Mathematical Models of Social Evolution:
A Guide for the Perplexed

Richard McElreath and Robert Boyd
## Contents

**Preface** ix

1 **Theoretician's Laboratory** 1  
1.1 The structure of evolutionary theory ............. 3  
1.2 The utility of simple models .................. 4  
1.3 Why not just simulate? ....................... 8  
1.4 A model of viability selection ................. 11  
1.5 Determining long-term consequences .......... 16  
1.6 Nongenetic replication ....................... 27  

2 **Animal Conflict** 37  
2.1 The Hawk-Dove game .......................... 38  
2.2 Retaliation ................................... 46  
2.3 Continuous stable strategies ................. 52  
2.4 Ownership, an asymmetry ..................... 55  
2.5 Resource holding power .......................... 58  
2.6 Sequential play ................................ 60  

3 **Altruism & Inclusive Fitness** 71  
3.1 The prisoner's dilemma ....................... 72  
3.2 Positive assortment ......................... 76  
3.3 Common descent and inclusive fitness ........ 78  
3.4 Rediscovering Hamilton's rule ............... 82  
3.5 Justifying Hamilton's rule .................... 97  
3.6 Using Hamilton's rule ........................ 99
CONTENTS

Bibliography 393

Index 409