

JASON B. FICE

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EDUCATION

- Sept 2012 - Current PhD, Kinesiology, University of British Columbia
Thesis: *Neck muscle activity and whiplash injury*
Supervisors: Gunter P. Siegmund, PhD & Jean-Sébastien Blouin, DC PhD
- May 2008 - Oct 2010 MSc, Mechanical Engineering, University of Waterloo
Thesis: *Numerical modeling of whiplash injury*
Supervisor: Duane S. Cronin, PhD
- Sept 2003 - Apr 2008 BAsC, Mechanical Engineering, University of Waterloo

RESEARCH INTERESTS

- Human volunteer testing with an emphasis on muscle activity and motor control. Including both injury biomechanics and neurophysiology.
- Computational modeling of the human body for the purpose of injury prevention.

RESEARCH EXPERIENCE

- May 2012 - Current Research Assistant, University of British Columbia (PhD)
- Designed and performed human volunteer experiments to better understand neck muscle activity during automotive collisions and to collect data to improve finite element models of the human body.
 - During crash sled experiments, I investigated how looking away from straight ahead or bracing against the steering wheel influenced neck muscle activity and head motions during frontal and rear impacts.
 - I also programmed a robotic device with five servo motors to rotate a volunteer's head in three axes. This device could be used in admittance control mode where the forces generated by the subject's head/neck would move the device with minimal resistance, allowing perturbations to be overlaid on natural movements.
 - Finally, I used a device that measured static neck loads, which allowed for experiments that improved our understanding of the relationship between neck biomechanics and muscle activation and how maximum neck strength changed when generating moments in 3D directions.

Nov 2010 - Mar 2012 Research Engineer, University of Waterloo, Waterloo, ON (Post MAsc)

- I was heavily involved in the development of a detailed explicit finite element model of the human neck using LS-DYNA software for the Global Human Body Models Consortium.
- My responsibilities included: extensive validation against volunteer and cadaver test data, finding root cause for deviation from test correlation and mesh editing using Hypermesh.

Sept - Dec 2009 Research Assistant, University of Waterloo, Waterloo, ON (MAsc)

- I implemented whiplash injury prediction in an LS-DYNA model of the cervical spine.
- The major finding was that a finite element model of the human neck could predict tissue injuries during automotive impacts using detailed geometry and published material properties without calibration.
- Outside of my thesis work, I experimentally characterized door panel foams for Honda using a hydraulic fixture and pendulum hammer. I used the data to define LS-DYNA material models.

TEACHING INTERESTS

- Biomechanics
- Solid mechanics
- Fatigue and fracture analysis
- Finite element analysis

TEACHING EXPERIENCE

CO-SUPERVISION OF STUDENTS

Winter 2016 I supervised a 4th year kinesiology student undertaking a research position in my lab. I taught him about injury biomechanics and how to set-up experiments in this field.

Summer 2012 I assisted in the supervision of two 2nd year undergraduates from Mechanical Engineering who were doing a co-op term at MEA Forensic Engineers and Scientists. I taught them the basics of how to setup, run, and analyze LS-DYNA simulations.

TEACHING ASSISTANT POSITIONS

Winter 2013 & 2016 KIN 351 - Biomechanics II Mechanical Properties of Tissues, 3rd year undergraduate course, University of British Columbia.

Fall 2009	MTE 119 - Statics, 1 st year undergraduate course, University of Waterloo.
Winter 2009	ME 526 - Fatigue and Fracture Analysis, 4 th year undergraduate course, University of Waterloo
Fall 2008 & 2010, Winter 2010	ME 322 - Mechanical Design 1, 3 rd year undergraduate course, University of Waterloo

INDUSTRY WORK EXPERIENCE

May - Aug 2006	Engineering Analyst & Testing Engineer (Co-op)
Jan - Apr 2007	Magna International, Concord, ON
Sept - Dec 2007	

- My responsibility was the analysis of automotive components using ANSYS 10.0 finite element software and FEMFAT fatigue software.
- I used an MTS hydraulic fixture to test fatigue and ultimate strength of clutch housings and shafts. I also performed assembly, functionality and durability tests of oil pumps. Both tasks involved data processing and preparing test reports.

May - Aug 2004	Project Coordinator (Co-op)
Sept - Dec 2005	F&P Manufacturing, Tottenham, ON

- I worked on continuous improvement projects at a tier one automotive supplier, including: implementing a 3D vision system, takt time analysis of welding lines, and developing a consumable parts database in Access with VBA.

HONOURS & AWARDS

2016	Mitacs Accelerate Grant \$20,000 eight-month award. Awarded for a research collaboration with MEA Forensic Engineers & Scientists.
2015	Faculty of Education Graduate Tuition Award \$2700 one-time award.
2013	Alexander Graham Bell Canada Graduate Scholarship \$105,000 three-year award. Highest level award offered by the National Science and Engineering Research Council of Canada.
2013	Best in theme & honorable mention overall in the Auto21 Poster Competition.
2013	Killam Fellowship Travel Award

- \$2000 two-year award.
- 2013 Faculty of Education Graduate Tuition Award
\$3000 one-time award
- 2012 Four Year Fellowship Ph.D. Award - University of British Columbia
\$90,000 four-year award (partially declined).
- 2012 Faculty of Education Graduate Entrance Scholarship - University of British Columbia
\$3500 one-time award.
- 2012 Graduate Entrance Scholarship - University of British Columbia
\$2500 one-time award
- 2009 Ontario Graduate Scholarship
\$15,000 one-year award
- 2009 Arthur F. Church Memorial Award
\$5,000 one-year award
Awarded to the highest achieving Ontario Graduate Scholarship in Mechanical Engineering.
- 2009 President's Scholarship - University of Waterloo
\$5,000 one-year award
- 2008 Graduated undergraduate degree with distinction on the Dean's Honours List.

ACADEMIC INVOLVEMENT

Ad-hoc Reviewer:

- Journal of Biomechanics (5 reviews)
- Journal of Orthopaedic and Sport Physical Therapy (1 review)

JOURNAL ARTICLES

PUBLISHED

Fice JB, Blouin, J-S, Siegmund GP. Head postures during naturalistic driving. *Traffic Inj Prev.*
In press, accepted June 26th, 2018.

Fice JB, Siegmund GP, Blouin, J-S. Neck muscle biomechanics and neural control. *J Neurophysiol.* 2018;120(1):361-371.

Forbes PA, **Fice JB**, Siegmund GP, Blouin J-S. Electrical vestibular stimuli evoke robust muscle activity in superficial and deep neck muscles in humans. *Front Neurol.* 2018; 9:535.

Fice JB, Siegmund GP, Blouin J-S. Prediction of three dimensional maximum isometric neck strength. *Ann Biomed Eng.* 2014;42(9):1846-1852.

Fice JB, Cronin DS. Investigation of whiplash injuries in the upper cervical spine using a detailed neck model. *J Biomech.* 2012;45(6):1098-1102.

Fice JB, Chandrashekar N. Tapered fracture fixation plate reduces bone stress shielding: A computational study. *J Mech Med Biol.* 2012;12(4).

Fice JB, Cronin DS, Panzer MB. Cervical spine model to predict capsular ligament response in rear impact. *Ann Biomed Eng.* 2011;39(8):2152-2162.

Panzer MB, **Fice JB**, Cronin DS. Cervical spine response in frontal crash. *Med Eng Phys.* 2011;33(9).

IN PROGRESS

Fice JB, Mang DWH, Ólafsdóttir JM, Blouin J-S, Brolin K, Siegmund GP. Steering wheel bracing during frontal and rear-end impact. In preparation.

Fice JB, Mang DWH, Blouin, J-S, Siegmund GP. Volunteers in non-neutral postures during rear-impact. In preparation.

CONFERENCE PUBLICATIONS

PAPERS

Ólafsdóttir JM, **Fice JB**, Mang DWH, Brolin K, Davidsson J, Blouin, J-S, Siegmund GP. Trunk muscle recruitment patterns in simulated precrash events. *Traffic Inj Prev.* 2018;19(sup1):S186-S188.

Ólafsdóttir JM, **Fice JB**, Mang DWH, Brolin K, Davidsson J, Blouin, J-S, Siegmund GP. Volunteer experiments to study muscle activation patterns in dynamic conditions. *Traffic Inj Prev.* 2016;17(sup1):219-224.

Fice JB, Blouin J-S, Siegmund GP. Seatback rotational control reduces whiplash injury potential: A preliminary computational study. In: *1st International Workshop on Parametric Modeling of Human Anatomy*, Vancouver, BC, Canada: 2013.

Fice JB, Blouin J-S, Siegmund GP. Seatback rotational control reduces whiplash injury potential: A preliminary computational study. In *40th International Workshop on Human Subjects for Biomechanical Research*, Savannah, GA, USA: 2012.

Cronin DS, **Fice JB**, Dewit JA, Moulton J. Upper cervical spine kinematic response and injury prediction. In: *2012 IRCOBI Conference Proceedings*. Dublin, Ireland: 2012.

Fice JB, Moulton JA, Cronin DS. Development of a Detailed Finite Element Neck Model for Automotive Safety Research. In: *39th International Workshop on Human Subjects for Biomechanical Research*, Dearborn, MI, USA: 2011.

Fice JB, Cronin DS, Panzer MB. Investigation of Facet Joint Response under Rear Impact Conditions using FE Model of the Cervical Spine. In: *Proceedings of the 21st International Technical Conference on the Enhanced Safety of Vehicles (ESV)*. Stuttgart, Germany: 2009.

POSTERS & PRESENTATIONS

Fice JB, Mang DWH, J, Blouin, J-S, Siegmund GP. Neck muscle responses for rotated head postures during rear-end impacts. In: *8th World Congress of Biomechanics*, Dublin, Ireland: 2018.

Fice JB, Forbes PA, Siegmund GP, Blouin J-S. Neck Muscle Synergies. *45th Annual Meeting of the Society for Neuroscience*, Chicago, IL, USA: 2015.

Mang DWH, **Fice JB**, Yan P, Romilly DP, Blouin J-S, Siegmund GP (2015). The development of an actively controlled automotive seat to reduce the risk of whiplash injuries during low-speed rear end collisions. In: *AUTO21 Conference*, Ottawa, ON, Canada: 2015.

Fice JB, Siegmund GP, Blouin J-S. Relationship between neck muscle neural control and biomechanics. In: *9th Annual Canadian Neuroscience Meeting*, Vancouver, BC, Canada: 2015.

Forbes PA, **Fice JB**, Schouten A, Siegmund GP, Blouin J-S. Suppression of vestibulocollic reflexes during head movements. In: *9th Annual Canadian Neuroscience Meeting*, Vancouver, BC, Canada: 2015.

Mang DWH, **Fice JB**, Romilly DP, Blouin J-S, Siegmund GP. The development of an actively controlled automotive seat to reduce the risk of whiplash injuries during low-speed rear end collisions. In: *AUTO21 Conference*, Windsor, ON, Canada: 2014.

Fice JB, Siegmund GP, Blouin J-S. A generalized method for predicting maximum 3D neck moments. In: *7th World Congress of Biomechanics*, Boston, MA, USA: 2014.

Fice JB, Blouin J-S, Siegmund GP (2013). Organizing principles of neck muscle activation explored through electrical stimulation. In: *43rd Annual Meeting of the Society for Neuroscience*, San Diego, CA, USA: 2013.

Fice JB, Mang DWH, Romilly DP, Blouin J-S, Siegmund GP (2013). The development of an actively controlled automotive seat to reduce the risk of whiplash injuries during low-speed rear end collisions. In: *AUTO21 Conference*, Toronto, ON, Canada: 2013.

Fice JB, Panzer MB, Cronin DS. Development of a finite element model of the human cervical spine for automotive crashworthiness research. In: *6th World Congress on Biomechanics*, Singapore: 2010.

Chandrashekar N, **Fice JB**. A new tapered fracture fixation plate to reduce bone stress shielding. In: *54th Annual Meeting of the Orthopaedic Research Society*, San Francisco, CA, USA: 2008.

REFERENCES

- Dr. Gunter Siegmund, Director of Research, MEA Forensic Engineers and Scientists, gunter.siegmund@meaforensic.com, +1 604 351-2922 (PhD co-supervisor).
- Dr. Jean-Sébastien Blouin, Professor, School of Kinesiology, University of British Columbia, jsblouin@mail.ubc.ca, +1 604 827-3372 (PhD co-supervisor).
- Dr. Duane Cronin, Professor, Department of Mechanical and Mechatronics Engineering, University of Waterloo, duane.cronin@uwaterloo.ca, +1 519 888-4567 ext. 32682 (MAsc supervisor).