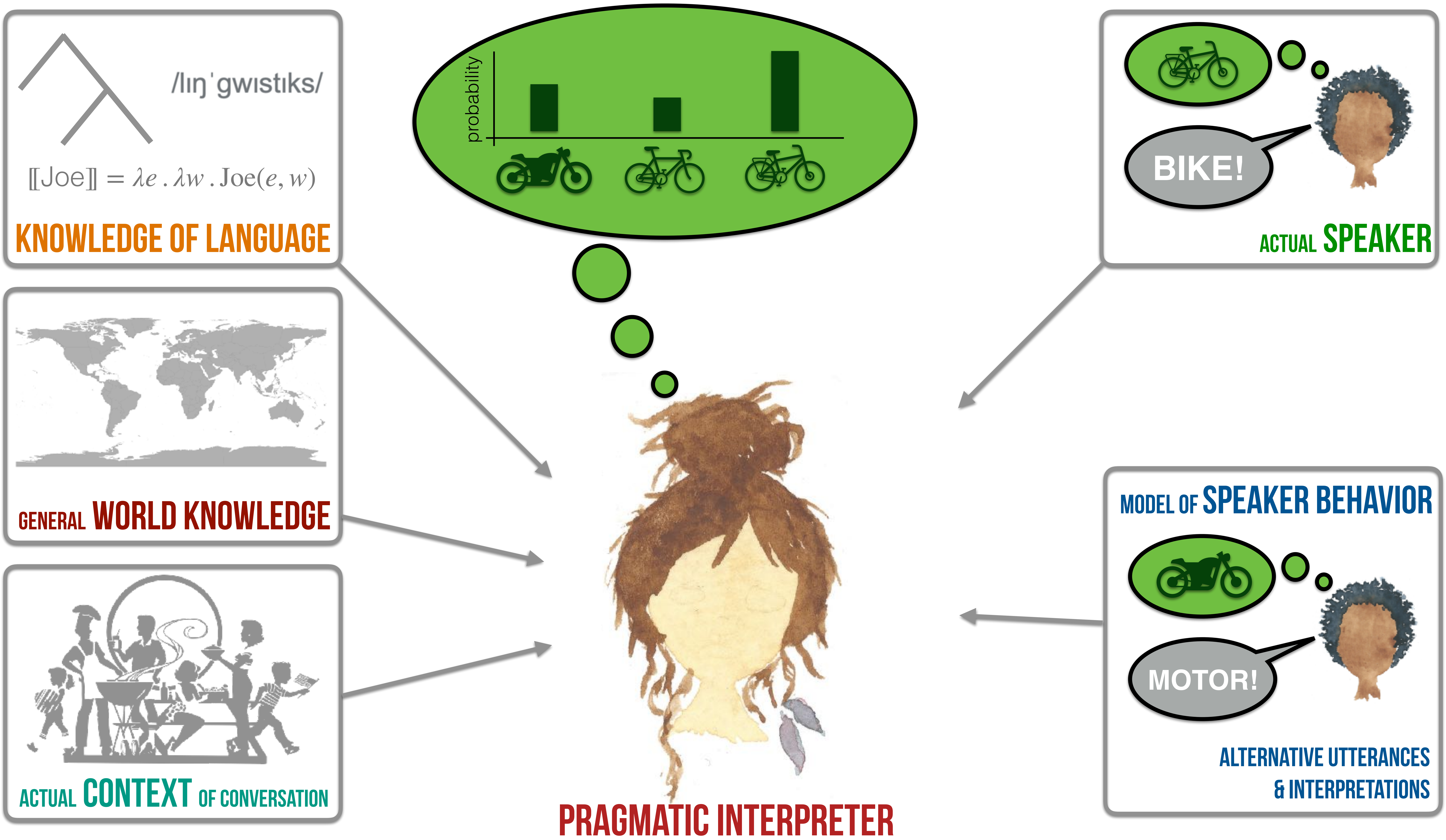
Computational Pragmatics

Introduction to the Rational Speech Act framework

Session 4


/lɪŋˈgwɪstɪks/
⟦Joe⟧ = λe . λw . Joe(e, w)
KNOWLEDGE OF LANGUAGE
GENERAL WORLD KNOWLEDGE
ACTUAL CONTEXT OF CONVERSATION
probability
PRAGMATIC INTERPRETER
BIKE!
ACTUAL SPEAKER
MODEL OF SPEAKER BEHAVIOR
MOTOR!
ALTERNATIVE UTTERANCES
& INTERPRETATIONS

Reference Games

referential communication

context

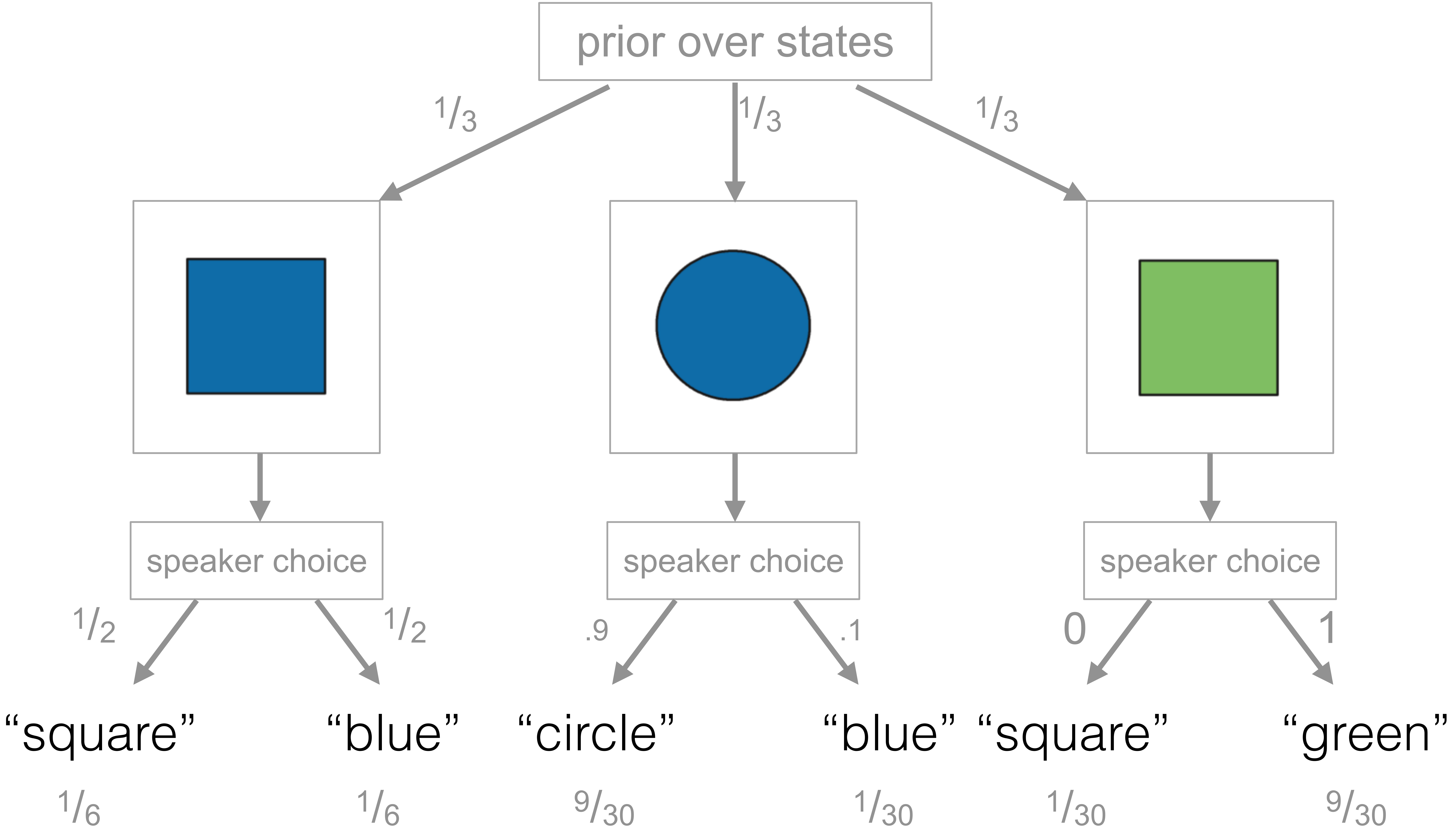
set of objects/referents

utterances

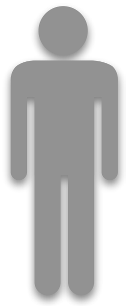
single properties of objects

$$U = \{\text{"square"}, \text{"circle"}, \text{"green"}, \text{"blue"}\}$$

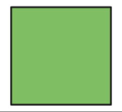
which object do you think a speaker meant when she selects “blue”?


prior over states
1/3
1/3
1/3
speaker choice
speaker choice
speaker choice
1/2
1/2
.9
.1
0
1
"square"
"blue"
"circle"
"blue"
"square"
"green"
1/6
1/6
9/30
1/30
1/30
9/30

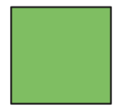
RSA for reference games (example)



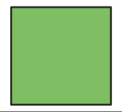
literal interpreter

			
“square”	.5	0	.5
“circle”	0	1	0
“green”	0	0	1
“blue”	.5	.5	0

rational speaker

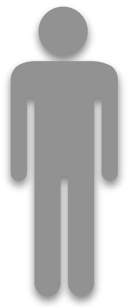
	“square”	**“circle”**	**“green”**	**“blue”**
	.5	0	0	.5
	0	.89	0	.11
	.11	0	.89	0

rational interpreter

			
“square”	.82	0	.18
“circle”	0	1	0
“green”	0	0	1
“blue”	.82	.18	0

vanilla RSA

Rational Speech Act model



L_0

LITERAL INTERPRETATION STRATEGIC DEPTH 0

$$P_{lit}(s \mid u) = P(s \mid [\![u]\!])$$

S_1

GRICEAN SPEAKER STRATEGIC DEPTH 1

$$P_S(u \mid s) \propto \exp\left(\alpha \left(\log P_{lit}(s \mid u) - C(u)\right)\right)$$

L_1

GRICEAN INTERPRETATION STRATEGIC DEPTH 2

$$P_L(s \mid u) \propto P(s)\ P_S(u \mid s)$$

Pragmatic listener

Pragmatic speaker

Pragmatic speaker

Pragmatic speaker

Literal listener