

**ESSAYS IN DECISION MAKING AND ECONOMIC
NETWORKS**

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INDIAN INSTITUTE OF TECHNOLOGY DELHI**

JULY 2020

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ESSAYS IN DECISION MAKING AND ECONOMIC NETWORKS

by

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Submitted

in fulfilment of the requirements of the degree of Doctor of Philosophy

to the



INDIAN INSTITUTE OF TECHNOLOGY DELHI

JULY 2020

CERTIFICATE

This is to certify that the thesis titled **Essays in Decision Making and Economic Networks**, submitted by **Ruhi Sonal**, to the Indian Institute of Technology, Delhi, for the award of the degree of **Doctor of Philosophy**, is a bona fide record of the research work done by her under my supervision. The contents of this thesis, in full or in parts, have not been submitted to any other Institute or University for the award of any degree or diploma.

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Date: July 2, 2020.

ACKNOWLEDGEMENTS

I acknowledge the support provided by the Department of Humanities and Social Sciences (HSS), IIT Delhi and the fellowship and administrative support provided by IIT Delhi that has enabled me to write this thesis.

I am thankful to my advisor, Prof. Saptarshi Mukherjee, who has guided me carefully through the process of conceptualizing the research problems and their execution. He has proactively suggested tractable research problems throughout the duration of my time at IIT Delhi and has been enthusiastic as well as patient regarding my progress in research. He involved me in different projects which has enabled me to widen my areas of specialisation and has also encouraged me to develop my cognitive capacity by working on multiple problems simultaneously. As a result of this experience, my time at IIT Delhi has been extremely productive, of which, this thesis is an important part. He has equipped me with the skill of reading academic papers, and the skills required for ideation and execution of research problems. He has also provided me with adequate training in order to enable me to tackle the technical challenges in the thesis. I am thankful to him for providing due support and motivation throughout this process.

I thank the faculty members at HSS for preparing me for the task of undertaking research through their engaging courses, and for providing support through suggestions and comments during the progress of my thesis.

I am thankful to Prof. Arunava Sen, ISI Delhi for inspiring me to challenge myself and pushing me to seek answers to fundamental questions in the field of economics. At all stages of my thesis, I have sought his suggestions, which he has provided to me in a forthcoming and encouraging manner. I have learnt immensely from his classes and from various academic interactions with him over the years.

Prof. Debasis Mishra, ISI Delhi has equipped me with technical knowledge of game theory. I have repeatedly sought his comments and suggestions on my work, and he has patiently obliged me with the same. I am extremely thankful to him for devoting time to

me as I have made lengthy presentations and explained details of my models to him. His suggestions have always been insightful as well as encouraging.

I thank Prof. Mihir Bhattacharya for his keen interest in my work and for his thoughtful comments on the same. I am thankful for the opportunity to collaborate with him on multiple projects and to learn from him in this process about various academic matters.

My colleagues at IIT Delhi- Asmita, Ahalya, Ekta and Sandip have helped me in developing a sense of community and belonging with discussions related to research questions, techniques, methodology and research findings. I am also thankful to Aatina, Asmita, Charumita, Dinsa, Hemant, Hrishi, Jayakrishnan, Pallabi, Pragya Paramita, Shikha, Shubhi, Sonakshi and Supreet for being generous and patient friends who have helped me sustain high levels of motivation. I thank my parents for their continued support and confidence in my ambitions. I also thank Dr. Manju Mehta, Dr. Shilpi Sharma and Dr. Deepak Gauba for their support during the final stages of my thesis.

ABSTRACT

I model individual decision making in two contexts: (i) when an attention-constrained decision maker is presented with a set of alternatives with *frames*, for example advertisements, packaging etc.; (ii) when boundedly rational individuals choose to form connections in a sequential entry game. In (i) I explore framing effects and characterize a class of random choice rules in which inattention occurs due to the frames. I further extend this model to the specific setting of random choice from ordered trees (for example, supermarkets) and characterize a corresponding class of random choice rules. I find the conditions required on the attention parameters to ensure that the decision maker's choice behavior respects the binary relation in the rule.

In (ii) I explore the formation of networks as the outcome of a sequential entry game in which each player has a *type*. I model the game in the settings of complete and asymmetric information. Under the assumption of complete information, the game has an infinite horizon and the types are known. I use the technique introduced by Fudenberg and Levine (1983) and Börgers (1989) to compute sufficient conditions for perfect equilibria. I find that players may display herd behavior in such equilibria and I provide sufficient conditions for the same. Further, I relax the assumption of complete information and use Bayes' Nash equilibrium as the solution concept to understand the network structures that occur in equilibria when types are private information and each player sends a publicly observable signal. I find the necessary and sufficient conditions for a *herding equilibrium* to occur. I also show under what conditions players send a misleading signal. This analysis is applicable to the formation of networks on social media platforms as well as professional networks.

Keywords: Stochastic choice; Attention; Networks; Perfect equilibrium;
Bayes' Nash Equilibrium; Herding.

संकषेप

मैंने दो संदर्भों में व्यक्तिगत निर्णय की प्रक्रिया का अध्ययन किया है: (i) जब एक ध्यान-बाधित निर्णयकर्ता के सामने कोई विकल्पों का सेट है, जसमें हर विकल्प किसी एक "फ्रेम" अर्थात् प्रस्तुति के साथ हो। ऐसे फ्रेम के उदाहरण हैं: विज्ञापन, पैकेजिंग आदि; (ii) जब संग्यानात्मक रूप से तर्कसंगत व्यक्ति एक क्रमबद्ध प्रवेश खेल में अन्य व्यक्तियों से जुड़ने का निर्णय लेता है।

(i) के अंतर्गत मैंने फ्रेम के प्रभाव का अन्वेषण किया है एवं इस संदर्भ में ध्यान-अपूर्ण निर्णयकर्ता के लिए एक नवीन बेतरतीब निर्णय नियम को पूर्ण गणितीय रूप से स्थापित किया है। इस प्रतिमान को मैंने वृक्ष रूपी व्यवस्था में बेतरतीब चयन के संदर्भ में भी स्थापित किया है (उदाहरण: सूपरमार्केट)। इस शोध से मैं ध्यान-मापदंड की उस संरचना को प्रकाशित करती हूं जिनसे चयन निर्णय व्यवहार नियम में इस्तेमाल होने वाले द्विआधारी संबंध के अनुसार हो।

(ii) में मैंने नेटवर्क के गठन का अध्ययन क्रमबद्ध खेल के ढांचे में किया है जिसमें प्रत्येक व्यक्ति का कोई "टाइप" अर्थात् प्रकार है। मैंने इस संदर्भ को खेल सिद्धांत के अनुसार प्रतिरूपित किया है- पूर्ण एवं असममित जानकारी के प्रसंगों में। पूर्ण जानकारी के अंतर्गत, खेल का स्वरूप अनन्त है और प्रत्येक व्यक्ति एक दूसरे के टाइप से परिचित है। इस प्रसंग में मैंने फुडेनबर्ग और लेविन (1983) और बॉर्जर्स (1989) द्वारा निर्मित तकनीक का प्रयोग कर "परफेक्ट इक्विलिब्रियम" अर्थात् पूर्ण संतुलन के लिए पर्याप्त गणितीय शर्तों का अनुसंधान किया है। इस शोध से यह पता चलता है कि खिलाड़ी संतुलन में भी झुंड व्यवहार के अनुसार निर्णय कर सकते हैं। मैंने झुंड व्यवहार के लिए पर्याप्त गणितीय शर्तों का प्रावधान किया है। असममित जानकारी के प्रसंग में मैंने बेज़ नैश संतुलन संकल्पना के प्रयोग से संतुलन में पाए जाने वाले नेटवर्क संरचना को विस्तृत किया है। असममित जानकारी के अधीन प्रत्येक खिलाड़ी सार्वजनिक रूप से अवलोकन संकेत भेजता है, जो उसके असली टाइप से अलग हो सकता है- अर्थात् खिलाड़ी झूठ बोल सकते हैं। मैं झुंड व्यवहार वाले संतुलन के आवश्यक एवं पर्याप्त गणितीय शर्तों को पूर्ण रूप से स्थापित करती हूं। मैं उन शर्तों को भी प्रस्तुत करती हूं जिनकी उपस्थिति में खिलाड़ी झूठ बोलते हैं। इस शोध के परिणाम सामाजिक मीडिया पर बनने वाले नेटवर्क एवं पेशेवर/व्यवसायिक नेटवर्क के गठन में प्रमुख रूप से उपयोगी हैं।

कीवर्ड: बेतरतीब चयन; अपूर्ण ध्यान; नेटवर्क; परफेक्ट इक्विलिब्रियम; बेज़ नैश इक्विलिब्रियम; झुंड व्यवहार।

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