**Appendix A.** R codes used in the study.

General notes:

a. We report the R codes of the models used for German preposition analyses. The same R codes were used when German VPs were analyzed.

b. ‘PathTerm’ refers to the dependent variable of whether the Path terms for an event pair are the same or different: ‘0’ for the same Path term and ‘1’ for different Path terms.

c. ‘FG syntax’ refers to the dependent variable of whether the syntax of produced sentence is correct or reverse: ‘0’ for correct syntax and ‘1’ for reverse syntax.

d. ‘Language’ refers to the two-level Language factor: ‘0’ for German and ‘1’ for Korean

e. ‘Relation’ refers to the two-level Relation factor: ‘0’ for Loose-fit relation and ‘1’ for Tight-fit relation.

f. ‘Typicality’ refers to the two-level Typicality factor: ‘0’ for Typical and ‘1’ for Non-typical.

g. All fixed factors are dummy coded and then are centered during the procedure of modeling.

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| Table/Appendix | R syntax |
| Table 2 | Model <- glmer (PathTerm ~ Language x Relation + (1 + Language + Relation |participant) + (1 + Language + Relation |item), family = binomial (logit), data = fgP, glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 100000))) |
| Table 3[German] | Model <- glmer (PathTerm ~ Relation + (1 + Relation |participant) + (1 |item), family = binomial (logit), data = fgPGerman, glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 100000))) |
| Table 3[Korean] | Model <- glmer (PathTerm ~ Relation + (1 + Relation |participant) + (1 |item), family = binomial (logit), data = fgPKorean, glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 100000))) |
| Table 7 | Model <- glmer (FG syntax ~ Language x Typicality + Relation x Typicality + Language x Relation + (1 + Language + Relation + Typicality |participant) + (1 |item), family = binomial (logit), data = fgS, glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 100000)))  |
| Table 8[Typical] | Model <- glmer (FG syntax ~ Language+(1+Language|participant) + (1+Language|item), family = binomial (logit), data = fgSTypical, glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 100000))) |
| Table 8[Nontypical] | Model<- glmer (FG syntax ~ Language+(1+Language|participant) + (1+Language|item), family = binomial (logit), data = fgSNTypicalTight, glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 100000))) |
| Table 9 | Model <- glmer (PathTerm ~ Language\*FG syntax + (1+Language + FG syntax | participant) + (1+ Language + FG syntax | item), family = binomial (logit), data = SD, glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 100000))) |