

THE TRUSTEES OF
COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

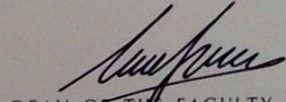
TO ALL PERSONS TO WHOM THESE PRESENTS MAY COME GREETING
BE IT KNOWN THAT

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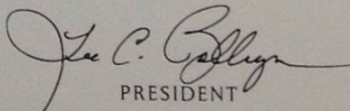
HAVING COMPLETED THE STUDIES AND SATISFIED THE REQUIREMENTS
FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

HAS ACCORDINGLY BEEN ADMITTED TO THAT DEGREE WITH ALL THE
RIGHTS PRIVILEGES AND IMMUNITIES THEREUNTO APPERTAINING IN
WITNESS WHEREOF WE HAVE CAUSED OUR CORPORATE SEAL TO BE HERE
AFFIXED IN THE CITY OF NEW YORK ON THE EIGHTEENTH DAY OF OCTOBER
IN THE YEAR TWO THOUSAND AND SEVENTEEN


DEAN OF THE FACULTY OF
THE GRADUATE SCHOOL OF
ARTS AND SCIENCES




PRESIDENT