**Appendix C: Models**

***Communicative Success***

1. *Type (I) Model: Accuracy over time*

Accuracy ~ centered.Round \* Condition + centered.ItemCurrentAge \* Condition + (1 | ItemID) + (1 +centered.Round | Group)



1. *Type (II) Model: Final Accuracy comparison*

MeanAccuracy ~ Condition + (1 | Group)



1. *Type (III) Model: Accuracy variance*

SD\_Accuracy ~ centered.Round \* Condition + (1 + centered.Round | ItemID)



***Convergence***

1. *Type (I) Model: Convergence over time*

Convergence ~ centered.Round \* Condition + centered.ItemCurrentAge \* Condition + (1 + centered.Round | ItemID) + (1 + centered.Round | Group)



1. *Type (II) Model: Final Convergence Comparison*

MeanConvergence ~ Condition + (1 | Group)



1. *Type (III) Model: Convergence variance*

SD\_Convergence ~ centered.Round \* Condition

+ (1 + centered.Round | ItemID)



***Stability***

1. *Type (I) Model: Stability over time*

Stability ~ centered.Round \* Condition + centered,ItemCurrentAge \* Condition + (1 | ItemID) + (1 +centered,Round | Group)



1. *Type (II) Model: Final Stability comparison*

MeanStability ~ Condition + (1 | Group)

1. *Type (III) Model: Stability variance*

SD\_Stability ~ centered.Round \* Condition+ (1 + centered.Round | ItemID)



***Linguistic Structure***

1. *Type (I) Model: Linguistic Structure over time*

Linguistic Structure ~ poly(centered.Round,2) \* Condition

+ (1 + poly(centeredRound ,2) | Group/Producer)



1. *Type (II) Model: Final Linguistic Structure comparison*

MeanStructure ~ Condition + (1 | Group/Producer)



1. *Type (III) Model: Linguistic Structure variance*

SD\_Structure ~ centered.Round \* Condition



***Input Variability***

1. *Input Variability over time*

MeanInputVariability ~ centered.Round \* Condition

+ (1 + centered.Round | Group)

***Changes in Linguistic Structure by Input Variability and Shared History***

1. *Differences in linguistic structure by input variability*

StructureDiff ~ centered.MeanInputVariability + (1 | Group/Producer)



1. *Differences in linguistic structure by shared history*

StructureDiff ~ centered.History + (1 | Group/Producer)



1. *Differences in structure by input variability and shared history*

StructureDiff ~ centered.MeanInputVariability + centered.History

+ (1 | Group/Producer)



***Relationship between measures***

1. *Convergence by linguistic structure and round*

MeanConvergence ~ centered.Structure \* centered.Round

+ (1 + centered.Structure \* centered.Round | Group)



1. *Communicative Success by convergence, linguistic structure and round*

MeanaAccuracy ~ centered.Structure \* centered.Round

+ (1 + centered.Structure \* centered.Round | Group)

