University of Groningen

Network games and strategic play

Govaert, Alain

DOI:
[10.33612/diss.117367639](https://doi.org/10.33612/diss.117367639)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2020

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):
Govaert, A. (2020). *Network games and strategic play: social influence, cooperation and exerting control*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.
<https://doi.org/10.33612/diss.117367639>

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Network games and strategic play

Social influence, cooperation and exerting control

Alain Govaert

The research described in this dissertation has been carried out at the Faculty of Science and Engineering, University of Groningen, the Netherlands.

disc

The research reported in this dissertation is part of the research program of the Dutch Institute of Systems and Control (DISC). The author has successfully completed the educational program of DISC.

Printed by *Ridderprint BV*
Ridderkerk, the Netherlands

ISBN (book): 978-94-034-2429-3
ISBN (e-book): 978-94-034-2428-6

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 groningen**

Network games and strategic play

Social influence, cooperation and exerting control

PhD thesis

to obtain the degree of PhD at the
University of Groningen
on the authority of the
Rector Magnificus, Prof. E. Sterken,
and in accordance with
the decision by the College of Deans.

This thesis will be defended in public on

Friday 14 February 2020 at 12.45 hours

by

Alain Govaert

born on 14 April 1989
in Weert, the Netherlands

Supervisors

Prof. M. Cao

Prof. J.M.A. Scherpen

Assessment committee

Prof. T. Başar

Prof. D. Bauso

Prof. A. Flache

To my late father, an inspiring exemplar

Acknowledgments

Let me begin by thanking my supervisor Ming Cao for allowing me to freely explore my curiosity during the last four years while also pushing me to expand my capabilities. If it was not for this freedom, your broad research perspectives and “subtle” management style, I doubt that I would have found the passion that I feel today for doing research. As a trained “industrial manager”, I had a lot to learn about doing research *your way*, that, the way I see it, requires a strict academic attitude, open mind and technical skill (not necessarily in that order). Because I believe we are never done learning, I will continue to develop these aspects both in life and work, and add a personal touch to it, to make it my way. You once told me that I can be quite stubborn, perhaps this was also part of the reason why I could explore topics freely. Nevertheless, I truly hope you feel proud of some of the work that we have done together.

To my second supervisor Jacqueliën Scherpen. Even though our research topics were quite different, you have always shown an interest in my progress and research topics. I am happy that you have added human behavior to your research portfolio as well. In the future, I will closely follow how you will approach challenging engineering problems with humans in the loop. Perhaps most of all, I would like to thank you for your positive spirit throughout the last four years and how this reflected in a very pleasant and social research group with you as the head.

I would also like to thank Michael Mäs. In our meetings, discussions and lab work, you have inspired me to look at decision-making processes from different perspectives. Going from equations to the real-world and back is a very challenging but inspiring task. Things that I used to take for granted, I now question. Naturally, this can be frustrating, but I am sure that this attitude is critical for obtaining new interesting insights. I hope in the future we will be able to finish the work that we have started.

I would also like to address some words to my co-authors. Many thanks to Pouria Ramazi, for the guidance at the beginning of my Ph.D. project and introducing me to game theory, evolutionary game theory, and network games. Even though I knew very little, your patience and enthusiasm always made our discussions enjoyable. I

have especially put your patience to the test, promising to finish our paper time after time, and failing to do so, time after time. I am glad that afterwards you felt it was worth the wait. To Yuzhen Qin, I can still remember the first day that we met at the welcome day for new Ph.D. candidates. It has been great to share the typical Ph.D. “burdens” with you. To Carlo Cenedese and Sergio Grammatico, thank you for being open to new ideas and being enthusiastic about our joint work. There are many challenging open problems ahead.

Alain Govaert
Groningen
September, 2019

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List of symbols and acronyms

$\mathbb{R}$	set of real numbers
$\mathbb{R}_{>}$	set of real positive numbers
$\mathbb{R}_{\geq}$	set of real nonnegative numbers
$\mathbb{Z}$	set of integers
$\mathbf{1}_n$	n -dimensional vector of all ones
$\mathcal{G}$	graph
$\mathcal{V}$	vertex set
$\mathcal{E}$	edge set
$\mathcal{N}_i$	the set of neighbors of i excluding i
$\bar{\mathcal{N}}_i$	the set of neighbors of i including i
N	Total number of players
n	groupsize of multiplayer game
Γ_f	finite game
Γ_c	convex game
$\mathcal{A}$	action space
$\mathcal{A}_i$	Action set of player i
$\mathcal{F}_i$	Feasible action set of player i
σ	action profile
$\mathcal{S}$	action space of a strategically differentiated game
s	action profile in a strategically differentiated game
π	combined payoff function
$\mathbf{p}$	memory-one strategy specifying cooperation probabilities
δ	continuation probability or discount factor
p_0	initial probability to cooperate
ϕ	Scaling parameter of zero-determinant strategy
s	slope of the zero-determinant strategy
l	Baseline of the zero-determinant strategy

AFIP	Approximate Finite Improvement Property
BR	Best Response
ϵ -NE	Approximate Nash Equilibrium
ϵ -GNE	Approximate Generalized Nash Equilibrium
FIP	Finite Improvement Property
GNE	Generalized Nash Equilibrium
NE	Nash Equilibrium
PD	Prisoner's Dilemma
pTFT	Proportional Tit-for-Tat
PGG	Public Goods Game
RBR	Relative Best Response
RSP	Rock-Scissors-Paper
TFT	Tit-for-Tat
ZD	Zero-Determinant