

PROJECT ADMINISTRATION DATA SHEET

ORIGINAL REVISION NO. _____

Project No. G-42-609 ~~GTRC/GIT~~ DATE 3 / 20 / 85

Project Director: E. J. Rinalducci School/~~Lab~~ Psychology

Sponsor: U. S. Army Research Office
Research Triangle Park, NC

Type Agreement: SFRC DAAG29-85-K-0061

Award Period: From 3/1/85 To 2/29/88 (Performance) 4/30/88 (Reports)

Sponsor Amount: 8-14-86
This Change Total to Date
Estimated: \$ 121,267 \$ 121,267
Funded: \$ 45,926 \$ 45,926 (1st year)

Cost Sharing Amount: \$ None Cost Sharing No: N/A

Title: The Effects of Foveal Lead on Peripheral Sensitivity in the Visual Field

ADMINISTRATIVE DATA

OCA Contact William F. Brown X4820

1) Sponsor Technical Contact:

2) Sponsor Admin/Contractual Matters:

Dr. Robert J. Campbell
U. S. Army Research Office
P. O. Box 12211
Research Triangle Park, NC 27709

~~Mr. T. A. Bryant~~ D. H. CALDER
ONR RR
Georgia Tech

Defense Priority Rating: None shown Military Security Classification: unclassified
(or) Company/Industrial Proprietary: N/A

RESTRICTIONS

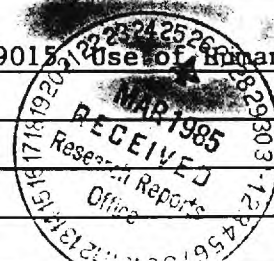
See Attached Gov't Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval - Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of \$500 or 125% of approved proposal budget category.

Equipment: Title vests with GIT; prior Gov't approval is required for any item of ADPE, whether or not specified in the budget (DD Form 1419 required).

COMMENTS:

Note special requirements in contract attachment AFARS 52.237-9015, Use of Human Subjects.



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SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date 1/5/87

Project No. G-42-609 School/~~KXX~~ Psyc.

Includes Subproject No.(s) N/A

Project Director(s) E. J. Rinalducci GTRC /~~KXX~~

Sponsor U.S. Army Research Office, Research Triangle Park, NC

Title The Effects of Foveal Lead on Peripheral Sensitivity in the Visual Field

Effective Completion Date: 8/14/86 (Performance) 10/14/86 (Reports)

Note: Jan.-June 1986 Progress Report has been accepted by Sponsor as "Final" per John Schonk.

Grant/Contract Closeout Actions Remaining:

- None
- Final Invoice or Final Fiscal Report Already submitted.
- Closing Documents
- Final Report of Inventions Already submitted.
- Govt. Property Inventory & Related Certificate
- Classified Material Certificate
- Other _____

Continues Project No. _____ Continued by Project No. _____

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- Angela Jones
- Russ Embry

PROGRESS REPORT
No. 1
TWENTY COPIES REQUIRED

1. ARO PROPOSAL NUMBER: 22412-LS
2. PERIOD COVERED BY REPORT: 1 January 1985 - 30 June 1985
3. TITLE OF PROPOSAL: The Effects of Foveal Load on
Peripheral Sensitivity in the
Visual Field
4. CONTRACT OR GRANT NUMBER: DAAG29-85-K-0061
5. NAME OF INSTITUTION: Georgia Institute of Technology
6. AUTHORS OF REPORT: Edward J. Rinalducci, Ph.D.
7. LIST OF MANUSCRIPTS SUBMITTED OR PUBLISHED UNDER ARO SPONSORSHIP
DURING THIS REPORTING PERIOD, INCLUDING JOURNAL REFERENCES:
8. SCIENTIFIC PERSONNEL SUPPORTED BY THIS PROJECT AND DEGREES AWARDED
DURING THIS REPORTING PERIOD:

Edward J. Rinalducci, Ph.D., Principal Investigator
Paul Rose, M.A., Graduate Research Assistant

E. J. Rinalducci
Department of Psychology
Georgia Institute of Technology
Atlanta, Ga 30332

BRIEF OUTLINE OF RESEARCH FINDINGS

The main objective of the research is to investigate the effects of foveal load on peripheral sensitivity in the visual field. Foveal load will be varied by using different orders of tracking (e.g., zero, first, etc.). Peripheral visual sensitivity will be determined by obtaining thresholds to light stimuli presented at various eccentricities from the central field of vision.

This report covers the period 1 January 1985 to 30 June 1985. The contract was initiated 1 March 1985. The months of March and April were used to obtain approval from the U.S. Army to acquire electronic data processing equipment for experimental control and data analysis of the research. This equipment has been ordered and delivery of much of it is expected by the end of July 1985.

An IBM PC-XT microcomputer in conjunction with Techmar Lab Master, memory and multifunction, and graphics boards will be used to control the presentation of the light stimuli and the tracking task. A small-screen CRT at the center of an 8-inch steel sphere will present the tracking task to the observer. Light sources arranged about every 5 degrees along 12 meridians (separated by 30 degrees) consist of diffuse green LEDs (Chicago CMP52 with a typical peak wavelength of 565 nm and a minimum intensity of 7.0 mcd at 20 mA). Green LEDs will be used as they will not only be able to reflect photopic or cone activity but also scotopic or rod activity at low luminance levels. Surround illumination will be provided by a baffled circular (16-inch diameter) fluorescent diameter lamp (Sylvania Circline Cool White 40 Watt). The inside of the modified visual perimeter will be painted flat white. The GTRI instrument shops will be used for some of the apparatus construction.

Subjects will be required to carry out a tracking task while simultaneously responding to light flashes using an ascending method of limits technique. The subject procedures and letter of consent have been approved by the Georgia Tech Human Subjects Committee. It is hoped that equipment construction will be completed and the running of subjects will begin during the Fall Quarter at Georgia Tech.

PROGRESS REPORT

TWENTY COPIES REQUIRED

1. ARO PROPOSAL NUMBER: 22412-LS
2. PERIOD COVERED BY REPORT: 1 July 1985 - 31 December 1985
3. TITLE OF PROPOSAL: The Effects of Foveal Load on
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Visual Field
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Georgia Institute of Technology
Atlanta, GA 30332

BRIEF OUTLINE OF RESEARCH FINDINGS

The main objective of the research is to investigate the effects of foveal load on peripheral sensitivity in the visual field. Foveal load will be varied by using different tracking orders. Peripheral visual sensitivity will be determined by obtaining thresholds to light stimuli presented at various eccentricities from the central field of vision. The effects of tracking practice will also be evaluated.

This report covers the period of 1 July 1985 to 31 December 1985. The contract was initiated 1 March 1985. As soon as approval was obtained from the U.S. Army, electronic data processing equipment was ordered in May. This equipment arrived in August 1985.

An IBM PC-XT microcomputer in conjunction with Techmar boards are used to control the presentation of the light stimuli and the tracking task. All data will be collected by the PC-XT and saved on disk for downloading to a Cyber 855 mainframe computer for data analysis. Basically, the apparatus is made up of two major components which includes a control unit consisting of the PC-XT and associated circuitry, and a display unit which consists of a modified perimeter. While subjects are engaged in a compensatory tracking task, light stimuli will be presented for a brief duration (about 200 msec) in the peripheral visual field. The lights are arranged along twelve meridians at about five-degree intervals. In the center of the hemisphere (or perimeter) there is a Panasonic 1.5 inch TV, upon which is displayed the tracking task. Subjects will be required to carry out a tracking task while simultaneously responding to light flashes using an ascending method of limits technique. Experimental procedures have been approved by the Georgia Tech Human Subjects Committee.

The duration and intensity of the LEDs are controlled through one of the Techmar Lab Master's D/A ports. Actual selection of the LED to be illuminated is accomplished through a switching box consisting of three rotary stepper relays. The inside of the perimeter is painted flat white (Krylon #11502) and is diffusely illuminated by a 40-watt Circline fluorescent light. The intensity of the fluorescent light can be varied by use of an electronic dimming ballast.

The equipment construction is virtually completed, and it is expected that the calibration of the equipment and the running of subjects will be initiated before the beginning of the second contract year.

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MEMORANDUM OF TRANSMITTAL

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TITLE: The Effects of Foveal Load on Peripheral Sensitivity in the Visual Field

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SUBMITTED FOR PUBLICATION TO (applicable only if report is manuscript): _____

Sincerely,

Edward J. Rinalducci, Ph.D.
Professor

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Dr. E. J. Rinalducci 22412-LS
Department of Psychology
Georgia Institute of Technology
Atlanta GA 30332

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DURING THIS REPORTING PERIOD, INCLUDING JOURNAL REFERENCES:

Rinalducci, E. J., and Rose, P. N. (1986). The effects of foveal load on
peripheral visual sensitivity. Proceedings of the Human Factors Society,
30th Annual Meeting. (In Press)

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DURING THIS REPORTING PERIOD:

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Paul N. Rose, M.A., Graduate Research Assistant

E. J. Rinalducci
Department of Psychology
Georgia Institute of Technology
Atlanta, GA 30332

BRIEF OUTLINE OF RESEARCH FINDINGS

The main objective of this research is to investigate the effects of foveal load on sensitivity in the peripheral visual field. Foveal load will be varied by using simple fixation of a cross vs. tracking tasks which vary in order and difficulty of tracking signal. Peripheral sensitivity will be determined simultaneously by obtaining thresholds to light stimuli presented at various eccentricities from the central field of vision. The effects of practice on the tracking task will also be varied to determine its effects on the functional visual field.

This report covers the period of 1 January 1986 to 30 June, 1986. During this period, refinements were made in the apparatus, light and time calibration of the system was carried out, pilot subjects were run, and the first in a series of experiments of the effects of foveal load on peripheral sensitivity was conducted.

A recently completed study was accepted for presentation at the 1986 Human Factors Society Annual Meeting and for publication in the Proceedings. This study employed two types of foveal tasks. The first task involved the simple fixation of a cross which served as a control condition, while the second involved a first-order (rate) compensatory tracking task resembling ZITA. Visual sensitivity was determined for the horizontal meridian out to about 50 degrees. In order to examine the effects of training a total of 18 trials were employed. Complete data was collected on six subjects.

In general, it was found that when a more complex visual task was employed, there was no loss in peripheral vision or a shrinkage in the size of the functional visual field. This finding does not support those of previous investigators. One possibility is that the tracking task employed may have not been very demanding. A second possibility is that the subjects regarded the light detection task as more important than the training task. Further experiments are planned to examine these possibilities.

One of the planned experiments will specifically vary the difficulty of the track (e.g., by using two or more sine waves of a frequency higher than 0.1 Hz). A second study will examine the effects of using a similar track with a higher order tracking system (i.e., second-order or acceleration). A third experiment will incorporate instructions to the subjects that both tasks are equally important.

THE EFFECTS OF FOVEAL LOAD ON PERIPHERAL
VISUAL SENSITIVITY

Edward J. Rinalducci and Paul N. Rose
School of Psychology
Georgia Institute of Technology
Atlanta, GA 30332

ABSTRACT

The main objective of the research was to investigate the effects of load on peripheral sensitivity in the visual field. Foveal load was varied by using simple fixation of a cross vs. a first-order (rate) compensatory tracking task. Peripheral sensitivity was determined simultaneously for light flashes located at different eccentricities along the horizontal meridian. The effects of training on the tracking task were also examined. In general, the results showed no losses in peripheral sensitivity under the experimental conditions employed, contrary to data from previous studies.

Proceedings of the Human Factors Society, 30th Annual Meeting, 1986. (In Press)