



INTER-SUBJECT CORRELATION OF EYE MOVEMENTS PREDICTS TEST SCORES IN ONLINE VIDEO EDUCATION

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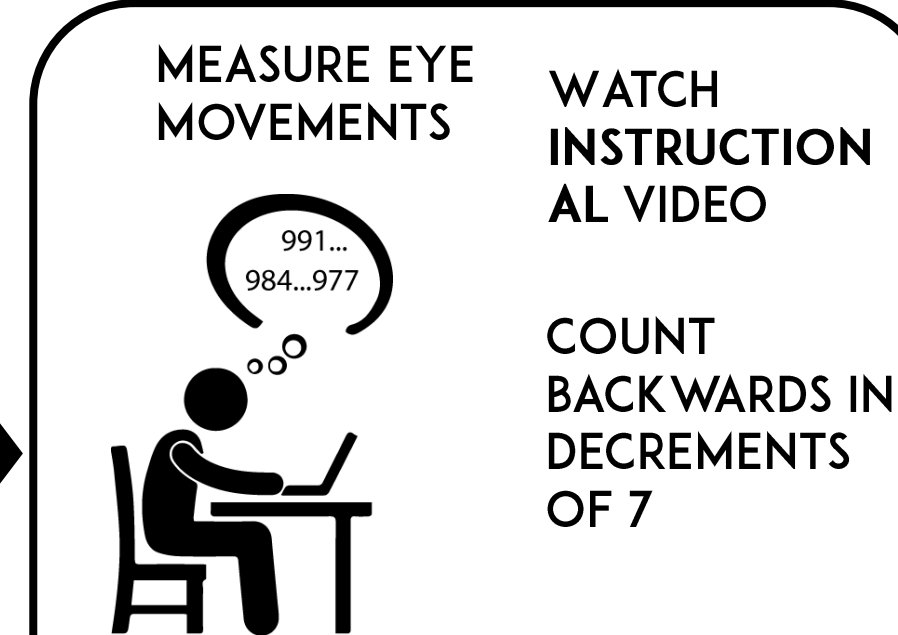
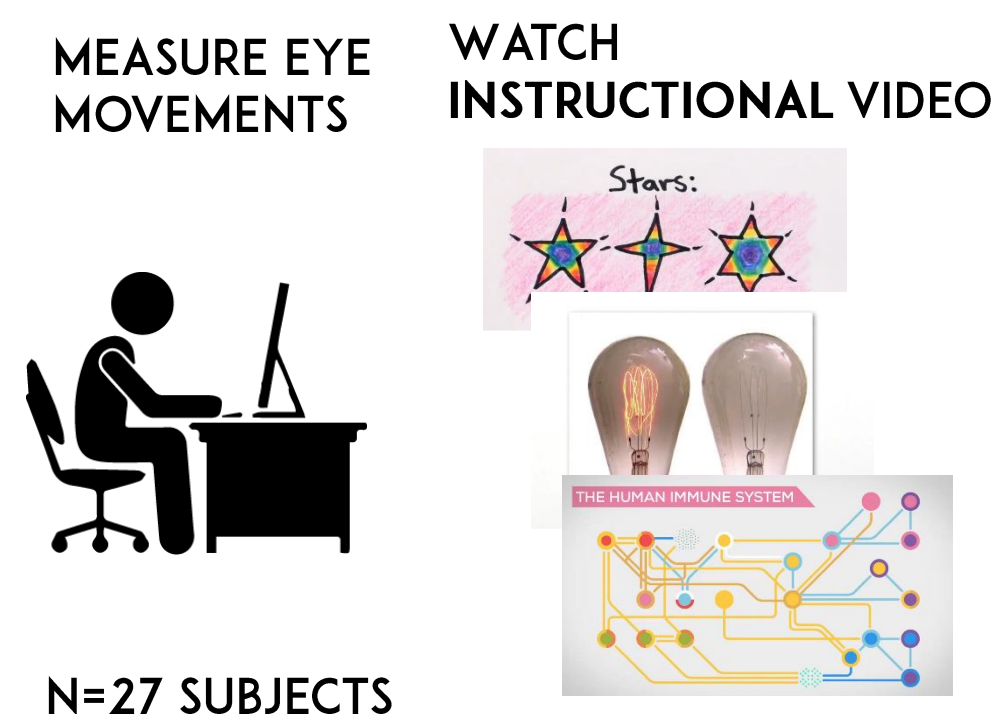
INTRODUCTION

EXPERIENCED TEACHERS PAY CLOSE ATTENTION TO THEIR STUDENTS. ADJUSTING THEIR TEACHING WHEN STUDENTS SEEM LOST. THIS DYNAMIC INTERACTION IS MISSING IN ONLINE EDUCATION. WE PROPOSE TO MEASURE ATTENTION TO ONLINE VIDEOS REMOTELY BY TRACKING EYE MOVEMENTS. AS WE HYPOTHESIZE THAT ATTENTIVE STUDENTS FOLLOW VIDEOS SIMILARLY WITH THEIR EYES. HERE WE SHOW THAT INTER-SUBJECT CORRELATION OF EYE MOVEMENTS DURING INSTRUCTIONAL VIDEO PRESENTATION IS SUBSTANTIALLY HIGHER FOR ATTENTIVE STUDENTS. AND THAT SYNCHRONIZED EYE MOVEMENT ARE PREDICTIVE OF INDIVIDUAL TEST SCORES ON THE MATERIAL PRESENTED IN THE VIDEO.

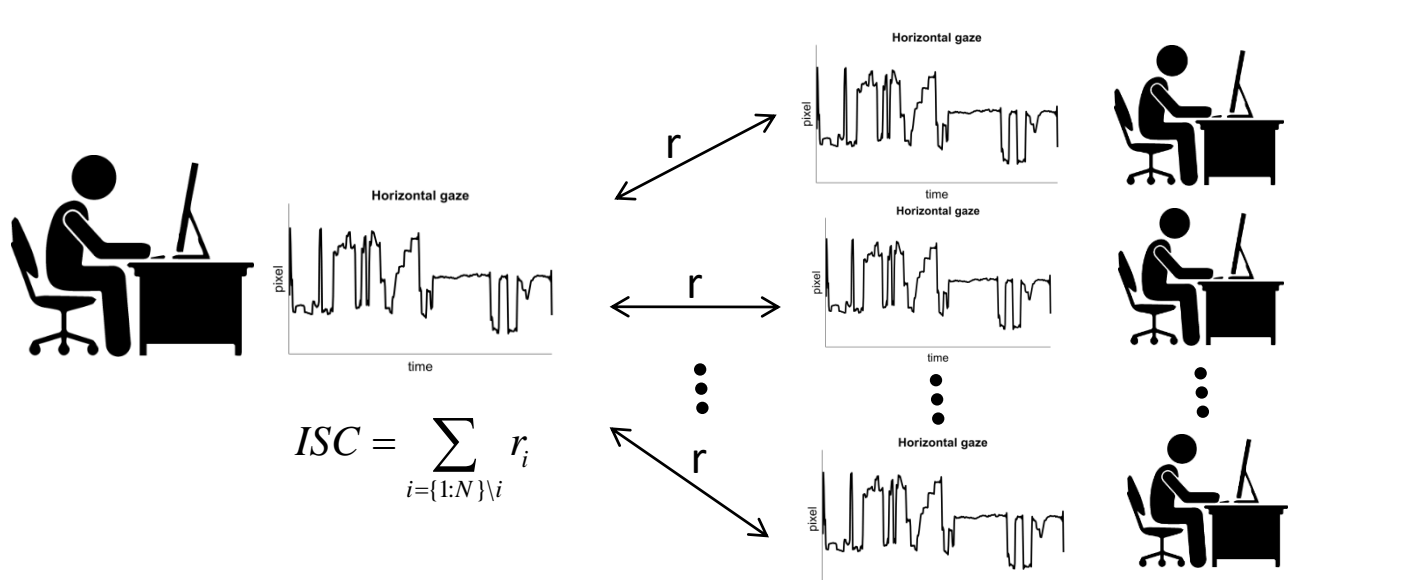
LAB EXPERIMENT

ATTEND CONDITION

DISTRACT CONDITION



INTER-SUBJECT CORRELATION OF EYE MOVEMENTS



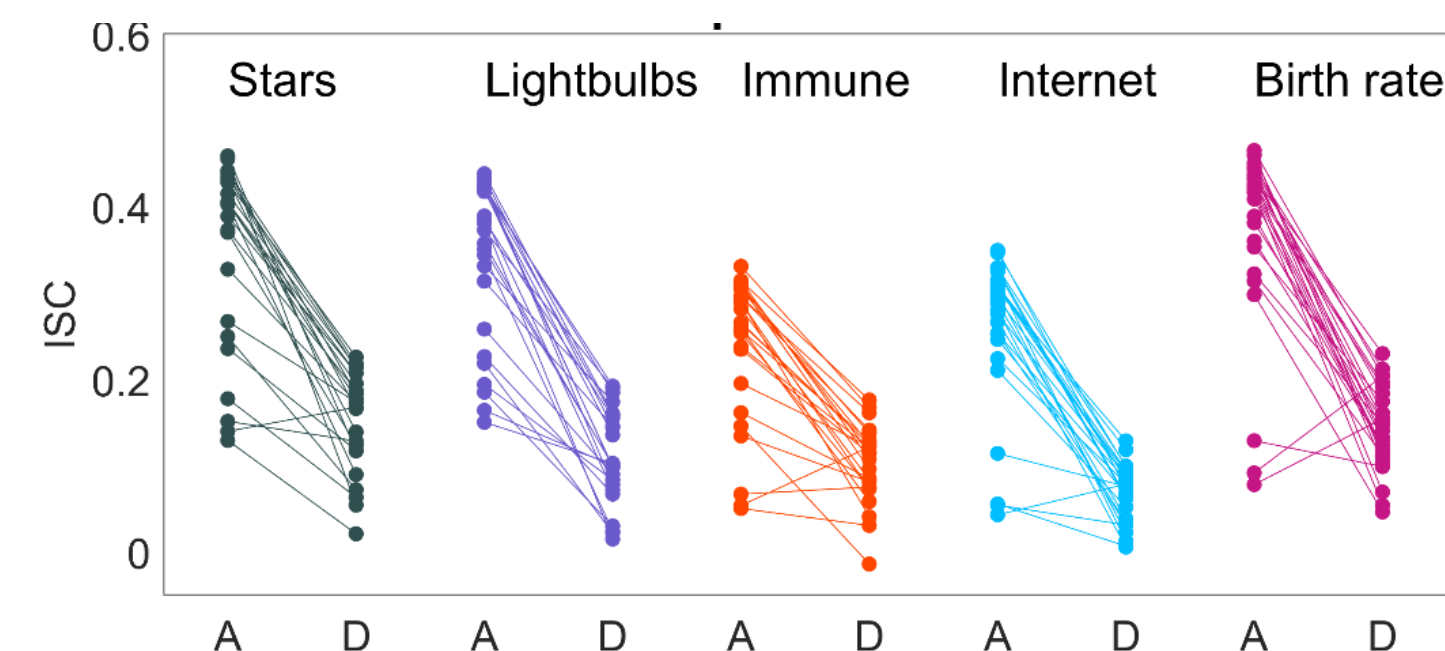
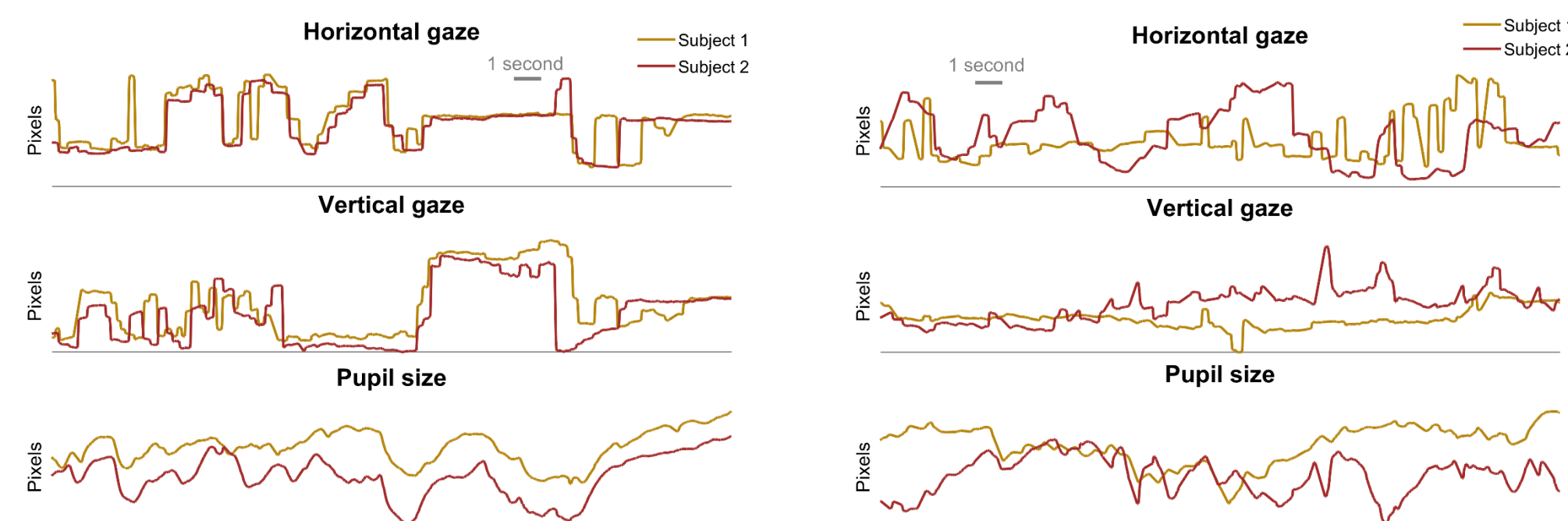
RESULTS

ATTENTION MODULATES INTERSUBJECT CORRELATION OF EYE MOVEMENTS

QUESTION: ARE THE ISC OF EYE MOVEMENTS MODULATED BY ATTENTION?

ATTEND CONDITION

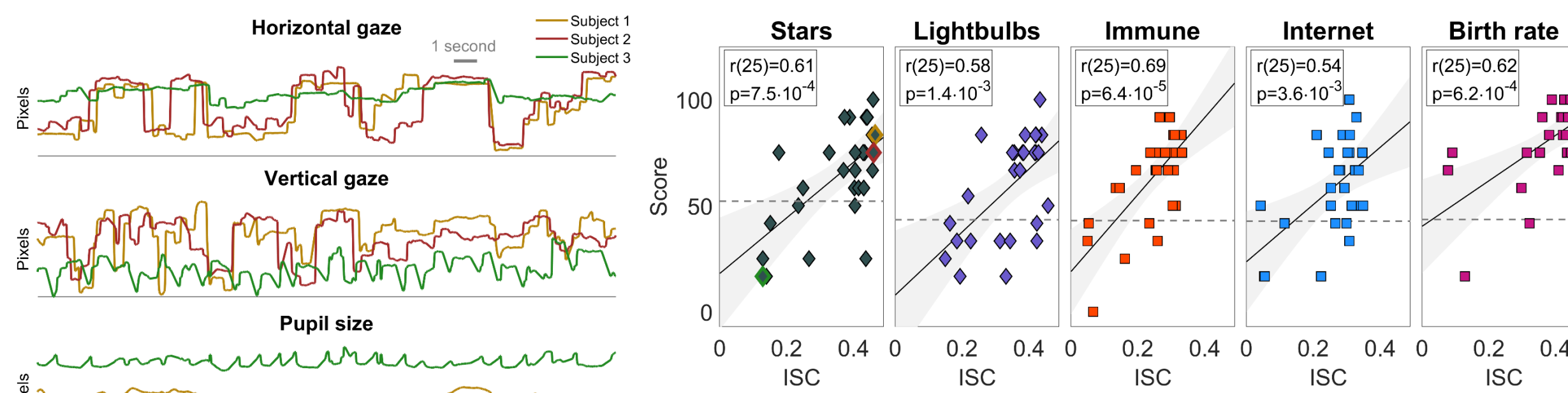
DISTRACT CONDITION



ANSWER: ATTENTION STRONGLY MODULATES ISC OF EYE MOVEMENTS

CORRELATED EYE MOVEMENTS PREDICTS TEST SCORES

QUESTION: CAN WE PREDICT TEST SCORE USING ISC OF EYE MOVEMENTS?



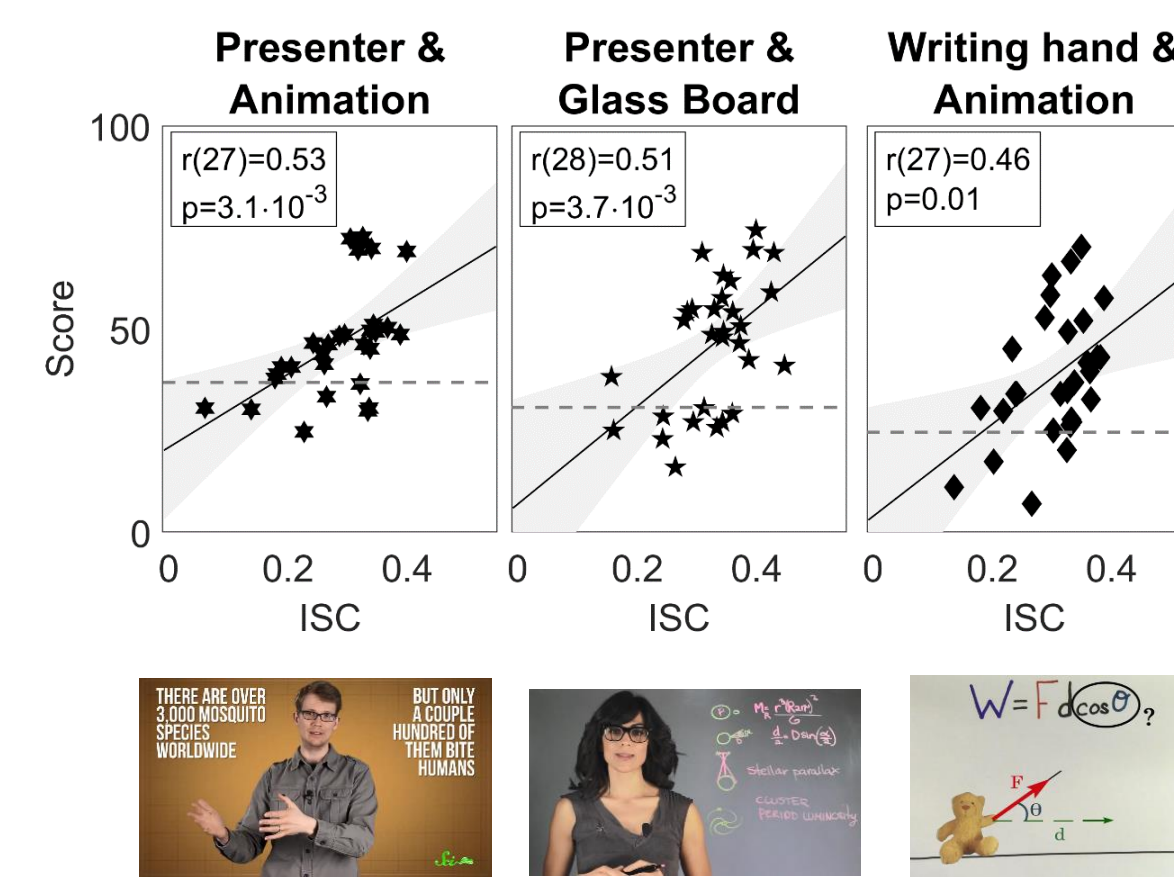
ISC OF EYE MOVEMENTS CORRELATE WITH TEST SCORE PERFORMANCE

2 STUDENTS WATCHING AN EDUCATIONAL VIDEO ATTENTIVELY AND 1 STUDENT NOT PAYING ATTENTION

ANSWER: WE FIND STRONG CORRELATION BETWEEN ISC AND TEST SCORE

INSTRUCTIONAL VIDEO STYLES

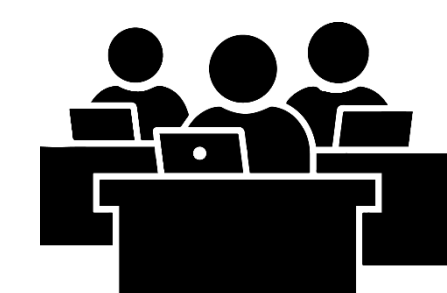
QUESTION: CAN WE PREDICT TEST SCORE USING ISC FOR DIFFERENT INSTRUCTIONAL VIDEO STYLES?



ANSWER: SCORE IS PREDICTABLE FROM ISC ACROSS 3 DIFFERENT INSTRUCTIONAL VIDEO STYLES

ONLINE EXPERIMENTS

CLASSROOM EXPERIMENT



The City College of New York

N=82 STUDENTS

AT-HOME EXPERIMENT



Prolific amazon mechanical turk

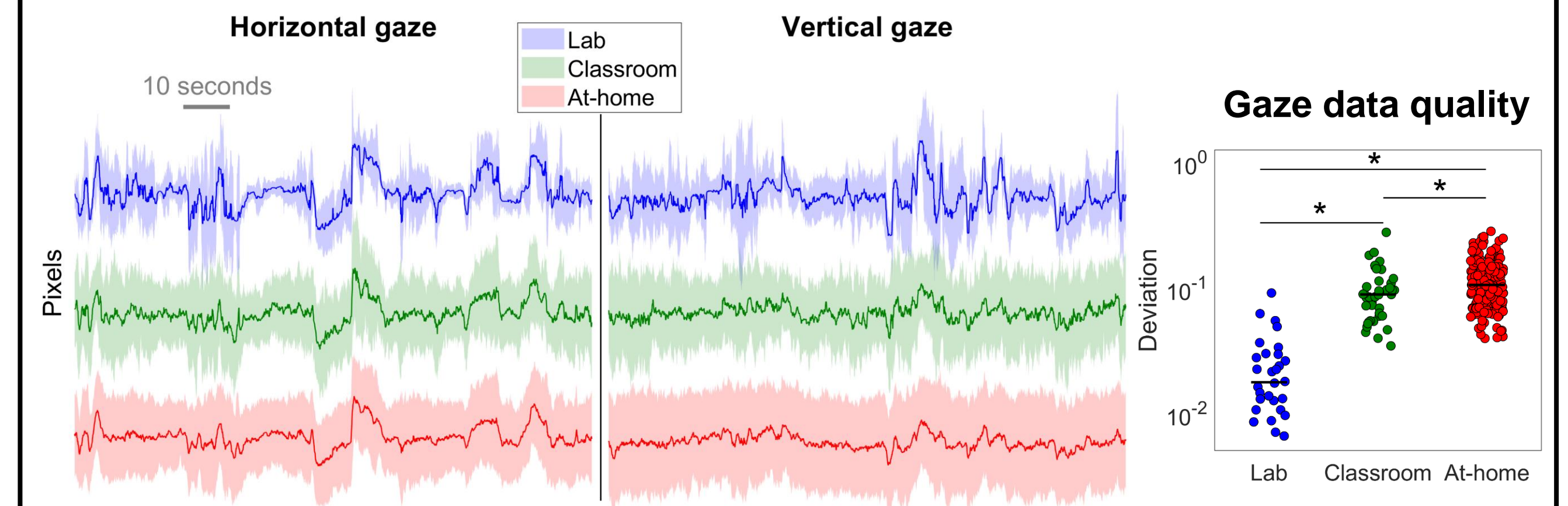
N=1012 PEOPLE

QUESTION: CAN WE MEASURE STUDENTS ATTENTIONAL LEVEL REMOTELY IN THE CLASSROOM OR AT-HOME AT SCALE USING STANDARD WEBCAMS?

RESULTS

CAPTURING EYE MOVEMENTS ONLINE AT SCALE USING STANDARD WEB CAMERAS

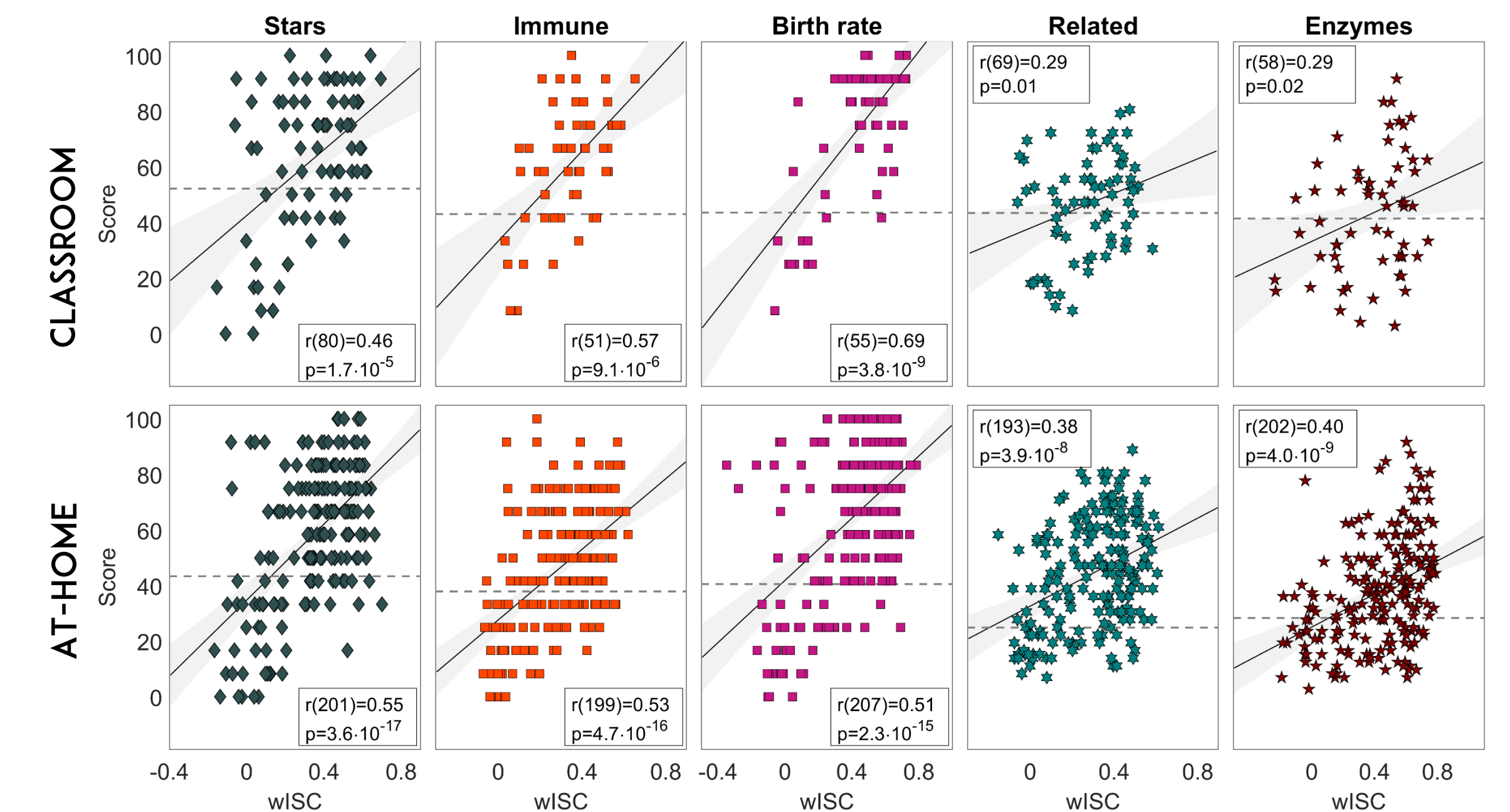
QUESTION: CAN STANDARD WEBCAMS BE USED TO MEASURE EYE MOVEMENTS RELIABLY REMOTELY WHILE PRESERVING PRIVACY?



ANSWER: CLASSROOM AND AT-HOME GAZE DATA HAVE HIGH CORRELATION WITH LAB DATA

PREDICTING TEST SCORES IN A CLASSROOM AND AT HOME USING WEB CAMERAS

QUESTION: CAN PREDICT TEST SCORES FOR STUDENTS IN THE CLASSROOM OR AT-HOME?



ANSWER: WE CAN PREDICT TEST SCORES OF STUDENTS USING EYE MOVEMENTS BOTH IN THE CLASSROOM AND AT-HOME

DISCUSSION

- ISC OF EYE MOVEMENTS IS MODULATED BY ATTENTION
- TEST SCORES OF STUDENTS CAN BE PREDICTED BY ISC
- THE ABILITY TO PREDICT TEST SCORES GENERALIZES TO MULTIPLE INSTRUCTIONAL VIDEO MATERIAL
- STANDARD WEBCAMS CAN BE USED TO MEASURE EYE MOVEMENTS REMOTELY WHILE PRESERVING PRIVACY
- ISC CAN BE USED TO MEASURE STUDENTS ATTENTIONAL LEVEL REMOTELY AT SCALE

ACKNOWLEDGEMENTS

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