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The effect of a standardized motivation protocol on speed of recognition training

Darin Paulson
Pacific University
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Abstract
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Thesis

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THE EFFECT OF A STANDARDIZED MOTIVATION PROTOCOL ON SPEED OF RECOGNITION TRAINING

By

DARIN PAULSON

A thesis submitted to the faculty of the College of Optometry
Pacific University
Forest Grove, Oregon
in partial fulfillment for the degree of Doctor of Optometry
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Adviser: Bradley Coffey, O.D., F.A.A.O.
THE EFFECT OF A STANDARDIZED MOTIVATION PROTOCOL ON SPEED OF RECOGNITION TRAINING

AUTHOR: Darin Paulson
4/14/94

ADVISER: Bradley Caffey, O.D., F.A.A.O.
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BIOGRAPHY

Darin Paulson was raised on a small farm 30 miles south of Spokane, Washington. He received a Bachelor of Science Degree in Biology from Washington State University in May, 1990. He has attended Pacific University College of Optometry since August of 1990 and expects his O.D. this May. Next year, Darin will participate in a vision therapy residency program at the State University of New York College of Optometry. Future plans include a stint as a private practitioner, finally ending up back in the academic setting as an optometric faculty member.
ABSTRACT

There continues to be much debate about the efficacy of vision therapy. Some practitioners claim VT is the best treatment option for a host of visual conditions while others maintain it is a waste of time. The purpose of the present study was to determine whether motivation may play a role in this discrepancy. A standardized motivation protocol was developed and applied to an experimental group of 26 first-year optometry and undergraduate psychology students during a speed of recognition training session. Performance on a near tachistoscopic task was measured before and after the training session and compared to a group of 24 control subjects. Results showed no significant between-group differences. Subjects' perceived motivation and the level of confidence they placed in the experimenter were determined with an exit questionnaire. Results showed significant between-group differences on each question, suggesting the value of applying a motivation regimen to the optometry patient.
ACKNOWLEDGMENTS

I would like to thank Suzy Scott and Michael Glanzer for the endless hours helping me gather the data.

I would like to thank Dr. Steven J. Cool, for without his inspiration and creative thinking the idea for this project would never have been generated.

I would like to thank Dr. Bradley Coffey for his invaluable assistance in the design of the project and the generation of the statistics, for providing expert feedback on numerous drafts, and for providing my motivation in times of doubt.
INTRODUCTION

Why do some practitioners claim uncommon success with their vision therapy patients while others claim VT is a waste of time and money? Could it be the successful practitioners are better at motivating their patients? And, if their patients are motivated to a higher degree, does that simply mean they do their independent therapy assignments on a more consistent basis, or does being motivated actually translate to more improvement per hour of therapy? If a doctor chooses to consciously motivate her patients, what strategies are most effective?

Many practitioners claim success with their vision therapy programs. Wold, Pierce and Keddington (1978) retrospectively reviewed the records of one hundred consecutive vision therapy patients and evaluated the changes that occurred in the patients' visual processing abilities. Strabismics and amblyopes were not included. The patients were scored using the Modified Clinical Technique (MCT), performance criteria, and the Southern California Visual Performance Scale. Utilizing the Modified Clinical Technique, the "vast majority" of patients were found to be normal following vision therapy but there was no report of the patients' visual status prior to therapy. The MCT is a structure-related model and tells us little about visual function. Utilizing the performance criteria, seven major areas of vision function were scored and all were improved significantly during the vision therapy. Each of the ten areas of visual function addressed with the Southern California Visual Performance Scale also improved significantly (p<0.001).

Brinkley and Walonker (1983) reported on ten cases of convergence insufficiency successfully treated with orthoptic training. The subjects reported classic near point complaints such as intermittent blur and diplopia, eye strain, and difficulty with prolonged reading. All had reduced convergence amplitudes and normal near points of convergence. Subjects underwent three to five sessions of orthoptic training plus home training activities. At the end of the training programs all subjects reported relief of symptoms and had normal amplitudes of convergence.

In a study on students with reading disabilities, eighteen learning disabled children who were diagnosed with visual and/or perceptual disorders received nine months of vision therapy over a two year period. Relative to a control group they showed significantly greater increases in all areas of reading performance tested, with the exception of spelling, as well as increases in the specific visual skills which were trained (Seiderman, 1980).

However, not everyone reports such positive results with vision therapy. In a review of the ophthalmic, optometric and psychological literature, Metzger and Werner
(1984) found no scientific basis for the use of visual-motor training on patients with reading disabilities. They found no relationship between reading disabilities and refractive condition or ocular motor abnormalities. Additionally, they found that vision training programs produced no further improvement in reading disabilities relative to control groups.

Moore (1963) reported on 180 children with intermittent exotropia who were treated with vision therapy, surgery, or a combination of the two. The training involved occlusion, diplopia awareness activities and antisuppression training. Good outcomes were defined by attainment of phoric posture at distance and near, ample fusional ranges at distance and near, diplopia awareness when tropic, and minimal foveal suppression. The success rates were found to be 0% for VT, 33% for surgery, and 30% for VT and surgery.

A reader must be very careful when reviewing the literature on vision therapy efficacy. First of all, the definition of vision therapy can be very different depending on the particular report. It may include the training of one specific ocular-motor skill (Mannen, et al., 1981) or it may include a complete visual-motor and visual-perceptual skill training program (Seiderman, 1980). In addition, the measurement of success can vary widely. It may mean a significant increase in the particular visual skills trained (Wold, et al., 1978) or it may mean enhanced performance on some task not specifically trained as is the case with vision therapy for reading disabilities (Melcer and Brown, 1945). The bottom line is that some experimenters report success while others do not. It is the purpose of the present study to determine whether motivation may play a role in this discrepancy.

A review of the literature revealed that development of a standard motivation protocol appropriate to all vision therapy patients would be very difficult. The primary difficulty is the fact that different people are motivated in different ways (Koestner, et al., 1991; Pintrich and De Groot, 1990; Weiner, 1990, Lawler, et. al., 1991). Perhaps the successful vision therapists are simply those who are able to identify each individual's personal motivation. But what if a protocol could be developed that motivated a majority of the therapy patients? Such a protocol could be a base from which a practitioner could still adjust to meet the needs of individual patients.

Much work has been done on identifying groups of people who tend to be motivated in the same ways and whether or not general motivation strategies can be successful with large groups of subjects. Koestner, et al. (1991) stress the importance of distinguishing between achievement motives assessed with fantasy and those assessed with self-report. Based upon a literature review and their own experimentation, they
noted the following facts. Fantasy achievement motives are often assessed by having subjects tell an imaginative story in response to picture cues and then content-coding those stories. Self-report achievement motives are typically measured with questionnaires that require people to report the extent to which they value achievement goals or possess various motive-related characteristics. People who score high in the fantasy achievement motive tend to perform better in tasks involving internalized standards of excellence, but the self-report scale is not related to performance on such tasks. People whose self-reported achievement motivation is high tend to be more influenced by expert opinion and are responsive to experimenters' instructions stressing achievement. Expert opinion is not related to fantasy achievement motives, nor are experimenters' instructions. Typically, individuals scoring high in fantasy achievement motivation perform relatively better on challenging tasks than do those who score low. However on easy tasks people who score low often outperform those who score higher. The self-report scale appears to be unrelated to level of challenge.

Lawler et al. (1991) in a study of ninety five male undergraduate students demonstrated that individuals with Type A behavior patterns tend to focus on extrinsic motivation rather than intrinsic. Experimental manipulations to increase intrinsic motivation had little effect on the Type A individuals. However, intrinsic instructions did affect the behavior of Type B individuals.

Students who believe they are capable tend to perform with more metacognition and higher levels of cognitive strategies and are more likely to persist at difficult tasks. Also, students whose motivational orientation involves goals of mastery, learning and challenge, and believe that the task is interesting and important will engage in more metacognitive activity, more cognitive strategy use, and more effective effort management (Pintrich and De Groot, 1990).

One should be cautious when choosing how to reward patients and stimulate their interests. It has been demonstrated that rewards seen as positive feedback are motivating but those which are seen as controlling actually decrease future effort (Weiner, 1990). In research, rewards tend to be money or prizes. Research indicates these types of rewards are detrimental to intrinsic motivation, expected rewards more so than unexpected, and that individuals who receive a reward are less likely to return to a task they once considered interesting than individuals who received no reward. Additionally, rewarded individuals produce work that is of higher quantity but lower quality and less creative than non-rewarded individuals (Weinberg, 1978).

Settings which provide intrinsic motivation and stimulate an interest in the task build feelings of competence whereas settings which provide extrinsic motivation reduce
interest in the task and build feelings of pressure and tension (Lawler et al., 1991). Negative verbal feedback concerning performance results in decreased intrinsic motivation; positive verbal feedback has produced inconsistent effects (Weinberg, 1978).

So, a motivational program which is to be successful on a majority of patients should instill in patients a feeling of confidence in themselves, the doctor, and the task or skills being trained. It should emphasize to the patient a feeling of intrinsic value rather than providing extrinsic rewards, with the possible exception of Type A individuals. Within a successful program, the practitioner should provide positive verbal feedback where appropriate and attempt to avoid negative verbal feedback. Finally, the program should provide a level of challenge without making the task seem impossible. If such a program is developed, the majority of patients should feel motivated and produce effortful work, but will this actually translate to better performance?

Pintrich and De Groot (1990), in a study of 173 seventh-grade students found those who were intrinsically motivated had higher levels of achievement on seat work, exams and quizzes, and essays and reports, regardless of prior achievement levels. In a study of 200 elementary students, it was found that teacher behavior affected students' perceived control which in turn had a significant effect on academic performance (Skinner, et al., 1990). It has been shown that there is a strong relationship between teachers' communication styles and student performance, and research has suggested that the link between those is the effect of communication style on student motivation (Richmond, 1990). Recently, it has even been demonstrated that subliminal motivation can have a positive effect on performance (Chakalis and Lowe, 1992). If motivation does indeed affect performance, by what means does this effect take place?

Recent research has begun to establish a biochemical basis for the value of motivation in vision therapy. It has been demonstrated that norepinephrine, a chemical released during motivated states, is necessary for maintaining cortical plasticity in cats long after the "critical period" of development (Kasamatsu, 1987). Evidence has suggested that norepinephrine from the brain's reticular activating system is strongly related to the receiving and processing of visual information in the primary visual cortex (Pettigrew, 1978). If motivation does indeed allow plasticity and reorganization of cortical synapses, it is possible that it may have a larger role in vision therapy than just making sure patients do their home assignments on a more consistent basis. It may mean that motivated patients are actually more efficient at reorganizing the visual-motor and visual-perceptual areas of their cortex.
Speed of recognition is a skill which has long been trained by optometrists. Is it a skill which can be more efficiently trained in conjunction with a motivational program? The tachistoscope has long been used by optometrists to test and train speed of recognition and related skills. As early as World War II, pilots and gunners were trained with the tachistoscope to more quickly recognize the difference between enemy and allied planes (Green, 1949). Probably the most popular use for the tachistoscope has been to increase reading speed and efficiency. It has been shown that the visual processing skills measured with the tachistoscope play a significant role in learning to read (Solan, 1987). Root and Root (1947) found that a 30-session tachistoscopic training program, run on a group of sixth-grade students, produced a 19% greater increase in reading rate relative to a control group. Recently, the tachistoscope has been used as part of a screening battery to test the visual skills of elite athletes (Coffey and Reichow, 1990).

It is the purpose of the present study to determine whether a standardized motivation protocol, applied to a group of subjects during speed of recognition training, will have a significant effect on their perceived motivation and whether that motivation translates to increased performance.

METHODS

A. Overview

All subjects signed informed consent forms and filled out an entrance questionnaire before being screened for adequate acuity and binocular status. The subjects were then tested on a near tachistoscopic task by one of two individuals. Following the initial test, the subjects received approximately 20 minutes of training on a distance tachistoscopic task. All subjects were trained by the same individual. The only time the subjects had contact with the trainer was during the training sequence. Half the subjects received motivation during the training, half received no motivation. Following the training session, all subjects were again tested on the near tachistoscopic task by the same individual who performed the initial test. Subjects filled out an exit questionnaire before leaving. Pre and post test scores were analyzed for repeated measures and between-group differences.
B. Subjects

54 students ranging from 17 to 30 years of age volunteered for the study. Three did not pass screening criteria and a fourth was released due to equipment problems during her scheduled training time. This left 50 subjects from whom data were acquired. 24 subjects were first-year optometry students who had no or minimal contact with the experimenter prior to the study. The remaining 26 subjects were undergraduate psychology students who had no contact with the experimenter prior to the study. The undergraduate psychology students received extra credit for a class they were taking. The optometry students received credit toward a research participation requirement. There were 17 males and 33 females. The subjects were pseudo-randomized into an experimental group, that received motivation during training, and a control group that received no motivation during training.

C. Apparatus

1. Screening Apparatus

A Snellen acuity chart was used to determine visual acuity at 6 m and 40 cm. Monocular and binocular acuities were measured with habitual lenses in place. An occluder, the tip of a pen and a letter on the acuity chart were used to estimate phoric posture at 6 m and 40 cm. The Wirt circles on the Stereo Butterfly (Stereo Optical) were used to determine minimum stereo acuity at 40 cm.

2. Testing Apparatus

The tachistoscope program within the Basic Skills folder of the Optimum (Learning Frontiers, Inc.) software package was used to determine subjects' speed of recognition, both prior to and following the training session. The software was run on an Amiga (Commodore-Amiga, Inc.) computer with the volume turned off. A chin and forehead rest were utilized to maintain a distance of 67 cm between subjects and the screen. Groups of 4 and 6 arrows pointing randomly up, down, left, or right (Figure 1) were used as the stimulus and subtended an angle of approximately 67 min of arc (size 1.2 on the Optimum program).

3. Training Apparatus

Subjects were seated at a table 5 meters from a standard projector screen. A constant illumination slide projector tachistoscope (Lafayette Instrument Co.) was used to project numbers onto the screen. Each slide displayed one group of 3, 5 or 7 numbers. The individual numbers subtended an angle of approximately 38 min of arc.
D. Procedure

1. Entrance Screening

All subjects read and signed an informed consent form. They then filled out an entrance questionnaire containing six items designed to determine the importance to them of reading, competitive athletics, and aggressive driving (Appendix 1). Results from the questionnaire were used by the experimenter to motivate subjects from the experimental group during the training session.

All subjects were screened with the habitual prescription in place prior to testing. There was a visual acuity requirement of at least 20/50 with the poorer eye and 20/40 with both eyes, measured with a Snellen chart at 6 m and 40 cm. The stereo acuity requirement was 80 seconds arc measured with the Wirt circles of the Stereo Fly (Stereo Optical, Inc.) at 40 cm. Subjects were required to demonstrate heterophoria as measured with the cover test at 6 m and 40 cm.

Illumination for all screening procedures was standard room illumination (12-15 fc).

2. Testing

Subjects were seated 67 cm from the computer screen. A chin and forehead rest were used to insure the proper distance was maintained. Subjects were instructed to look at the screen and that a group of 4 random arrows would be rapidly presented, each pointing up, down, left or right. They were to use the arrow keys on the keyboard to duplicate the direction of each arrow stimulus. The subjects were then given two demonstration presentations before beginning the testing sequence. The test consisted of three presentations of a group of 4 random arrows at 0.10, 0.07, 0.04 and 0.02 sec exposures followed by 3 presentations of a group of 6 random arrows at 0.10, 0.07, 0.04 and 0.02 sec exposures. Results were recorded by the tester after each presentation. Following the training session, the test sequence was repeated. After finishing the second test sequence subjects completed an exit questionnaire with 5 questions designed to assess their perception of the experimenter, the training sequence, and whether or not they felt motivated (Appendix 2).

To control the amount of contact the subjects had with the experimenter prior to the training session, all subjects were screened and tested by one of two testers, neither of whom were the experimenter/trainer.

Illumination for the testing was standard room illumination (12-15 fc).
3. Training

Subjects from the experimental group were introduced to the experimenter who shook hands, greeted them, and asked them to have a seat at the table. The subjects were then given background information on speed of recognition, the ease with which it could be trained and the benefits of improving one's speed of recognition. Special emphasis was placed on areas which were important to the subject based on results from the entrance questionnaire. For example, if a subject indicated competitive athletics were important to her and she spent several hours every week participating in racquetball, the experimenter would explain how enhancing her speed of recognition would allow her to better anticipate where the ball would come off the wall and potentially improve her game. The subjects were then asked to look at a fixation point in the center of the screen and told a slide with 3, 5 or 7 numbers would be rapidly flashed on the screen. They were instructed to record what they thought the numbers were on the blank recording form in front of them.

Slides were presented to the subjects one every 10 seconds. They were presented at speeds of 0.10 and 0.05 sec. Every nine slides the instructor would stop and provide feedback and motivation to the subjects. Motivation included information on how they were performing relative to other subjects, lots of slaps on the back, encouraging statements, and small goals (Tables 1 and 2).

The control subjects were not introduced to the experimenter but told by the experimenter to sit at the table. They were then given the instruction set and the training sequence proceeded. The sequence was again interrupted every nine slides but rather than receiving feedback and encouraging statements, the subjects were simply told what the next group of slides would consist of, how many numbers and how fast they would be presented.

At predetermined times, all subjects were given the following specific strategies: 1) "Don't scan across the numbers, rather look at one spot and take a picture with your eyes of the whole group at once." 2) "Look softly at the numbers rather than staring hard." 3) "Remember not to scan and to look softly." Efforts were made to insure the only differences encountered by the experimental and control groups were of a motivational nature and occurred only during the training sequence.

Illumination for the training sequence was dim room illumination (6-7 fc).

Following the 20-minute training session, subjects were retested with the arrow stimuli on the computer and pre-test and post-test scores were analyzed for repeated measures and between-group differences.
RESULTS

The data were analyzed on a Macintosh computer utilizing Microsoft Excel and Statview software. T-tests were run to compare pre-test and post-test scores within and between the experimental and control groups. The unpaired t-test was also run to compare the differences in pre-test scores between experimental and control groups and the post-test scores between experimental and control groups. The subjects were divided into sub-groups of males and females, and optometry students and psychology students. A 2-way ANOVA was run to find whether the motivation had a significant effect on any of the sub-groups and whether there was any interaction between groups.

Results were recorded as total number of correct arrow directions. The total number correct on the pre-test was compared to the total number correct on the post-test and recorded as mean change. The raw, descriptive data showed only very slight differences (Tables 3 & 4). The differences in mean change between the experimental group and the control group were not significant (p > 0.05) (Table 5 and Figure 2). Additionally, there was no significant performance difference found between males and females or between psychology students and optometry students (p > 0.05) (Table 6).

An unpaired t-test identified significant differences in responses on the exit questionnaire. Question number 1 assessed how competent the subjects felt the examiner was. Motivated subjects reported the experimenter to be more competent (p < 0.02). Question number 2 determined how caring the subjects felt the examiner was. Motivated subjects felt the examiner was more caring (p = 0.0001). Question #3 assessed the value the subjects placed in the procedure. Motivated subjects felt the procedure was more valuable (p < 0.04). Question #4 assessed the likelihood the subjects would return to the experimenter for their future vision care needs. Motivated subjects reported they were more likely to return (p < 0.001). Question #5 determined how motivated the subjects felt they were. The motivated subjects felt they were more motivated (p < 0.005) (Table 7 and Figure 3).

DISCUSSION

The first part of the initial hypothesis, that a clinician could have a direct effect on the patients' motivation, was supported. The motivated subjects reported the examiner to be more competent, the procedure to be more valuable, and that they would be more likely to return to the experimenter for future vision care needs. They also reported that they felt more motivated to enhance their speed of recognition. Given the parameters within which this study was conducted, that perceived motivation did not transfer to enhanced performance on the speed of recognition task. Because of the
tremendous variance between individuals, the small differences found between groups was not significant. Perhaps a larger population would have solved this problem.

Another variable was the training time. Each subject received only one session of training lasting approximately 20 minutes. Perhaps a longer training session or multiple training sessions would have enhanced and made visible any hidden difference between groups.

There were some problems with design of the study. The first problem dealt with the subjects. Original plans included only undergraduate students with whom the experimenter had no previous contact. Due to small numbers of volunteers, first-year optometry students were used in addition to the undergraduates. Many of these students had at least brief prior contact with the experimenter. Another closely related problem was the way in which the subjects were scheduled. The experimenter called each individual to schedule an appointment and again to remind them of their appointment. The contact time on the phone, along with prior personal contact in the case of the optometry students, may have pre-set the subjects' motivation and added another variable.

Another design problem dealt with how the subjects responded to the arrow directions. They used four arrows on the keyboard to recreate the arrow directions presented on the screen. On many occasions this motor involvement seemed to interfere with the subjects' ability to recall the directions. If their fingers slipped off the keyboard or they became otherwise distracted, they seemed to lose the arrow directions stored in the short-term memory. Perhaps if they would have verbally called out the arrow directions and had the tester record them, this variable would have been eliminated.

Although the results of this study do not lend support for the claim that clinician-provided motivation has a direct effect on speed of recognition training, the higher levels of perceived motivation may lead to more consistent compliance with home training activities which in turn could lead to faster and more significant therapy results. The motivation paradigm utilized in this study emphasized intrinsic rather than extrinsic motivation. The intrinsic motivation is more likely to result in increased confidence which will lead to more consistent and sustained effort which may ultimately translate to enhanced performance results in the long run.

The study demonstrated that a standardized motivation protocol, applied to a group of patients can affect their motivation as well as the value those patients place in the vision therapy procedures. No effort was made in the present study to classify the subjects by personality type and no effort was made to alter the motivation paradigm.
based on personality type. However, it is certainly possible that customizing the type of motivation to the personality type of the patient may result in even more effective motivation.

The bottom lines are: 1) when the effort is made, the practitioner can have a significant effect on the patient’s motivation, and 2) more research needs to be done to determine the most effective way to motivate the vision therapy patient and to determine the long-term results of motivation on the vision therapy patient.

REFERENCES


Lawler KA, Armstead CA, Patton EK. Type A behavior and intrinsic vs extrinsic motivational orientation in male college students. Psych Record 1991;41:335-342.


ADDRESS FOR INSTRUMENTATION SOURCES

Commodore-Amiga, Inc.
1200 Wilson Drive
West Chester, PA 19380

Lafayette Instrument Co.
P.O. Box 5729
Sagamore Parkway
Lafayette, IN 47903

Learning Frontiers, Inc.
190 Admiral Cochran Dr., #180
Annapolis, MD 21401

Stereo Optical Company, Inc.
3539 N. Kenton Ave.
Chicago, IL 60641
Figure 1: sample test stimulus
Figure 2: Average increase in arrows correctly identified on the post-test relative to the pre-test, comparing experimental and control groups.
Figure 3: Mean responses on exit questionnaire, comparing experimental and control groups. Smaller values indicate more favorable responses.
<table>
<thead>
<tr>
<th>MOTIVATED</th>
<th>NON-MOTIVATED</th>
</tr>
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<tbody>
<tr>
<td>1) Pleasant Introduction with handshake</td>
<td>1) No introduction</td>
</tr>
<tr>
<td>2) Discuss answers to entrance questionnaire</td>
<td>2) No discussion of entrance questionnaire</td>
</tr>
<tr>
<td>3) Small talk/get to know subject</td>
<td>3) Begin task with no small talk</td>
</tr>
<tr>
<td>4) Subject given background information on Speed of Recognition &amp; why it is valuable to improve.</td>
<td>4) No background information given.</td>
</tr>
<tr>
<td>5) Examiner smiles a lot</td>
<td>5) Examiner does not smile</td>
</tr>
<tr>
<td>6) Examiner touches shoulder of subject</td>
<td>6) Examiner does not touch subject</td>
</tr>
<tr>
<td>7) Appropriate positive verbal feedback with small goals</td>
<td>7) No verbal feedback or goals</td>
</tr>
</tbody>
</table>

Table 1: Major training protocol differences for motivated and control subjects.
1) We know speed of recognition can be improved, we're trying to find best way. The differences we will find will be subtle so we need you to try really hard at all times.

2) Almost no one gets the slides with seven numbers right, see if you can get just one.

3) Alright! Only 7 (used real and accurate number) people have gotten that many right, you're part of an elite group of visual performers.

4) I know it is seeming long. You're almost there, just stay with it for a few more minutes.

5) OK, this will be the hardest group you will do, you're doing great (for the 7-digit, .02-second presentation).

6) Good job, this is a piece of cake for you isn't it (when they had not missed any on a section)?

7) OK, that is where most people start to miss some. You didn't miss any. Great job, keep it up.

Table 2: Samples of statements used to motivate the experimental group.
Table 3: Average pre-test scores with +/- 1 standard deviation comparing the motivated to control groups.

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<tr>
<th></th>
<th>0.10 sec</th>
<th>0.07 sec</th>
<th>0.04 sec</th>
<th>0.02 sec</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>CONTROL</td>
<td>20.21 (+/-2.95)</td>
<td>20.58 (+/-3.28)</td>
<td>20.13 (+/-2.94)</td>
<td>20.00 (+/-3.34)</td>
<td>80.92 (+/-8.76)</td>
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<tr>
<td>MOTIVATED</td>
<td>19.54 (+/-3.23)</td>
<td>19.62 (+/-2.98)</td>
<td>19.34 (+/-3.87)</td>
<td>20.42 (+/-3.35)</td>
<td>78.96 (+/-9.83)</td>
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<td>p-Value</td>
<td>&gt;0.40</td>
<td>&gt;0.20</td>
<td>&gt;0.50</td>
<td>&gt;0.50</td>
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Table 4: Average post-test scores with +/- 1 standard deviation comparing the motivated to control groups.

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<th>TOTAL</th>
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<tr>
<td>CONTROL</td>
<td>20.38 (+/-2.68)</td>
<td>21.08 (+/-3.20)</td>
<td>21.04 (+/-2.97)</td>
<td>20.88 (+/-3.29)</td>
<td>83.38 (+/-8.32)</td>
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<td>20.65 (+/-3.51)</td>
<td>20.04 (+/-2.91)</td>
<td>21.35 (+/-2.90)</td>
<td>81.96 (+/-8.52)</td>
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<td>p-Value</td>
<td>&gt;0.50</td>
<td>&gt;0.50</td>
<td>&gt;0.20</td>
<td>&gt;0.50</td>
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Table 5: Average increase in arrow directions correctly identified on the post-test relative to the pre-test, comparing the experimental and control groups.

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<th>0.04 sec</th>
<th>0.02 sec</th>
<th>TOTAL DIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>0.17 (+/-3.13)</td>
<td>0.50 (+/-3.50)</td>
<td>0.92 (+/-3.46)</td>
<td>0.88 (+/-3.72)</td>
<td>3 (+/-8.50)</td>
</tr>
<tr>
<td>MOTIVATED</td>
<td>0.38 (+/-3.65)</td>
<td>1.04 (+/-3.70)</td>
<td>0.65 (+/-4.00)</td>
<td>0.92 (+/-3.67)</td>
<td>2.46 (+/-7.16)</td>
</tr>
<tr>
<td>p-Value</td>
<td>&gt;0.50</td>
<td>&gt;0.50</td>
<td>&gt;0.50</td>
<td>&gt;0.50</td>
<td>&gt;0.50</td>
</tr>
</tbody>
</table>

Table 6: Average increase in arrow directions correctly identified on the post-test relative to the pre-test, including +/- 1 standard deviation, comparing males to females and psychology students to optometry students.

<table>
<thead>
<tr>
<th></th>
<th>0.10 sec</th>
<th>0.07 sec</th>
<th>0.04 sec</th>
<th>0.02 sec</th>
<th>TOTAL DIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALES</td>
<td>-0.65 (+/-2.62)</td>
<td>0.59 (+/-3.69)</td>
<td>-0.12 (+/-4.00)</td>
<td>0.82 (+/-3.89)</td>
<td>0.65 (+/-7.31)</td>
</tr>
<tr>
<td>FEMALES</td>
<td>0.76 (+/-3.65)</td>
<td>0.88 (+/-3.58)</td>
<td>1.24 (+/-3.54)</td>
<td>0.94 (+/-3.59)</td>
<td>3.82 (+/-7.95)</td>
</tr>
<tr>
<td>p-Value</td>
<td>&gt;0.10</td>
<td>&gt;0.50</td>
<td>&gt;0.20</td>
<td>&gt;0.50</td>
<td>&gt;0.30</td>
</tr>
<tr>
<td>PSYCH</td>
<td>0.04 (+/-3.38)</td>
<td>1.50 (+/-4.06)</td>
<td>0.77 (+/-3.20)</td>
<td>0.42 (+/-3.89)</td>
<td>2.73 (+/-7.59)</td>
</tr>
<tr>
<td>OPTOMETRY</td>
<td>0.54 (+/-3.43)</td>
<td>0.00 (+/-2.86)</td>
<td>0.79 (+/-4.27)</td>
<td>1.42 (+/-3.39)</td>
<td>2.75 (+/-8.21)</td>
</tr>
<tr>
<td>p-Value</td>
<td>&gt;0.50</td>
<td>&gt;0.10</td>
<td>&gt;0.50</td>
<td>&gt;0.30</td>
<td>&gt;0.30</td>
</tr>
</tbody>
</table>
Table 7: Mean responses with +/- 1 standard deviation on exit questionnaire (scale of 1 - 5)

<table>
<thead>
<tr>
<th>QUESTION #</th>
<th>MEAN MOTIVATED RESPONSE</th>
<th>MEAN NON-MOTIVATED RESPONSE</th>
<th>p VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.12 (+/-0.33)</td>
<td>1.58 (+/-0.93)</td>
<td>&lt; .02</td>
</tr>
<tr>
<td>2</td>
<td>1.04 (+/-0.20)</td>
<td>2.54 (+/-1.06)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>3</td>
<td>1.77 (+/-0.71)</td>
<td>2.29 (+/-1.00)</td>
<td>&lt; .04</td>
</tr>
<tr>
<td>4</td>
<td>1.58 (+/-0.70)</td>
<td>2.54 (+/-1.06)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>5</td>
<td>1.42 (+/-0.64)</td>
<td>2.13 (+/-0.99)</td>
<td>&lt; .005</td>
</tr>
</tbody>
</table>
Using the scale below, rate the following statements with respect to how well they describe you.

1: describes me very well
2: describes me fairly well
3: describes me somewhat
4: does not describe me very well
5: does not describe me at all

1) The ability to drive aggressively is important to me.
   
   
   1 2 3 4 5

2) The ability to read quickly and efficiently is important to me.
   
   
   1 2 3 4 5

3) The ability to compete and excel in athletics is important to me.
   
   
   1 2 3 4 5

Using the scale below, rate the following activities with respect to time per week you engage in them.

1: more than 15 hours per week
2: 10-15 hours per week
3: 5-10 hours per week
4: 1-5 hours per week
5: less than 1 hour per week

1) Driving
   
   
   1 2 3 4 5

2) Reading
   
   
   1 2 3 4 5

3) Athletics
   
   
   1 2 3 4 5

subject #: ___

Appendix I: Entrance Questionnaire
EXIT QUESTIONNAIRE

1) How competent did you feel the examiner was?

very competent 1 2 3 4 5 not competent

2) How caring do you feel the examiner was?

very caring 1 2 3 4 5 not caring

3) How valuable do you feel the procedure was?

very valuable 1 2 3 4 5 not valuable

4) If you were a paying patient, how likely would you be to return to the examiner for your vision needs in the future?

very likely 1 2 3 4 5 not likely

5) How motivated were you to improve your speed of recognition during the procedure?

very motivated 1 2 3 4 5 not motivated

subject #: ____

Appendix 2: Exit Questionnaire