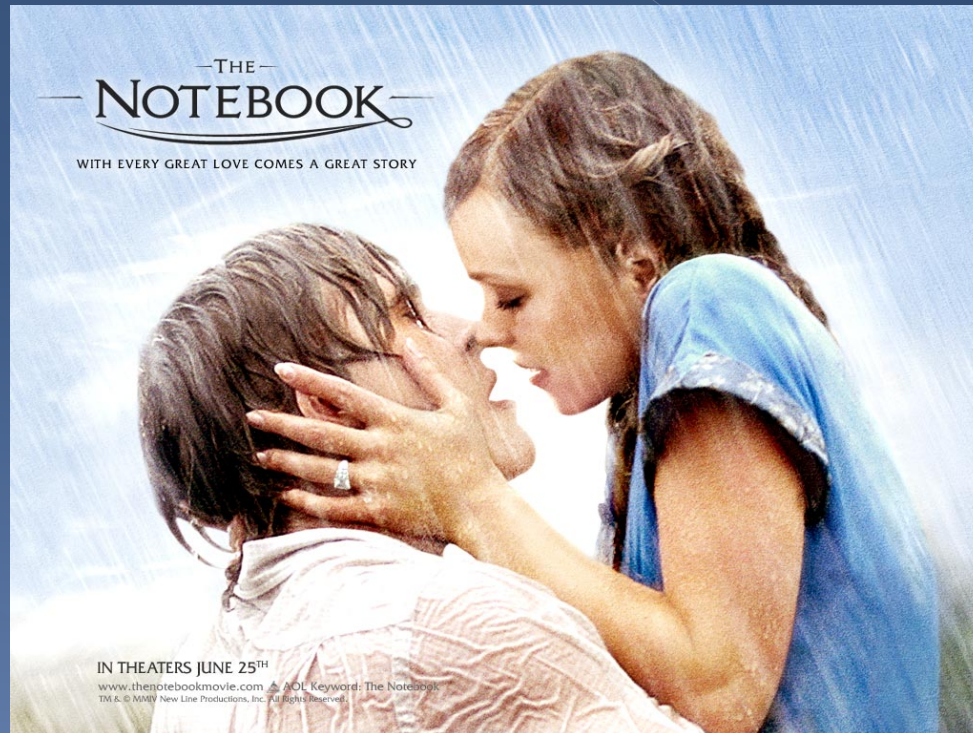


The Notebook: A Mathematical Analysis

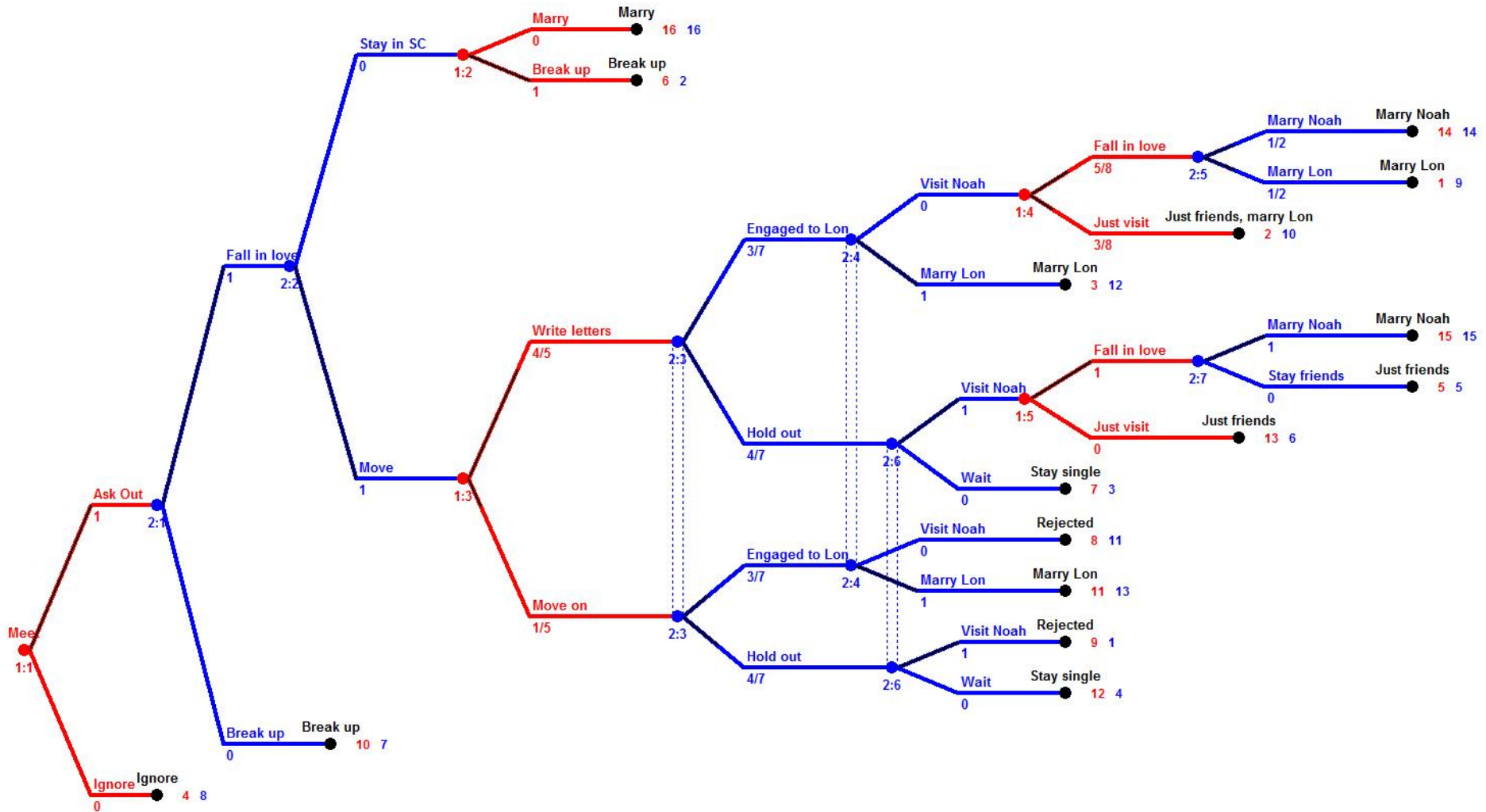


Erin Helmuth
Game Theory Final Project

Plot Summary

- ◉ Characters: Noah and Allie
- ◉ Fall in love, despite social class difference
- ◉ Allie moves to New York
- ◉ Noah writes daily letters
- ◉ Allie becomes engaged to Lon
- ◉ Allie sees Noah in paper, visits
- ◉ They fall in love
- ◉ Allie chooses to stay with Noah

Complete Extensive Form Game



Player Objectives:

◎ Noah's Objectives

- › Primary: Marry Allie and spend time with her to increase the chances of her saying yes
- › Secondary: Avoid heartache and pain

◎ Allie's Objectives

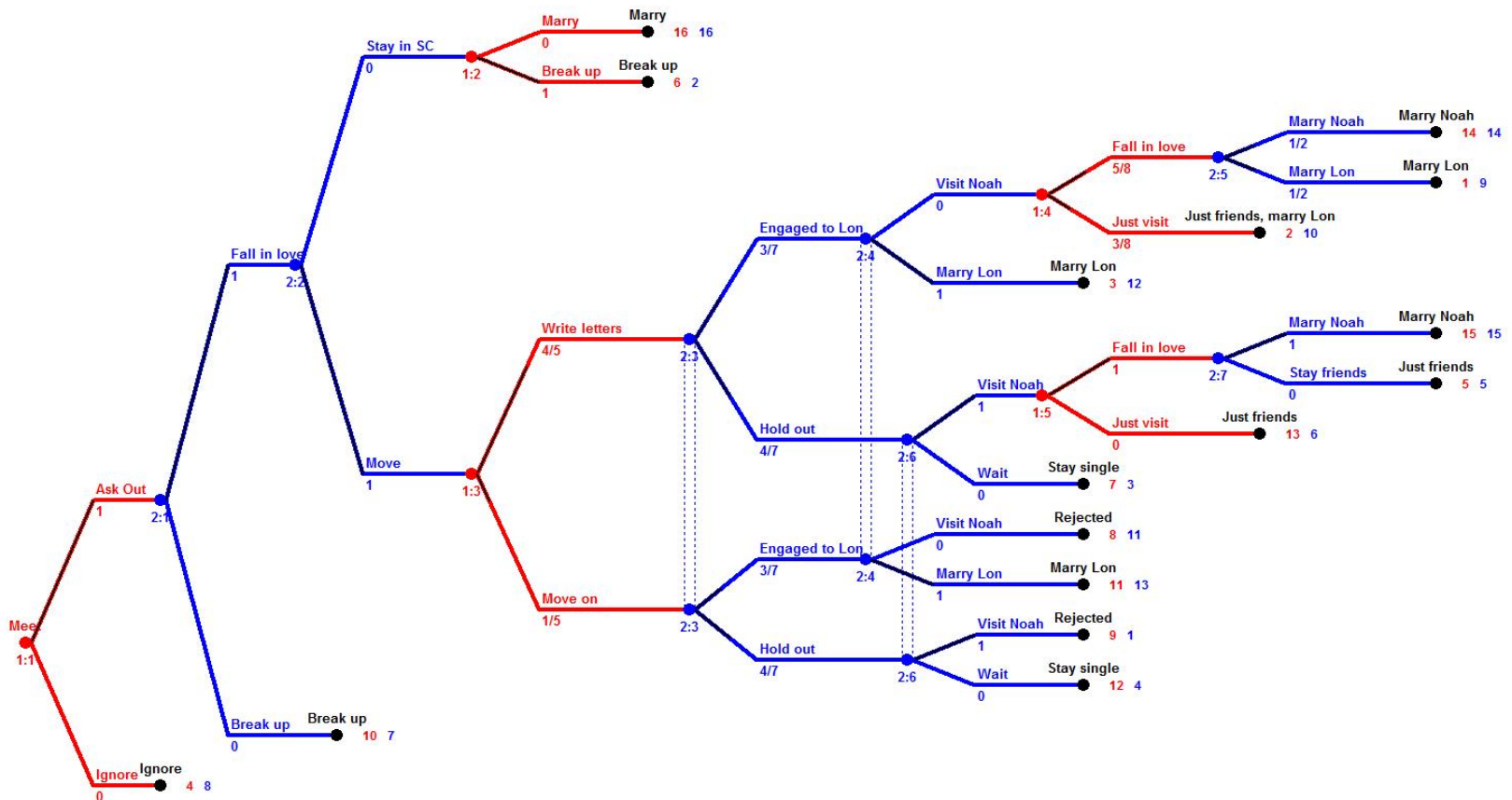
- › Primary: Marry Noah
- › Secondary: Be married to someone
- › Third: Avoid heartache and pain

Player Preferences: Ordinal Payoffs

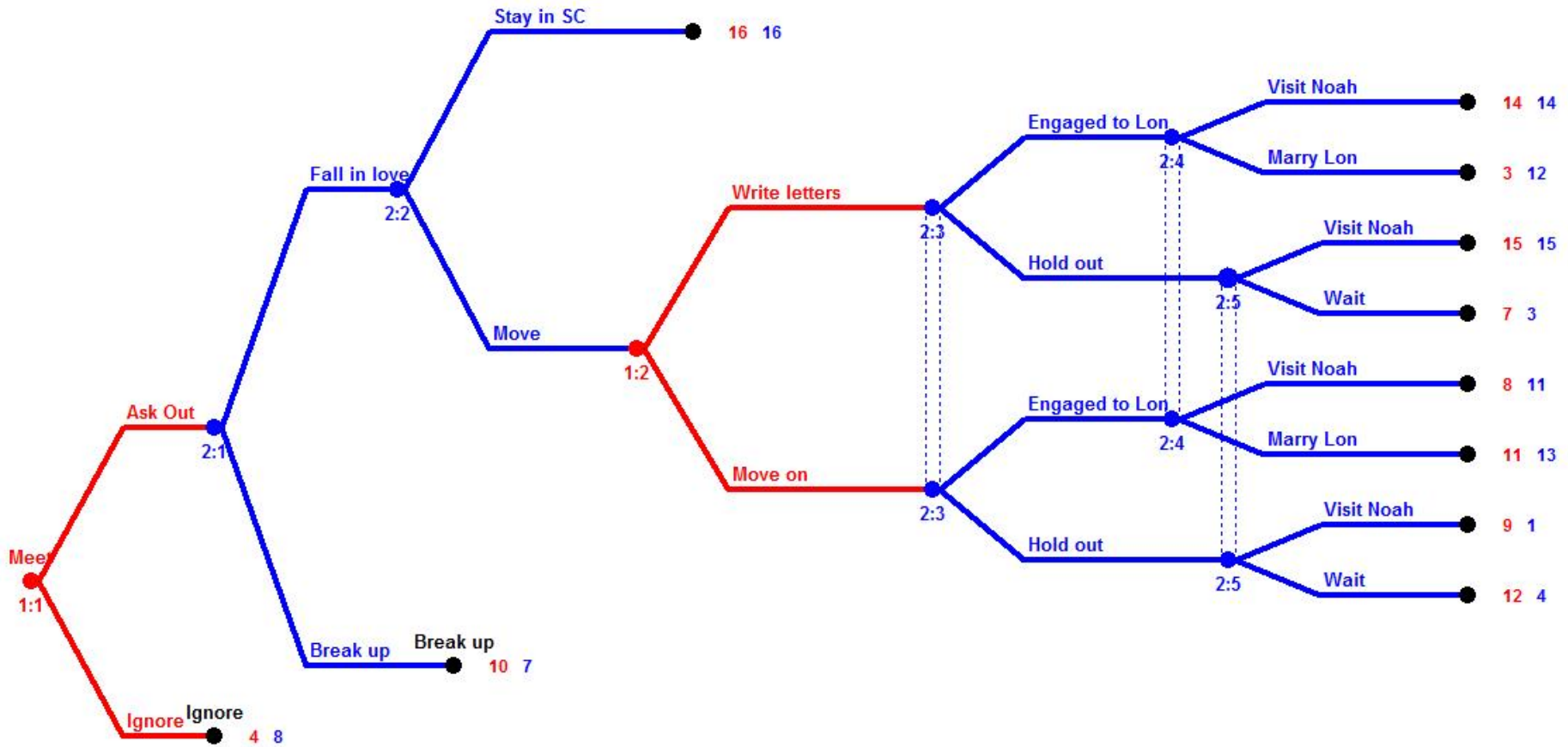
Ordinal Preferences	Noah	Allie
16	Allie loves and stays in South Carolina. They get married.	Allie loves and stays in South Carolina. They get married.
15	Allie loves, moves, holds out, visits, and chooses Noah. Noah writes and falls in love. They marry.	Allie loves, moves, holds out, visits, and chooses Noah. Noah writes and falls in love. They marry.
14	Allie loves, moves, becomes engaged, visits, and chooses Noah. Noah writes and falls in love. They marry.	Allie loves, moves, becomes engaged, visits, and chooses Noah. Noah writes and falls in love. They marry.

13	Allie loves, moves, holds out, and visits. Noah writes. They decide to be friends	Allie loves, moves, and becomes engaged. Noah moves on. Allie marries Lon.
12	Allie loves, moves, holds out, and visits. Noah writes. They stay friends.	Allie loves, moves, and becomes engaged. Noah writes. Allie marries Lon.
11	Allie loves, moves, and becomes engaged. Noah moves on. Allie marries Lon.	Allie loves, moves, becomes engaged, and visits. Noah moves on and rejects her. Allie marries Lon.
10	They date, but break up.	Allie loves, moves, becomes engaged, and visits. Noah writes. They remain friends and Allie marries Lon.
9	Allie loves, moves, holds out, and visits. Noah moves on and rejects her.	Allie loves, moves, becomes engaged, visits, and chooses Noah. Noah writes and falls in love. Allie marries Lon.
8	Allie loves, moves, becomes engaged, and visits. Noah moves on and rejects her. Allie marries Lon.	Allie and Noah never date.
7	Allie loves, moves, holds out, and waits. Noah writes. They stay single.	They date, but break up.
6	Allie loves and stays in South Carolina. They break up.	Allie loves, moves, holds out, and visits. Noah writes. They are just friends.
5	Allie loves, moves, holds out, visits, and chooses Noah. Noah writes and falls in love. They decide to just be friends.	Allie loves, moves, holds out, visits, and chooses Noah. Noah writes and falls in love. They decide to just be friends.
4	Allie and Noah never date.	Allie loves, moves, holds out, and waits. Noah moves on. They stay single.
3	Allie loves, moves, and becomes engaged. Noah writes. Allie marries Lon.	Allie loves, moves, holds out, and waits. Noah writes. They stay single.
2	Allie loves, moves, becomes engaged, and visits. Noah writes. They remain friends and Allie marries Lon.	Allie loves and stays in South Carolina. They break up.
1	Allie loves, moves, becomes engaged, visits, and chooses Noah. Noah writes and falls in love. Allie marries Lon.	Allie loves, moves, holds out, and visits. Noah moves on and rejects her.

Complete Extensive Form Game



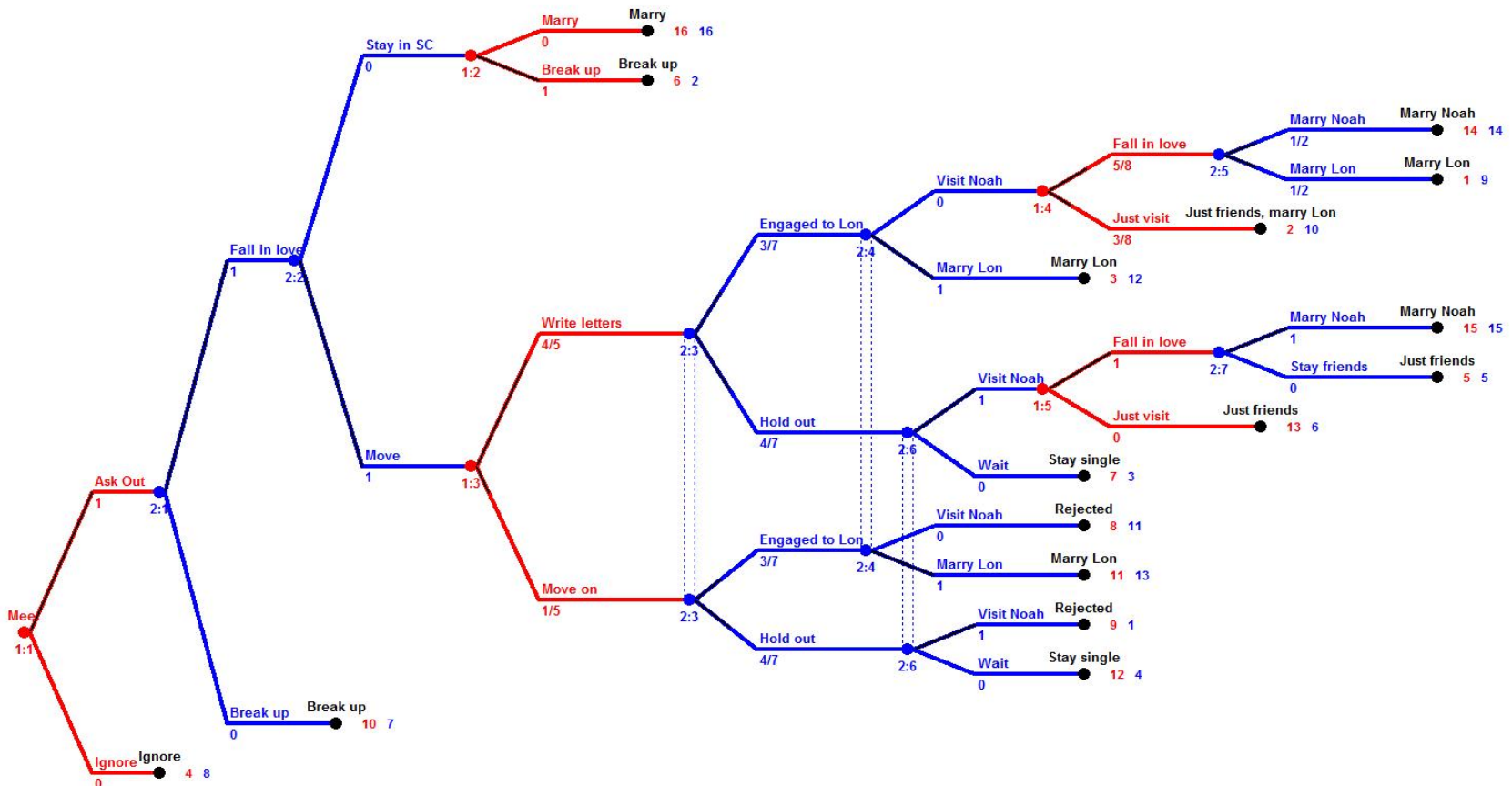
Reduced Extensive Form Game



However...

- What about alternative player preferences?
- Will they make a difference in my computations?

Complete Extensive Form Game



Reduced Strategic Game

	11***		1211*		1212*		122*1		122*2		2****	
11	16	16	14	14	3	12	15	15	7	3	10	7
12	16	16	8	11	11	13	9	1	12	4	10	7
2*	4	8	4	8	4	8	4	8	4	8	4	8

- Allie will always choose the same
- Noah will always choose outcomes 11, 12, and 10 over outcome 4
 - Outcome 4: Never ask Allie out
 - First objective: spend time with Allie in order to increase the chances of her agreeing to marry him
- Reasonable changes in preference orderings will have no effect

Conclusions

- ◉ Nash Equilibrium outcome:
 - > Allie and Noah date
 - > Allie stays in South Carolina
 - > They get married
- ◉ Actual ending of movie is different
- ◉ Demonstrates weakness of extensive form game model
- ◉ Still helpful in analyzing outcome

The End