Desautels Faculty of Management – McGill University
Decision Neuroscience (MRKT 709)

Preliminary Syllabus

Course ID and Title: MRKT 709 (PhD)
Topics: Decision-Neuroscience

Prerequisites: Instructor Permission
Semester and day/time: Autumn 2015, Wednesdays 10h05-12h55
Location: Room 310, Desautels Faculty of Management, 1001 Sherbooke West

Instructors:

Laurette Dubé
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Introduction, Overview and Objective

Decision neuroscience originally focused on studying behavioral decision making and neuro-economic studies of fast, intuitive, oftentimes emotional or hot "irrational" judgments, vis-à-vis their better known cold, knowledge-based, deliberate, rational, or utility maximizing counterparts. Functional magnetic resonance imagining (fMRI) and lesion studies have provided critical insights into various neurobiological and psychological mechanisms involved in choice valuation, reward and risk, impulsivity and self-control.

Decision neuroscience, as taught in this marketing seminar of the joint doctoral management program, will cover the above topics in the first part of the course, but will also move beyond these early boundaries to delve into the most recent developments of behavioral and brain sciences to study the broader context of "motivated decision making and behavior." The second part of the course examines the latest cutting edge research on dopamine pathways and the associated reinforcement learning that underlies everyday decision-making and behaviors within the personal, professional, and commercial realms. In this part of the class, we will examine and discuss the added value of neuroscience to the present understanding of decision-making in the current consumer, marketing, psychology and health research.

The third part of the course investigates the social, cultural, political, and moral context within which individual choices are made, including trust and cooperation. Here again, we will examine and discuss the added value of decision neuroscience to the present understanding of these phenomena in current marketing and other social sciences.

This course is designed for graduate and post-graduate students in consumer behavior, marketing and other management disciplines with strong behavioral components. It should also be of high interest for

students in psychology, health, political sciences, and economics who are attempting to understand the neural basis of decision-making and behaviors, and the insights these provide for their respective domains of research and practice. The course is also designed to extend the means and methods of translational neuroscience beyond the present bench-to-bed focus on psychiatric diseases. Our goal is for students to be able to apply these findings to real world decision-making contexts and be knowledgeable of how our world evolved in dramatically different conditions.

Course Format: To account for the fact that students might not have a deep mastery of brain sciences, the course will be conducted as a seminar but will be enriched by tutorials performed by instructors and guest participants to facilitate insights from brain sciences to behavior research and/or innovation, management, health and other relevant practices. All students will be expected to actively participate in the discussion based on the assigned material. The professors of the course will lead the first meeting of the class. However, subsequent sessions will involve student-led discussions focused on the examination, evaluation, and integration of theories specific to the session's topic. For the best class experience, it is imperative for students who are not discussion leaders to be prepared (read and integrate the articles) and be active participants in the discussion. Class dialogue is a core element aimed to sharpen students' critical thinking skills and will revolve around the assigned readings which will serve as the focus of deliberation.

The class will meet once per week for approximately 3 hours per session/class for a total of 13 sessions. Each session will revolve around a separate topic (see **Tentative schedule** below).

Course Requirements and Grades

Students are responsible for all announcements or schedule changes made in class, whether or not they are in attendance.

Required Texts: There are no required texts. However, a list of articles and reading assignments will be provided.

Examinations and Grading: The final grade in the course will be based on the following weights:

Class discussion leadership (twice per student; 20% each)	40%
Participation in class discussion	20%
Term paper (due during the last week of class)	40%
Final Grade	100%

Term paper: This assignment will consist of a comprehensive and integrative review of topics related to one phenomenon discussed in class. We encourage you to pick a topic related to your research and explore what part a specific decision neuroscience topic plays into it. In developing this paper, the readings assigned for class should be regarded only as a starting point. In all cases, the paper will be evaluated based on the creativity of the project, the extent to which sound principles of logic and empirical research are used in the paper, and the effectiveness of the written communication. You will have many opportunities to get feedback about your term project from other students and the instructors before the final paper is due.

Class discussion leadership: You will be asked to lead a class discussion during the term on the topic that you choose from the list provided below. Depending on the number of students registered for the class, students will have to present once or twice. The class discussion should include coverage of all the

articles in the session, both from the neuroscience and marketing part. Carefully introduce the articles and link them together. Describe how each study builds on each other and be ready to critique it.

You will be evaluated based on the instructors' overall assessment of the extent to which your presentation is clear, concise, organized, and reflects an understanding of the assigned course readings and how the session fits within the neuroscience domain and can lead to novel research. The grade will also reflect the extent to which you are able to engage the class in a deep and useful discussion and answer questions posed by other students or faculty members in a thoughtful and responsive manner.

Selecting a topic for class discussion leadership: Please review the syllabus' topics below and come to the first class knowledgeable of your top three picks for leading a class discussion. You will also have the possibility to make up your mind during the first class. These topics will be on a first come/first serve basis. We can accommodate a maximum of 2 presentations per student each week of class, and if some class sessions remain open, we will ask for volunteer students to make additional presentations.

Please note that the person picking the topic and date of the first class' discussion leadership must chose to do so during the first week of class (**Wednesday, September 9**). Be assured that the instructors are well aware of the short preparation time given to the student who will lead the first discussion and will be taking this in account when rating the quality and effectiveness of the class discussion. Preferably, all students will be able to pick their discussion topic during the first class. However, due to add and drop period, it will also be possible to choose the discussion leadership sessions during our second week of classes.

Selecting a topic for term paper: You are responsible for informing the instructors about your topic choice for the term paper in class. You can also request to meet with one of the instructors to guide you with this choice. Once the paper topic has been chosen, please confirm it by sending a brief e-mail outlining your topic to all three instructors. This decision and notification should be made no later than the week of **Wednesday, October 21**. Please be advised you cannot change the topic of your paper without instructors' consent. Do not hesitate to consult with us throughout the process.

Participation in class discussions: You will be evaluated based on our overall assessment of the amount and quality of the individual's comments. High quality contributions will reflect both a depth and breadth of knowledge gained from the assigned readings, will be clearly stated and effectively communicated, and will be insightful and relevant to the issues under discussion. Although the quantity of comments is important, students should refrain from monopolizing discussions and should aim to be succinct.

Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester.

Statement on Academic Integrity

McGill seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles.

Hybrid, Local Online, or Distance Learning Courses: Not applicable

Tentative Course Schedule

Date	Topic
Wednesday, September 9	1. Course introduction (Dubé & Fellows)
Part 1: Behavioral decision making and neuroeconomics	
Wednesday, September 16	2. Prospect theory, heuristics, biases and their neural basis (Dubé & Fellows)
Wednesday, September 23	3. Dopaminergic pathways, reward and valuation (Dubé & Dagher)
Wednesday, October 7	4. Behavioral and neurobiological study of sensory processes and integration into value judgment and utility (Dubé & Shizgal, with guest Accolla)
Wednesday, October 14	5. Anticipation, experience and delay in judgment and decision making (Dubé & Zatorre)
Part 2: Neuroscience of Motivated Choice and Behavior	
Wednesday, September 30	6. Learning pathways in motivated choice: Novelty seeking, reinforcement learning and conditioning (Dubé & Dagher)
Wednesday, October 28	7. Impulsivity and instructional control (Dubé & Dagher)
Wednesday, October 21	8. Motor learning, habit formation/change, and goal-directed decision making (Fellows & Dubé, with guest Sweet)
Wednesday, November 4	9. Brain-gut interaction, experience, self-control and self-regulation (Dubé and Fellows, with guest Battistini)
Part 3. Neuroscience of Individual Decision Making in a Whole-Brain Context	
Wednesday, November 11	10. Attention, memory, belief system, mindset; and interfaces with motor processes (Dubé, Fellows, & Dagher; with guest Kergoat)
Wednesday, November 18	11. Deliberate decision making, foresight, free will, and moral behavior (Dubé, Fellows, & Dagher, with guest Grohmann)
Wednesday, November 25	12. Social neuroscience, altruism, cooperative behavior, and culture (Dubé, Fellows, and Bartz*, with guest Duncan)
Wednesday, December 2	**Term Paper Presentations (**Dubé, Dagher, & Fellows)

***Note*:** Not in chronological order
*Confirmed guest

CLASS READINGS LIST:

1. Course introduction (Sept 9)

***Instructors*: Dubé & Fellows**

Fellows, L. K. (2012). "Current concepts in decision-making research from bench to bedside." Journal of the International Neuropsychological Society **18**(06): 937-941.

Kable, J.W. (2011), The cognitive neuroscience toolkit for the neuroeconomist: A functional overview, Journal of Neuroscience, Psychology, and Economics, 4(2), 63-84.

Loewenstein, G., S. Rick, et al. (2008). "Neuroeconomics." Annual Review of Psychology **59**(1): 647-672.

Plassmann, H., T. Z. Ramsøy, et al. (2012). "Branding the brain: A critical review and outlook." Journal of Consumer Psychology **22**(1): 18-36.

Ariely, D., & Berns, G.S. (2010). Neuromarketing: the hope and hype of neuroimaging in business. Nature Reviews Neuroscience, 11(4), 284-292.

Dubé, L., A. Bechara, et al. (2008). "Towards a brain-to-society systems model of individual choice." Marketing Letters **19**(3-4): 323-336.

Preissl, R., Wong, T. M., et al. (2012). Compass: a scalable simulator for an architecture for cognitive computing. In *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis* (p. 54). IEEE Computer Society Press.

Part 1: Behavioral decision making and neuroeconomics

2. Prospect theory, heuristics, biases and their neural basis (Sept 16)

***Instructors*: Dubé & Fellows**

Fellows, L. K. (2011). The neurology of value. Neurobiology of Sensation and Reward. J. A. Gottfried. Boca Raton, FL, CRC Press**:** 351-368. Accessed from: http://www.ncbi.nlm.nih.gov/books/NBK92793/

Fellows, L. K. (2011). "Orbitofrontal contributions to value-based decision making: Evidence from humans with frontal lobe damage." Annals of the New York Academy of Sciences **1239**(1): 51-58.

Bechara, A. and A. R. Damasio (2005). "The somatic marker hypothesis: A neural theory of economic decision." Games and Economic Behavior **52**(2): 336-372.

Kable, J. W. and P. W. Glimcher (2007). "The neural correlates of subjective value during intertemporal choice." Nature Neuroscience **10**(12): 1625-1633.

Tversky, A. and D. Kahneman (1974). "Judgment under uncertainty: Heuristics and biases." Science **185**(4157): 1124-1131.

Thaler, R. H. and S. Benartzi (2004). "Save More Tomorrow™: Using behavioral economics to increase employee saving." Journal of Political Economy **112**(1): S164-S187.

Leotti, L. A. and M. R. Delgado (2014). "The value of exercising control over monetary gains and losses." Psychological Science **25**(2): 596-604.

3. Dopaminergic pathways, reward and valuation (Sept 23)

***Instructors*: Dubé & Dagher**

Rangel, A., Camerer, C., & Montague, P. R. (2008). A framework for studying the neurobiology of value-based decision making, Nature Reviews Neuroscience, **9**(7), 545-556

Dagher, A. (2007). "Shopping centers in the brain." Neuron **53**(1): 7-8.

Dagher, A. (2012). "Functional brain imaging of appetite." Trends in Endocrinology & Metabolism **23**(5): 250-260.

Salamone, J. D., et al. (2005). "Beyond the reward hypothesis: alternative functions of nucleus accumbens dopamine." Current opinion in pharmacology **5**(1): 34-41.

Aarts, E., D. L. Wallace, et al. (2014). "Dopamine and the cognitive downside of a promised bonus." Psychological Science **25**(4): 1003-1009.

Luxi, S., A. Fishbach, et al. (2015). "The motivating-uncertainty effect: Uncertainty increases resource investment in the process of reward pursuit." Journal of Consumer Research **41**(5): 1301-1315.

Botvinick, M. and T. Braver (2015). "Motivation and cognitive control: From behavior to neural mechanism." Annual Review of Psychology **66**(1): 83-113.

4. Behavioral and neurobiological study of sensory processes and integration into value judgment and utility (Oct 7)

***Instructors*: Dubé & Shizgal, with guest Accolla**

Shizgal, P. (2012). "Scarce means with alternative uses: Robbins' definition of economics and its extension to the behavioral and neurobiological study of animal decision making." Frontiers in Neuroscience **6**: 1-20.

Shankar, M., C. Simons, et al. (2010). "An expectations-based approach to explaining the cross-modal influence of color on orthonasal olfactory identification: The influence of the degree of discrepancy." Attention, Perception, & Psychophysics **72**(7): 1981-1993.

Small, D. M., Veldhuizen, M. J., et al. (2013). "Sensory Neuroscience: Taste Responses in Primary Olfactory Cortex." Current Biology **23**(4): R157-R159.

Rudenga, K., B. Green, et al. (2010). "Evidence for an integrated oral sensory module in the human anterior ventral insula." Chemical Senses **35**(8): 693-703.

Krishna, A. (2012). "An integrative review of sensory marketing: Engaging the senses to affect perception, judgment and behavior." Journal of Consumer Psychology **22**(3): 332-351.

Spence, C. (2012). "Managing sensory expectations concerning products and brands: Capitalizing on the potential of sound and shape symbolism." Journal of Consumer Psychology **22**(1): 37-54.

Biswas, D., L. I. Labrecque, et al. (2014). "Making Choices While Smelling, Tasting, and Listening: The Role of Sensory (Dis)similarity When Sequentially Sampling Products." Journal of Marketing **78**(1): 112-126.

5. Anticipation, Experience and Delay in Intensity, Affective and Valuation Judgments (Oct 14)

***Instructors*: Dubé & Zatorre**

Zatorre, R. J. and V. N. Salimpoor (2014). From perception to pleasure: Music and its neural substrates. In the light of evolution: Volume VII: The human mental machinery. Washington, DC, National Academies Press; US**:** 225-241.

Salimpoor, V. N., M. Benovoy, et al. (2011). "Anatomically distinct dopamine release during anticipation and experience of peak emotion to music." Nature neuroscience **14**(2): 257-262.

Small, D. M., R. J. Zatorre, et al. (2001). "Changes in brain activity related to eating chocolate: From pleasure to aversion." Brain: A Journal of Neurology **124**(9): 1720-1733.

Loewenstein, G. F., E. U. Weber, et al. (2001). "Risk as feelings." Psychological bulletin **127**(2): 267.

Chan, E. and A. Mukhopadhyay (2010). "When choosing makes a good thing better: Temporal variations in the valuation of hedonic consumption." Journal of Marketing Research **47**(3): 497-507.

Pyone, J. S. and A. M. Isen (2011). "Positive affect, intertemporal choice, and levels of thinking: Increasing consumers' willingness to wait." Journal of Marketing Research **48**(3): 532-543.

Part 2: Neuroscience of Motivated Choice and Behavior

6. Learning in motivated choice: Novelty seeking, reinforcement learning and conditioning (Sept 30)

***Instructors*: Dubé & Dagher**

Costa, V. D., V. L. Tran, et al. (2014). "Dopamine modulates novelty seeking behavior during decision making." Behavioral neuroscience **128**(5): 556-566.

Small, D. M., D. Gitelman, et al. (2005). "Monetary incentives enhance processing in brain regions mediating top-down control of attention." Cerebral Cortex **15**(12): 1855-1865.

de Araujo, Ivan E., T. Lin, et al. (2013). "Metabolic regulation of brain response to food cues." Current Biology **23**(10): 878-883.

Meyer, M. D., Risbrough, V. B., et al. (2015). Pavlovian conditioning to hedonic food cues in overweight and lean individuals. Appetite **87**, 56-61.

Tang, D. W., L. K. Fellows, & Dagher, A. (2014). "Behavioral and neural valuation of foods is driven by implicit knowledge of caloric content." Psychological Science **25**(12): 2168-2176.

Otto, A., S. J. Gershman, et al. (2013). "The curse of planning: Dissecting multiple reinforcement-learning systems by taxing the central executive." Psychological Science **24**(5): 751-761.

Fangyuan, C. and S. Jaideep (2014). "Forced to be bad: The positive impact of low-autonomy vice consumption on consumer vitality." Journal of Consumer Research **41**(4): 1089-1107.

7. Impulsivity and instructional control (Oct 28)

***Instructors*: Dubé & Dagher**

Doll, B. B., W. J. Jacobs, et al. (2009). "Instructional control of reinforcement learning: A behavioral and neurocomputational investigation." Brain Research **1299**: 74-94.

Simpson, A., K. J. Riggs, et al. (2012). "Refining the understanding of inhibitory processes: how response prepotency is created and overcome." Developmental science **15**(1): 62-73.

Maia, T. V. and M. J. Frank (2011). "From reinforcement learning models to psychiatric and neurological disorders." Nature neuroscience **14**(2): 154-162.

Coutlee, C. G., C. S. Politzer, et al. (2014). "An abbreviated impulsiveness scale constructed through confirmatory factor analysis of the Barratt Impulsiveness Scale Version 11." Archives of Scientific Psychology **2**(1): 1-12.

Talukdar, D. and C. Lindsey (2013). "To buy or not to buy: Consumers' demand response patterns for healthy versus unhealthy food." Journal of Marketing **77**(2): 124-138.

Plassmann, H. and B. Weber (In Press). "Individual differences in marketing placebo effects: Evidence from brain imaging and behavioral experiments." Journal of Marketing Research.

8. Motor learning, habit formation/change, and goal-directed decision making (Oct 21)

***Instructors*: Dubé & Fellows with guest Sweet**

Hare, T. A., J. O'Doherty, et al. (2008). "Dissociating the role of the orbitofrontal cortex and the striatum in the computation of goal values and prediction errors." The Journal of neuroscience : the official journal of the Society for Neuroscience **28**(22): 5623-5630.

de Wit, S., H. Standing, et al. (2012). "Reliance on habits at the expense of goal-directed control following dopamine precursor depletion." Psychopharmacology **219**(2): 621-631.

Carter, R. M. and S. A. Huettel (2013). "Learning from silver linings." Frontiers in Neuroscience **7**: 1-2.

Sweet, S. N., M. S. Fortier, et al. (2014). "Testing a longitudinal integrated self-efficacy and self-determination theory model for physical activity post-cardiac rehabilitation." Health Psychology Research **2**(1).

Topolinski, S., S. Lindner, et al. (2014). "Popcorn in the cinema: Oral interference sabotages advertising effects." Journal of Consumer Psychology **24**(2): 169-176.

Van den Bergh, B., J. Schmitt, et al. (2011). "Embodied Myopia." Journal of Marketing Research **48**(6): 1033-1044.

Kavanagh, L. C., C. L. Suhler, et al. (2011). "When it's an error to mirror: The surprising reputational costs of mimicry." Psychological Science **22**(10): 1274-1276.

9. Brain-gut interaction, experience, self-control and self-regulation (Nov 4)

***Instructors*: Dube and Fellows, with guest Battistini**

de Araujo, I. E., J. G. Ferreira, et al. (2012). "The gut–brain dopamine axis: A regulatory system for caloric intake." Physiology & Behavior **106**(3): 394-399.

D'Agostino, A. E. and D. M. Small (2012). "Neuroimaging the interaction of mind and metabolism in humans." Molecular Metabolism **1**(1-2): 10-20.

Veldhuizen, M. G., D. J. Nachtigal, et al. (2013). "Verbal descriptors influence hypothalamic response to low-calorie drinks." Molecular Metabolism **2**(3): 270-280.

Finkelstein, S. R. and A. Fishbach (2010). “When healthy food makes you hungry.” Journal of Consumer Research **37**(3): 357-367.

Argo, J. J. and K. White (2012). "When do consumers eat more? The role of appearance self-esteem and food packaging cues." Journal of Marketing **76**(2): 67-80.

Schmeichel, B. J., C. Harmon-Jones, et al. (2010). "Exercising self-control increases approach motivation." Journal of Personality and Social Psychology **99**(1): 162-173.

Usta, M. and G. Häubl (2011). "Self-regulatory strength and consumers' relinquishment of decision control: When less effortful decisions are more resource depleting." Journal of Marketing Research **48**(2): 403-412.

Part 3. Neuroscience of Individual Behavioral in a Whole-Brain Context

10. Attention, memory, belief system, mindset; and interfaces with motor processes (Nov 11)

***Instructors*: Dube, Fellows, & Dagher, with guest Kergoat**

Petersen, S. E. and M. I. Posner (2012). "The attention system of the human brain: 20 years after." Annual Review of Neuroscience **35**: 73-89.

Oztekin, I., L. Davachi, et al. (2010). "Are representations in working memory distinct from representations in long-term memory? Neural evidence in support of a single store." Psychological Science **21**(8): 1123-1133.

Wilkinson, L. and M. Jahanshahi (2015). Non declarative (procedural) memory. International Encyclopedia of the Social & Behavioral Sciences (Second Edition). J. D. Wright. Oxford, Elsevier**:** 844-850.

Topolinski, S. and F. Strack (2009). "Motormouth: Mere exposure depends on stimulus-specific motor simulations." Journal of experimental psychology **35**(2): 423-433.

Chernev, A. and S. Blair (2015). "Doing well by doing good: The benevolent halo of corporate social responsibility." Journal of Consumer Research **41**(6): 1412-1425.

Wyer Jr, R. S. and A. J. Xu (2010). “The role of behavioral mind-sets in goal-directed activity: Conceptual underpinnings and empirical evidence.” Journal of Consumer Psychology **20**(2): 107-125.

Buhrau, D. and M. Sujan (2015). “Temporal mindsets and self-regulation: The motivation and implementation of self-regulatory behaviors.” Journal of Consumer Psychology **25**(2): 231-244.

11. Deliberate decision making, foresight, free will, and moral behavior (Nov 18)

***Instructors*: Dubé , Dagher, & Fellows, with guest Grohmann**

Bode, S., C. Murawski, et al. (2014). "Demystifying "free will": The role of contextual information and evidence accumulation for predictive brain activity." Neuroscience & Biobehavioral Reviews **47**(0): 636-645.

Rigoni, D., S. Kuhn, et al. (2011). "Inducing disbelief in free will alters brain correlates of preconscious motor preparation: The brain minds whether we believe in free will or not." Psychological Science **22**(5): 613-618.

Haggard, P. (2008). "Human volition: Towards a neuroscience of will." Nature Reviews Neuroscience **9**(12): 934-946.

Morhart, F., L. Malär, et al. (2015). "Brand authenticity: An integrative framework and measurement scale." Journal of Consumer Psychology **25**(2): 200-218.

Nestler, S., B. Egloff, et al. (2012). "An integrative lens model approach to bias and accuracy in human inferences: Hindsight effects and knowledge updating in personality judgments." Journal of Personality and Social Psychology **103**(4): 689-717.

Shariff, A. F., J. D. Greene, et al. (2014). "Free will and punishment: A mechanistic view of human nature reduces retribution." Psychological Science **25**(8): 1563-1570.

Dietvorst, R. C., W. J. M. I. Verbeke, et al. (2009). "A sales force-specific theory-of-mind scale: Tests of its validity by classical methods and functional magnetic resonance imaging." Journal of Marketing Research **46**(5): 653-668.

12. Social neuroscience, altruism, cooperative behavior, and culture (Nov 25)

***Instructors*: Dubé, Fellow, and Bartz, with guest Duncan**

Olff, M., J. L. Frijling, et al. (2013). "The role of oxytocin in social bonding, stress regulation and mental health: An update on the moderating effects of context and interindividual differences." Psychoneuroendocrinology **38**(9): 1883-1894.

Crockett, M. J., L. Clark, et al. (2008). "Serotonin modulates behavioral reactions to unfairness." Science **320**(5884): 1739.

Kishida, K. T. and P. R. Montague (2012). "Imaging models of valuation during social interaction in humans." Biological Psychiatry **72**(2): 93-100.

Duncan, L. R., M. C. Bertoli, et al. (2013). "Mapping the protective pathway of emotional intelligence in youth: From social cognition to smoking intentions." Personality and Individual Differences **54**(4): 542-544.

Chan, C., L. Van Boven, et al. (2014). "Moral violations reduce oral consumption." Journal of Consumer Psychology **24**(3): 381-386.

Winterich, K. P., V. Mittal, et al. (2013). "When does recognition increase charitable behavior? Toward a moral identity-based model." Journal of Marketing **77**(3): 121-134.

Aggarwal, P. and R. P. Larrick (2012). "When consumers care about being treated fairly: The interaction of relationship norms and fairness norms." Journal of Consumer Psychology **22**(1): 114-127.