might create in subjects the blank look feeling. Loss of attention might be mitigated by a trick that would cause the listeners' eyes to move rather than being stuck in the blank look.

The uncomfortable blank look feeling has consequences including the "inability to concentrate" associated with "breakdown in listening comprehension" (Amna, 2006, p. 36). Repetition and redundancy sometimes benefit and sometimes detract from listening comprehension, Amna reported in reviewing literature (p. 36). This experimental study provides repetition and redundancy as visual stimuli designed to complement and augment the aural. "Among the four skills, the aural/oral are the most neglected skills at the different educational levels," Amna wrote (p. 37) of the Saudi Arabian university students to whom English was a second language.

Not all blank looks indicate disinterest. Daniel C. Richardson of Cognitive, Perceptual and Brain sciences at University College, London, commented on the research design for this experiment: "First, it could be the case that what you term a 'blank look' may not always signal disengagement, but could signal heavy cognitive processing" (D.C. Richardson, personal communication, August 11, 2010).

Glenberg, Schroeder and Robertson (1998) found in a review study that looking away from the immediate surroundings improves "performance" of answering moderately difficult questions, speculating that "averting the gaze helps people to disengage from environmental stimulation and thereby enhances the efficiency of cognitive processing directed by nonenvironmental stimulation" (p. 651).

Therefore, the term "the blank look" must be understood in this study as a look of disinterest and disengagement rather than of averting the gaze temporarily in engagement of a cognitive

task.

"Secondly," Richardson added of the research design, "there is the nature of the 'informative flashing cue.' You state that 'the subway stations light up when the news story is describing each of a variety of stations.' In our paper, the pictures were not exactly lit up when they were relevant to the discourse: they were lit up when the speaker looked at them. These two things are slightly different…. This distinction is not important if you are mostly concerned with the relationship between visual cues and learning, but might be relevant if you want to make more specific claims about gaze coordination."

The blank look, for purposes of this experiment, is distinguished from a look of engagement. The vacant expression results from a decrease in frequency and range of eye movement. However, the impression that the eyes completely stop moving when attention wanes is incorrect. Movement may slow, and focus may change, but the eyes never cease movement, according to psychologist Purcell (J. Purcell, personal communication, August 22, 2010). Saccade, a rapid jerky movement such as when changing focus along a horizontal or vertical axis, is one of various kinds of eye movement, and it includes pursuit eye movement.

"Abrupt rapid small movements of both eyes, such as when the eyes scan a line of print, the saccades can be divided into two distinct groups: the major saccades that are easily observed with the naked eye and the minor saccades that are virtually unobservable without special instrumentation" (MedicineNet, 2010).

Tracking eyes movements to study cognition has become a popular academic and clinical practice. "Language use often occurs within rich visual contexts … and the interplay between linguistic processes and visual perception is of increasing interest to psycholinguists and vision researchers," according to Richardson and Dale (2005, p. 1046).

Richardson and Dale (2005, p. 1047) predicted, in one of a pair of experiments, "… the relation between eye movements and comprehension would be causal. If we manipulated a listener's eye movements we would influence his or her understanding."

On the clinical level, eye movement desensitization and reprocessing (EMDR) as a therapy is listed as an effective treatment by the American Psychiatric Association, Departments of Defense and Veterans Affairs, International Society for Traumatic Stress Studies, and numerous international agencies. The seminal study (Shapiro, 1989) reported amelioration of distress when a therapist elicited traumatic memories by following the eye movements of patients.

Posmontier, Dovydaitis, and Lipman (2010) introduced health care providers to the technique of EMDR, explaining that "After experimenting on 7 patients with symptoms of PTSD, [Francine Shapiro, Ph.D.] hypothesized that saccadic eye movement or any bilateral stimulation

of the brain causes activation of an adaptive information processing system, which facilitates reprocessing of distressing thought into positive thoughts" (p. 756). While English language acquisition is not usually traumatic, eye movement manipulation could have a positive learning effect on a difficult cognitive experience.

Clearly, eye movements holds important clues for cognitive processes, and eye movement manipulation has academic, research, and clinical applications. Technological aids proliferate. "…The cost of eye-tracking instrumentation continues to decrease, the quality and precision of instrumentation continue to improve, and research entailing eye-tracking measures is increasingly visible in our research journals and professional conferences," remark Hallowell and Lansing (2004, p. 4).

However, such eye-tracking equipment was beyond the resources of this investigation. How could an experiment's participants' eye movement be observed where there is no instrument to measure it? Presenting a static map does not mean that there would be no eye movement; but the static map would be the reduced eye movement condition compared to maps with changing elements (subway station names). Without being able to track eye movements directly with a camera, this study is exploratory.

Listening comprehension studies have dealt with difference between "more- and less-proficient listeners" including how listeners are classified to level, as well as "strategies versus tactics" according to a review study (Berne, 2004, p. 521). Visualization strategies were used more among more proficient learners (DeFilippis, 1980, in Berne, p. 523). Less proficient listeners used different patterns from more—proficient listeners to interpret aural input, relying more on pronunciation of unknown words (Murphy, 1986, 1987 in Berne, p. 524). And more-proficient listeners could better "re-direct their attention to task if distracted" (O'Malley et al., 1989, in Berne, p. 524).

3. Research questions

Hypothesis

1. Visual stimuli will increase comprehension.
2. Accurate visual cues will increase comprehension.

3a. The advanced-level English students will benefit more from the manipulations than the intermediate-level students;

3b. The accurate manipulations will increase the scores more than the arbitrary (non-informative) manipulations.

4. Experiment

4.1 Methods

4.1.1 Group

This experiment manipulates eye movement during a listening task, and measures resulting changes in comprehension.

Experimental subjects are about 200 Japanese men and women in university classes who do not understand the English language fluently.

On a big screen at the front of a classroom, they are shown a subway map of a recent (Spring 2010) Moscow terrorist attack while hearing the news report in the English language about the attacks. They see the names of all the subway stations along a subway line in yellow letters on a red background on the map. In the manipulated conditions, the colors of the station names mentioned in the news report are switched to the reverse colors, red letters on a yellow background.

The classes are divided into three groups, and randomly assigned to one of three the conditions.

Group 1 does not get any visual cues. In other words, the map stays the same.

Group 2 gets visual stimuli. However, the station names switch colors consecutively along the train route. The switch does not correspond directly to the audio mention of station names, but are “shuffled” (in the term of Richardson & Dale, 2005, p. 1056). These visual cues are similar to the “bright onsets” of Richardson & Dale (2005, p. 1056).

Group 3 gets accurate visual stimuli, similar to “synchronised” in the term of Richardson and Dale (2005, p. 1056). When the news story mentions a station, the map changes to show a PowerPoint slide with the mentioned station name in the reverse-color scheme from the stationary map.

The comparison of effects was measured by a post-stimuli comprehension test.

4.1.2 Participants

192 undergraduate students enrolled in classes to study English at Kansai University and at Osaka University participated in the experiment in December 2010 and in January 2011. English was a second language to all the students. Classes were debate and conversation and essay-writing. Student mastery of English varied between intermediate and advanced. Students’ majors varied among English, other languages, and informatics. Students were in 11 classes taught by three native English teachers.

Classes were randomly assigned to condition (See Table 1).

Table 1　Random assignment to condition

Condition	English fluency	N
1. No cues	Advanced	21
	Intermediate	31
	Total	52
2. Consecutive cues	Advanced	32
	Intermediate	23
	Total	55
3. Accurate cues	Advanced	26
	Intermediate	59
	Total	85
Total	Advanced	79
	Intermediate	113
	Total	192

The participants are from two universities and their general English levels (such as TOEIC scores) can be useful.

Universities divide students into appropriate classes of language fluency in different ways. Some universities might weight the listening scores, rather than attending to a simple grammar score. Furthermore sometimes TOIEC scores are modified by student performance during entry interviews.

In this study, categorization as advanced or intermediate level of fluency did not map onto division by TOIEC scores at Osaka University and Kansai University.

At Osaka University, this study's intermediate participants were in classes of range 580-630 in TOEIC, and advanced were above 630 in TOEIC. A few participants categorized for this study as intermediate had no TOEIC scores because they attended the night school; their level was by self-reports as well as judgment by the teacher.

At Kandai Takatsuki campus, this study's intermediate level of fluency participants were in classes at level lower than TOEIC 490, and advanced participants were in classes whose levels required minimum TOEIC 490.

At the Kandai Senri Yama campus, this study's advanced level of fluency participants were in classes ranging from TOEFL 300-630.

Categories for this study were made according to class designations (advanced, debate, composition) rather than categories of TOEIC scores. Indeed, it would be interesting for a future study to run the data again using the TOEIC score criteria for "advanced" and "interme-

diate," and compare the results.

Students signed human subject agreement forms provided in English and Japanese languages, and were told that participation was voluntary and anonymous and would have no influence on course grades or student status.

4.1.3 Design

A PowerPoint presentation of 1 minute 10 seconds had a map of the Moscow subway system and narration of the terrorist bombing incident of Spring 2010. The subway map provided the opportunity for the experimental manipulation. The control, Condition 1, was the unchanging map. Condition 2 manipulated the map by highlighting the station names consecutively, one station for each of the ten PowerPoint slides. Condition 3 manipulated the map by highlighting the station names accurately, matching the narrated mention of that station; five stations were highlighted on five separate slides in Condition 3, defaulting to the non-highlighted map in the other five slides where a station name was not mentioned in the narration. The default appearance of the subway map, Condition 1, was no highlighting, with the station names written in yellow lettering on a red rectangular background. The map of the subway system was in Russian. Along the bombed subway line running diagonally across the map, the station names in English were pasted onto the Russian language map.

It could be anticipated that the spelling of the station names hinder listening comprehension, as the Russian spellings in Romaji do not correspond to the sounds. However, showing the station names in katakana would have disrupted the intensive English language classroom setting of the experiment.

Color highlighting, suggested by the head of the Multi-media department of Berkeley City College in California, toggled between red letters on a yellow background and the reverse. "The goal is to keep people's eyes moving," Professor Marrs said of graphic multi-media. She added that the colors red and yellow were chosen as a dramatic contrast. The experimental manipulation was designed according to these suggestions (L. Marrs, personal communication, August 21, 2010).

The students in Condition 2 and Condition 3 were to deal with the stimuli of color change. They would see the color change on a station name whenever a PPT slide changed, on an average of once every ten seconds, and they were to treat the change as relevant information which would not bog down their comprehension. Condition 3 information would be more relevant than Condition 2, showing not only the train line but the station on the train line corresponding to the narration on that slide.

The primary researcher, who is an experienced radio producer, recorded the narration, text amalgamated from published and broadcast news reports, as follows:

> Moscow. 29 March 2010. Russia Suspects Terrorists in Moscow Subway.
>
> Russian authorities blame female suicide bombers for the two explosions at metro stations during rush hour Monday morning. Russian authorities have opened hotlines for relatives seeking information about victims.
>
> The first explosion occurred on the *Red Arrow* train at the Lubyanka station at approximately 8 o'clock local time. The train started from Yugozapadnaya, and stopped at Lubyanka station. Train doors opened.
>
> A second explosion at the Park Kultury station followed at approximately 8:30 am, caused by another female. At the time of the first explosion she was riding another train from Sokilniki station in the same direction.
>
> At the time of first explosion, the second train had stopped between Frunzenskaya and Park Kultury stations. The bombs were at the Lubyanka and at the Park Kultury stations.

Post-test questions were translated into Japanese by Mimura, one of the author's colleagues, and printed on an A3-size page next to the same questions in English, and this question sheet was distributed to students immediately after the PowerPoint presentation ended. There was only one question (#3) about location among the five post-test questions:

1. What time of day were the attacks?
2. How many passengers were on the subway trains?
3. Which station was bombed?
4. What gender were the terrorists?
5. How many stations were bombed?

These questions could be characterized as "a relatively coarse measure of comprehension" (Richardson & Dale, 2005, p. 1056). Answering the location question requires either less or more "substantial linguistic processing," in the phrase of Takano and Noda (1993, p. 459), than answering the other questions. The "more or less" depends on whether the information is processed as an unfamiliar Russian word or as a spatial location. The location question was intended as a check on non-spatial comprehension, in other words, comprehension that did not depend on the map, or its manipulations.

The location question implies that only one station was bombed; however, the wording was carefully chosen to avoid the clue that two stations were bombed. The answer of either correct

station would be honored. Answers for the location question could be teased out in data processing to investigate whether the place name was confusing.

4.1.4 Apparatus

Laptop computers ran the PowerPoint presentation. Narration embedded in the presentation ran concurrently with the maps of the subway system. In a preliminary attempt, laptop audio volume was too low and the source too restricted a location (the sound played through the laptop computer) to be heard throughout the room; a variety of rooms and sound systems were used thereafter in the 11 classroom settings, and in subsequent episodes the experimenter tested the sound system before use. Some classrooms provided adequate sound in the audio-visual built-in equipment; other classrooms required a separate audio system by way of traditional heavy portable audio tape recorders linked to the laptop computer by cable.

University technical support provided the apparatus (laptop computers and, as needed, audio tape recorders whose output could handle digital input) as well as expert personnel to connect the machines.

Visual display in all but one classroom was on built-in monitors that were mounted overhead. A projection screen, either built-in to the classroom or mobile, was used for visual display in the few classrooms lacking monitors.

The PowerPoint presentation was shown in three conditions visually, and always with the same narration. The presentation was the same length, about one minute, in every condition.

4.2 Data coding

Data was collected on one printed page, size A3, with facing pages, one page in Japanese and one page in English with the same content; students could respond on either page. Anonymous demographics were coded for gender and age, and for the five post-test question responses. The five comprehension questions were multiple choice, six choices given for each question, one of the choices being “I don’t know.” Each response was coded and checked, and data entered into an Excel spreadsheet. Preliminary statistics were done in Excel; however, many necessary calculations were beyond the scope of that general purpose processing tool, including ANOVA and Tukey HSD post hoc analysis. The Excel spreadsheet was sent to a colleague, Ito, experienced in statistics, who imported the data into the SPSS (Statistical Package for Social Science) software and ran the quantitative tests.

4.3 Data analysis

The independent variable was the conditions (3 levels.) The dependent variable was the scores. The design is a one-factor between-subjects design with three levels of the independent variable (conditions 1, 2, and 3). See Table 2 below.

Table 2　Comprehension test scores for 5 questions

Condition	N	Mean	Std. Deviation
1. No cues	52	2.32	1.29
2. Consecutive cues	55	1.65	1.20
3. Accurate cues	85	1.87	1.43
Total	192	1.93	1.35

95% Confidence interval for means

Interpretation (see Table 3 below) of the F-statistic, a comparison of the observed difference to the expected sameness, indicates whether the observed difference is significant. Here, the F-statistic falls into the rejection region. The rejection of the null hypothesis indicates that there is a statistically significant difference between the sample means at the .05 level. The observed difference between groups is treated as due to the effect of the independent variable. In other words, the students in each condition scored differently on the comprehension test; the difference in scores was big enough to be due to the difference in the conditions (Condition 1, 2, and 3).

Table 3　ANOVA (Analysis of Variance)

Condition	df	*F*	*p*
Between groups	2	3.56	.03
Within groups	189		
Total	191		

Because the ANOVA showed significant effects, Tukey HSD post hoc analysis was needed to determine which groups differ from each other. Tukey HSD post hoc analysis (See Table 4 below) led to the conclusion that the students' scores in the pair of conditions 1 and 3, and the students' scores in the pair of conditions 2 and 3, did not differ significantly from each other. However, the students' scores in the pair of conditions 1 and 2 differed significantly from each other.

Table 4 Multiple comparisons of comprehension test score by condition

Condition		Mean Difference	*p*	Std. Error
1	2	.67*	0.03	.26
	3	**.46**	**0.13**	.23
2	1	-.67*	0.03	.26
	3	**-.22**	**0.62**	.23
3	1	-.46	0.13	.23
	2	.22	0.62	.23

* The mean difference is significant at the .05 level.
Note Tukey HSD post hoc analysis values are in bold.

Further, strength-of-effect measures indicate that some effect of the independent variable (Condition 1, 2, and 3) accounts for a small percentage of the variance in the dependent variable (the comprehension test score). Therefore, some other factor than condition accounts for a great part the variance of the dependent variable (the comprehension test score).

Perhaps something beside the experimental condition accounted for variance of comprehension test scores: students' English fluency. To investigate this possibility, a statistical test was done of two factors. Factor A was the condition (Condition 1, 2, and 3) and Factor B was the English fluency (intermediate and advanced) as in Table 5, below. Advanced fluency was designated in this experiment for students in classes with name of debate, advanced English, and academic composition. Intermediate fluency was designated for students in English conversation classes. External rating of fluency by class names was expedient and reliable for this study, as opposed to a self-rating measure of fluency, for instance, a 7-point scale from *not fluent at all* to *as fluent as native speakers* used by Takano and Noda (1995, p. 664).

Table 5 Between-Subject Factors: Conditions and English fluency

Factors		N
Factor A, Condition	1	52
	2	55
	3	85
Factor B, English fluency	Advanced	79
	Intermediate	113

The statistical test run was a two-factor between-subjects ANOVA, with the following results.

The main effect of Factor A (Condition) is significant (F = 4.64; p = .01). This indicates that the main effect means (average comprehension test scores) for conditions (Condition 1 = 2.35, Condition 2 = 1.57, Condition 3 = 1.89) differ significantly. Tukey Post-Hoc analysis leads to the

conclusion that the means (average comprehension test scores) between Condition 1 and 2 differ significantly from each other. However, the means (average comprehension test scores) between Condition 1 and 3, and between Condition 2 and 3, do not differ significantly.

The main effect of Factor B (English fluency) is significant (F = 5.69; p = .02). The main effect means (average comprehension test scores) for English fluency (advanced = 2.18, intermediate 1.70) differ significantly from each other.

There is no statistically significant interaction between Factor A (Condition) and Factor B (English fluency). F (2, 186) = 1.65. Thus, the effect of the type of condition does not depend on the level of English fluency.

Students in Condition 2 (consecutive) had lower scores than students in Condition 1 and in Condition 3 (accurate); however, the deleterious effect of Condition 2 was less for advanced students than for intermediate students.

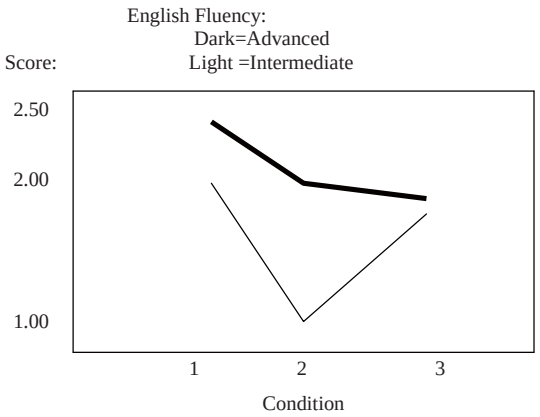

Chart 1　Effect of Fluency on Test Scores (perfect score is 5) by Condition

A weakness of this investigation is that the operationalization of eye movement manipulation made the incorrect assumption that manipulations of additional information could be processed cognitively by all the students.

5. Results

The hypothesis that visually stimulated conditions would increase comprehension was not supported.

By far, students who had no visual manipulation (Condition 1, control) had the highest comprehension scores.

Regarding the difference between scores of students with intermediate fluency and those of advanced fluency, the distraction introduced by eye movement abated for advanced students.

The hypothesis was not supported by the experimental data: Students did not score higher in comprehension when provided with more information. Contrary to design, eye movement did not add value, but hindered comprehension.

The listening material of Moscow subway bombing was itself very difficult firstly because of the unfamiliar names of the stations. Moreover, the visual aids (Conditions 2 and 3) were not as helpful as the design intended: Condition 1 (map only) was the most easily understandable.

Perhaps Condition 2 was especially distracting because the narration did not match the map. In fact, Condition 2 was created as the "consecutive condition" to engage students to move their eyes without providing useful information. The station names were emphasized in consecutive order along the train line to keep students' eyes moving—avoiding the blank look of frustration—without adding information.

In Condition 3, the narration did match the map, a circumstance designated "accurate." The effects, however, of Conditions 2 and 3 would prove to be the opposite in terms of comprehension. In fact, Conditions 2 and 3 were designed with the intent of one—the accurate Condition 3 — being more informational than the other.

The task was presented to the students not as a test nor as a measure of their English skills, but as a method to determine the best among several designs of a Powerpoint Presentation.

6. Discussion

Results were opposite of the hypothesis. Searching for explanatory ideas for why more informative and sensory cues did not result in more comprehension, the most obvious was offered by one of the students in a word: distraction. Indeed, language comprehension tests as well as most other measurement devices employ distracters to tease out thorough understanding from superficial understanding. Surprisingly, the study design itself was susceptible to distracters. What the study design intended as added information and added stimulation functioned to distract the students.

The students did not gain from manipulations that forced eye movement and graphically emphasized auditory input. To investigate the ineffective attempts of the manipulations to improve student comprehension, consider two elements of language learning: need-to-know and hearing as the prerequisite skill.

The students may not have felt a need-to-know when exposed to the manipulations. The

static map provided information in a standard format; the maps with graphic movement, i.e., the manipulated maps, could have provided more information, but the students may not have felt a need-to-know about the non-standard presentation; the students may have been searching the map for information, and been distracted by movements on the map.

The students were hearing the information that provided the correct answers to the comprehension test. None of the students were highly fluent in English. Hearing is the prerequisite skill for language acquisition. Therefore, the strongest English skill of these students was listening. The higher-level students were less distracted by the "accurate condition" map than by the "consecutive condition" map. The lower level students gleaned information from listening, not from the map; movement on the map (highlighting station names) required visual processing that detracted attention from audio processing. The students, especially the lower level students, were not skillful enough at English to process both visual and audio. Results support only Part 3 —both 3a and 3b— of the hypothesis: advanced-level English students will benefit more from the manipulations, and the accurate manipulations were more effective than the consecutive manipulation.

Visual manipulations can lower or raise the students' comprehension. This experiment, which concerns mostly the relationship between visual cues and learning, is much different from Richardson and Dale's, which concerned gaze coordination. However it is worthwhile to note their phrase "…what makes the flashing a distraction or not" (p. 1057) and the implication that visual cues can be valuable or deleterious to comprehension. The students were divided into advanced and intermediate levels. The advanced students' scores did not fall as much as the intermediate students' scores when provided with additional information (Conditions 2 and 3). Maybe the advanced students understood enough English to avoid being distracted by the additional visual information. However, it may be difficult to prove a threshold level, because of the difficulty in concretely stating the levels of the learners.

As for practical applications of this study, by having teased out which students profit from complementing aural information with visual, better use could be made of movies that students love to watch. As Amna (2006, p. 37) stated, "By investigating EFL lecture comprehension problems we can suggest appropriate methods to develop EFL learners' listening skills and guide content subject lecturers in how to present their lectures to ensure optimal comprehension." Many teachers and administrators discourage a dependence on showing of movies in class as a language teaching tool.

One of the important points of teaching listening communicatively is to make the listening materials close to real settings. In real situations, only listening to sounds does not occur very

often—aside from mediated activities such as listening to the radio and having telephone conversations. It is therefore quite consistent with the richness of multi-sensory communication and useful to include various sensory input—reading, writing, visuals, and speaking during instruction in listening comprehension.

Considering the experimental stimuli of this study as a classroom activity, there might be "pre-listening," "during-listening," and "post-listening" tasks. For pre-listening, for a schema activating purpose, a teacher could introduce the newspaper/internet article of the Moscow bombing, and also provide all the station names with correct pronunciation, so that the names become familiar to the students. Then, for during-listening task, the students would mark on the map. Finally, for post-listening, for example, the students might be practicing the narration in a role-play of TV casters.

As an anonymous colleague suggested, "perhaps the 'blank look feeling' arises when the listener realizes, perhaps subconsciously, that paying attention is futile. There can be no further increase of comprehension because there is too little linguistic scaffolding. Movement in the visual field does attract attention but it does not solve the scaffolding problem." Therefore, induced eye movement by itself does not suffice as a tactic to aid listening comprehension.

Many studies were done of less than 25 participants (Berne, 2004, p. 525). This study had almost 200 participants, a positive feature. Furthermore, while many studies have not addressed what to do about the difference in strategies employed by listeners (Berne, 2004, p. 525), this study can make suggestions about the use of visual aids in aural text.

The strategy of augmenting attention span could be implemented by listeners by the tactic of moving their eyes. This tactic —a specific step— could be compared to a driver who actively moves eyes from road to rear view mirror and side windows instead of staring at the car ahead.

As far as limitations of this study, the students were not asked about familiarity with the task's topic. They may or may not have heard about the terrorist bombing in the Moscow subway, which occurred several months before this study. The research design considered that prior knowledge was probably consistent across subjects. In addition, operationalization of the concept of prior knowledge was difficult. However, as Amna pointed out (2006, p. 40), "Familiarity with the topic of the lecture augments comprehension." Therefore, the collection of that data variable of familiarity with the topic, which was neglected, could have contributed to the study.

In a future study, a camera could be used to record the eye movement accurately. With this methodological limitation in mind, if findings of future studies using such eye-movement machines are similar to the findings of this present study, it might be reasonable to conclude

that eye movement is a tactic that can aid listening comprehension under certain circumstances having to do with individual learner style and level of fluency.

Another limitation of this study is that it did not investigate the eye movement itself. Even without a camera, there could have been an observational technique, although the number of respondents may have been substantially less as a consequence. In addition, “visual manipulation” on the side of the teacher does not equate with the “eye movement” of the students.

As for the difficulty of Russian place names for Japanese learners, the written Russian language as well as the English language present opaque pronunciation. But in the Japanese language, pronunciation can be understood perfectly from visual information of the phonetic scripts of Japanese katakana and hiragana. Such a linguistic difference between L1 and L2 might be considered a linguistic limitation of this study. Also, a future study might investigate whether pictures as visual cues might be more effective—i.e., less distracting— than words.

A limitation of this study was the non-generalizability of results due to lack of abiding by the standard fluency categories for participants.

A methodological criticism could be made that this study asked participants to reply to questions, implying that the purpose of the listening was scanning for subcategories of information. However, points to listen for were not given to the participants. A TOEFL model was followed: by intention, the listeners were left ignorant of how to distinguish relevant matter during the listening task. On the other hand, during a listening comprehension lesson, listening points are typically given, for example, “Listen for the names of the stations,” or “Listen so you can summarize what happened in the story.” However, participants in this study were not informed of what information would be relevant to the questions they would be be asked.

Acknowledgement

The author is very grateful to Fumihiko Ito, PhD, Gunma National College of Technology for statistical assistance and to Chieko Mimura, PhD, Sugino Fashion College, for comments about TESOL. She is also very thankful to the students who participated in this study.

References

Amna, A. Y. (2006). Listening Comprehension Difficulties as Perceived by First Year Students [Electronic version]. *Journal of King Saud University Language & Translation, 19*, 35-47. Riyadh, digital.library.ksu.edu.sa/V43M351R2703.pdf. Retrieved 22 January 2011.

Berne, J. E. (2004). Listening Comprehension Strategies: A Review of the Literature. *Foreign Language Annals, 37* (4), 521-533.

Glenberg, A. M., Schroeder, J. L., & Robertson, D. A. (1998). Averting the gaze

disengages the environment and facilitates remembering. *Memory and Cognition*, *26*(4), 651–658.

Hallowell, B. & Lansing, C. R. (2004, November 16). Tracking Eye Movements to Study Cognition and Communication [Electronic version]. *The ASHA Leader*. http://www.asha.org/Publications/leader/2004/041116/f041116a.htm. Retrieved 21 January 2011.

MedicineNet, Inc. (2010, September). http://www.medicinenet.com/script/main/hp.asp. Retrieved 14 September 2010.

Posmontier, B., Dovydaitis, T., & Lipman, K. (2010). Sexual Violence: Psychiatric Healing with Eye Movement Reprocessing and Desensitization. *Health Care for Women International, 31*, 755-768.

Richardson, D.C., & Dale, R. (2005). Looking To Understand: The Coupling Between Speakers' and Listeners' Eye Movements and Its Relationship to Discourse Comprehension. *Cognitive Science, 29*, 1045–1060.

Shapiro, F. (1989). Efficacy of the eye movement desensitization procedure in the treatment of traumatic memories. *Journal of Traumatic Stress Studies, 2*, 199–223.

Takano, Y., & Noda, A. (1993). A Temporary Decline of Thinking Ability During Foreign Language Processing. *Journal of Cross-Cultural Psychology, 24*(4), 445-462.

Takano, Y., & Noda, A. (1995). Interlanguage Dissimilarity Enhances the Decline of Thinking Ability During Foreign Language Processing. *Language Learning, 45*(4), 657-681.

Wikipedia. (2010). Moscow Metro bombings, http://en.wikipedia.org/wiki/2010_Moscow_Metro_bombings. Retrieved 14 November 2010.