Polarity Items licensing in the non-monotonic environment: experimental evidence

FDSL 18

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Intro

- current theories of Negative Polarity Items (NPIs or generally PIs) licensing (Gajewski (2011), Chierchia (2013)) consider them unlicensed in affirmative episodic statements
  - if no traditionally recognized licenser is present;
- experiments (for English: Gajewski (2016) – definite DPs; for Czech: Dočekal and Juřen (2023)) show that the number of the head NP may affect NPI licensing:

(1) a. The students who have **any** books on NPIs are selling them.

b. *The student who has **any** books on NPIs is selling them. (Guerzoni & Sharvit, 2007, p. 372, (29))

- another theoretically expected factor in acceptability is genericity
    - Kadmon and Landman (1993) point out the relation between genericity and free-choice *any*;
- however, the effect on potential indefinite licensors for PIs has not been tested;

- we constructed an experiment testing the number of the head NP and the genericity/episodicity of the verb as factors in NPI licensing in Czech;
- we asked if speakers recognize genericity as a boost for the acceptability of sentences with *sebemenší* (NPI);

- generic sentences are non-monotonic (Nishiguchi (2003),Kirkpatrick (2019), a.o.), which poses a problem for the still most widely used theories of NPIs, which derive their distribution from downward-entailingness (Ladusaw (1979) and all after him);

(2) a. Birds lay eggs.
b. ↛ Male birds lay eggs.

(3) Our research question:

a. Is genericity a factor in NPI licensing in Czech?

- especially considering that the previous experiment on English definite descriptions did not show this effect
- but considering that Czech is one of the languages with dedicated morphological marking of genericity

- joint work with Rhiana Horovská
- slides:

- we used the scope theory of NPIs licensing by Barker (2018), which can account for NPI licensing in non-monotonic contexts;
- NPIs are licensed if their wide scope doesn't entail their narrow scope:
  - licensing by negation
  - the NPI signals the narrow scope of the indefinite w.r.t. negation

(4) John didn't see *any* students.

a. $\exists x[student'(x)\&\neg see'(J,x)]$

b. $\nvDash \neg\exists x[student'(x)\&see'(J,x)]$

- in non-monotonic contexts, the entailment does not hold, so NPIs can be licensed too

Experiment

- series of experiments: reporting the third one here
- we conducted an experiment in PCIbex on native speakers of Czech
- acceptability judgement task: 1 = unacceptable ... 5 = acceptable
- the fillers of corresponding complexity;
- 112 participants, 98 passed the fillers

- 2×2×2 factorial design, controlling for:

1. number (sg/pl on the subject and predicate)
2. genericity (generic: the adverb *většinou* – "mostly" + habitual *-av-* morpheme in the predicate × episodic: the adverb *právě* – "just" + perfective predicate)
3. PI presence (PI: *sebemenší* "the slightest", adj: a non-polarity-sensitive adjective)

- the participants rated the acceptability of the stimuli on a 1 (low) to 5 (high) scale
- we hypothesized:

a) genericity would be rated higher than episodicity

b) plural higher than singular

c) PI-sentences less accepted than non-PI sentences.

Example item (generic conditions): - preceded by a short context:

(5) Kontext: Jiřka se zajímá o
context Jiřka REFL take-interest about
jasnovidky, což jsou obvykle mystické
clairvoyant.F.PL.ACC which are usually mystical
ženy. Tvrdí o nich:
women claim.3SG about them:
Context: Jiřka takes interest in clairvoyants who are usually mystical women. She claims about them:

(6) **(pl)**:Jasnovidky/**(sg)**:Jasnovidka se [**(PI)**:*sebemenší*
clairvoyant.F.PL/SG with slightest.INS
známkou]/[**(adj)**:*vysokou* úrovní] nadání většinou
hint.INS/high.INS level.INS talent.GEN mostly
vídávají/vídává smutnou budoucnost.
see.HAB.3PL/3SG sad.ACC future.ACC
'Clairvoyants/A clairvoyant with the slightest hint/a high level of talent see/-s a sad future most of the times.'

(episodic conditions) - context first:

(7) Kontext: Jiřka vyzpovídala jasnovidky, z nichž
context Jiřka interviewed clairvoyants from whom
některé vyvěštily samé trápení. Tvrdí o
some prophesied all anguish claim.3SG about
nich:
them:
'Context: Jiřka has interviewed clairvoyants out of whom some prophesied nothing but anguish. She claims about them:'

(8) **(pl)**:Jasnovidky **(sg)**:Jasnovidka se [**(PI)**:*sebemenší*
clairvoyant.F.PL /SG with slightest.INS
známkou]/[**(adj)**:vysokou úrovní] nadání právě
hint.INS/high.INS level.INS talent.GEN just
uviděly/uviděla smutnou budoucnost.
see.PF.PST.3PL/3SG sad.ACC future.ACC
'Clairvoyants/A clairvoyant with the slightest hint/a high level of talent have/-s just seen a sad future.'

Descriptive statistics

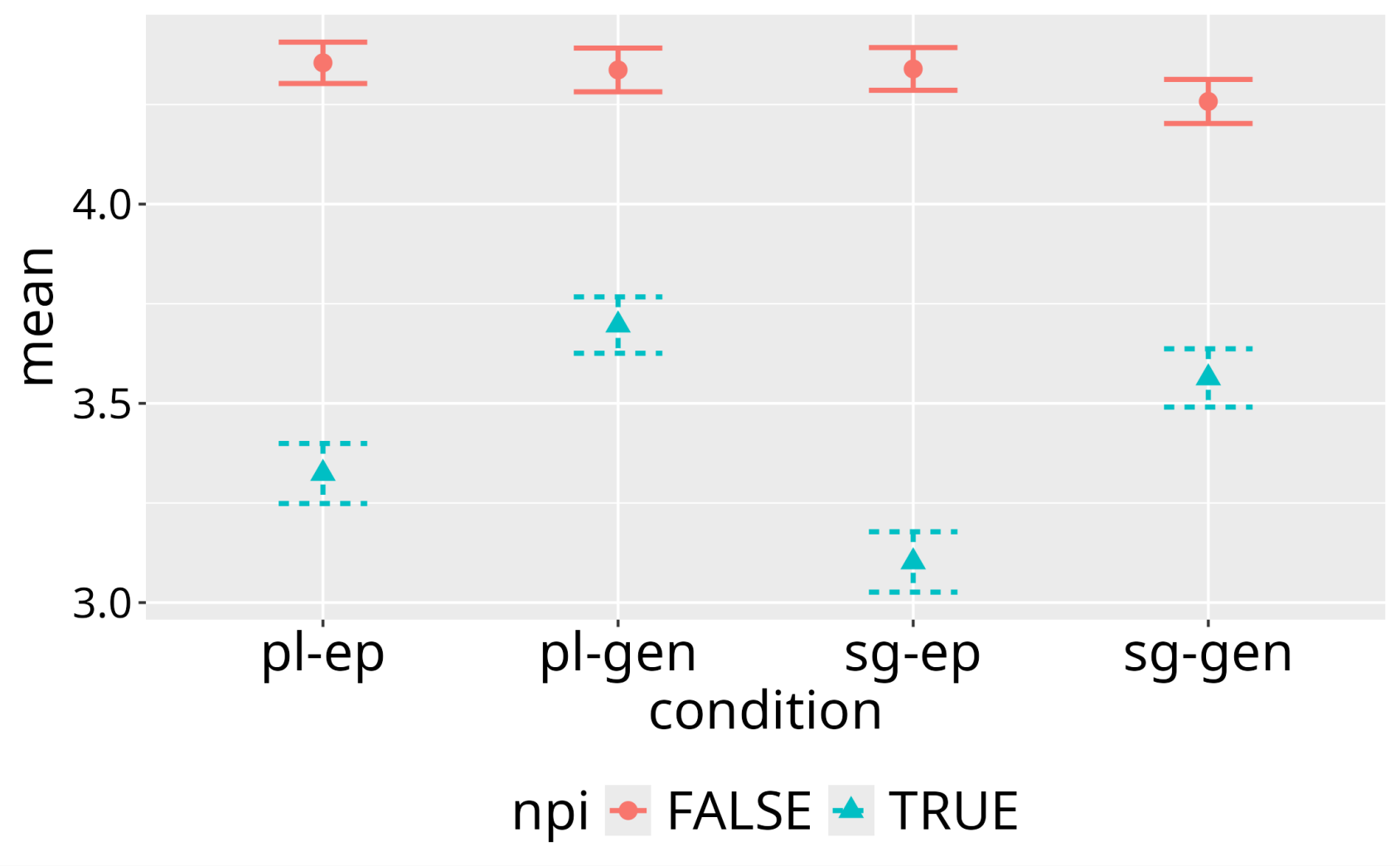

Figure 1: Responses: mean and standard errors

Inferential statistics

- the data were analyzed in a mixed-effects Bayesian linear regression model using *rstanarm* package (Brilleman et al. (2018)) in *R* (R Core Team (2024));
- the model uses the sum-coded contrasts in 2x2x2 design with interactions (the conditions GEN,PLUR,NPI against EP,SG,ADJ);
- the dependent variable is the subject's response on the Likert scale;
- the model uses the full random effects structure and *rstanarm* default weakly informative priors.

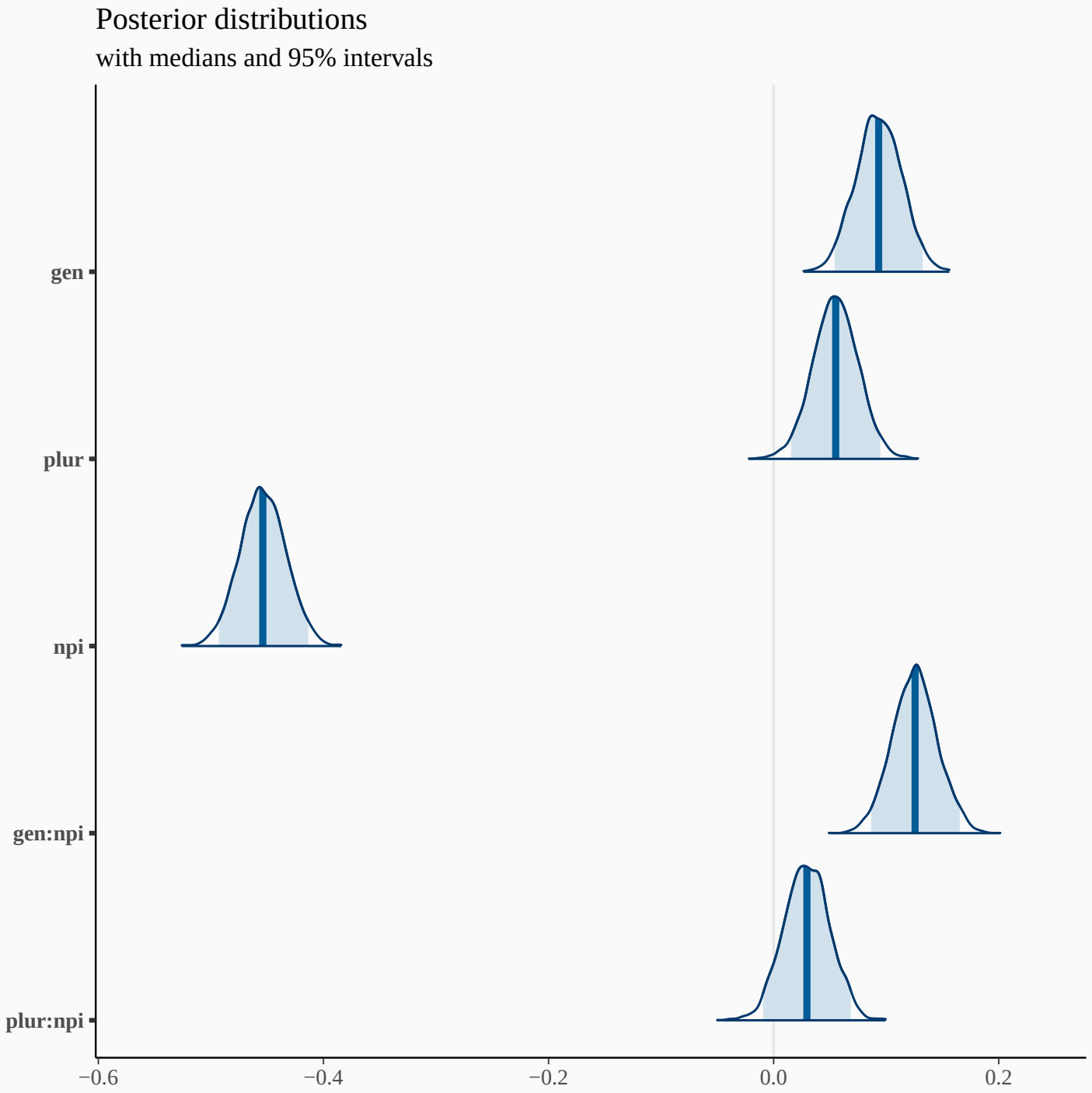

Figure 2: Main effects and interaction

- the model shows:

0. the effects (and interactions) are interpreted against the grand mean (Intercept): $\widehat{\beta} = 3.87$, CrI=[3.73, 4.02], BF 2.13e+93;
1. a credible main positive effect of genericity (GEN: $\widehat{\beta} = 0.09$ 95% Cr(edibility)I(interval)=[0.05, 0.13] with Bayes factor (BF) 31.8

- very strong evidence in favor of the effect)

2. the strongest main effect is negative for the PI (NPI: $\widehat{\beta} = -0.45$, CrI=[-0.49, -0.41], BF 2.36e+23

- extreme evidence)

3. the third main effect is positive for the plural (PLUR: $\widehat{\beta} = 0.06$, CrI=[0.02, 0.10]), but there is moderate evidence against its existence due to the BF of 0.330;

5. the strongest interaction effect is between genericity and PI (GEN:NPI: $\widehat{\beta} = 0.13$, CrI=[0.09, 0.16], BF 3.00e+04

- extreme evidence

All other interactions (GEN:PLUR,PLUR:NPI,GEN:PLUR:NPI) receive BF 0.018 and below, meaning very strong evidence against their existence (direct argument for their H_0).

Linguistic interpretation:

1. PIs are licensed by genericity (credible interaction GEN:NPI)
2. but not by plurality (noncredible PLUR:NPI).

- in the previous experiment (without context), the interaction effect was much less credible
  - genericity interpretation: morphological marking plus context information
    - even in Czech, the genericity marker can be used to derive non-generic readings (secondary imperfectives, ...) – morphology is not a foolproof marker of genericity

Preliminary steps to formalization

- to formalize genericity, we follow the dynamic approaches to counterfactuals and generics (von Fintel (2001),Kirkpatrick (2019), a.o.)
- which use dynamic conditional '$>$' quantifying over most normal worlds

- The generic (1) is then formalized in (9), non-monotonic modal universal quantification (UQ).

(9) a. $\forall x(Clairvoyant'(x) > SeeSadFuture'(x))$

b. $\forall x \in^*$
$(w, ClairvoyantWithTalent'(x) \wedge HasTalent'(x)$
in $w) \subseteq \{w \in W : SeeSadFuture'(x)$ in $w\}$

- where $^*(w, [\![\phi]\!])$ is a function from the actual world (w) to the set of most normal worlds with respect to ϕ being true in w
  - the normality makes the quantification non-monotonic
  - after Stalnaker, Lewis, newer formalization: Asher and Morreau (1995), a.o.

- assuming that *sebemenší* is an NPI, its occurrence in (1)/(2) is unexpected in standard DE theories of NPIs licensing;
- since it appears in the first argument of the non-monotonic UQ, we use a non-standard approach to NPIs licensing (Barker (2018))
- licensed if the wide scope interpretation of the NPI fails to entail the narrow scope of the NPI w.r.t. other operators - true for (9) where the PI occurs in the first argument ($ClairvoyantWithTalent(x)$).

- preliminary truth conditions:

(10) $\forall x \in^{*} (w, Clairvoyant'(x) \wedge max\{d : HasTalent'(x, d)\} > min(S_{talent})$ in $w) \subseteq \{w \in W : SeeSadFuture'(x)$ in $w\}$

- NPI contributes the $min(S_{talent})$ – for future work – decompose *sebemenší*
- non-monotonic modal universal quantifier has wide scope, and the wide scope of the NPI wouldn't entail the narrow scope

- in the episodic sentence (depending on formalization):

1. either there is no operator over which NPI can take a wide scope – then inserting an expression signalling narrow scope (NPI) is useless;
2. there is existential closure (of the event variable) – the wide and narrow scope of the NPI are equivalent, then the NPI is not licensed.

- our results starkly contrast with the English data (Gajewski (2016)), where the experiment did not show the effect of genericity on NPI licensing in definite descriptions;
- but only the effect of the number of the head NP;

- we hypothesize that this follows partially from the predicate's morphological marking by *-av-* (dedicated genericity marking in Slavic languages)
  - which allows to test the effects of genericity more directly;
  - but also from the fact that we provided a context, which made the generic reading more salient (unlike Gajewski);

Thank you for your attention!

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Appendix

- a note on FCI/NPI licensing by genericity
- in the system of Barker (2018), FCIs are licensed similarly to NPIs: they signal narrow scope
  - but unlike NPIs, FCIs require modal or generic meaning
- unified system, so we don't need to exactly tease apart NPIs and FCIs and decide whether *sebemenší* is an NPI or FCI
- but it seems more like an NPI:

1. it doesn't have the usual FCI inferences:

(11) You can take any fruit.

a. $\diamond(f_1 \vee f_2 \vee \ldots f_n) \rightsquigarrow \diamond f_1 \wedge \diamond f_2 \wedge \cdots \diamond f_n$

(12) Můžeš si vzít sebehorší ovoce.
can.2SG REFL take worst Fruit.ACC
'You can take the worst fruit.'

a. $\diamond(f_1 \vee f_2 \vee \ldots f_n) \not\rightsquigarrow \diamond f_1 \wedge \diamond f_2 \wedge \cdots \diamond f_n$

- very odd if grammatical at all

2. it has existential (not universal) interpretation:

(13) Pokud věříš jakékoliv teorii, tak
if believe.2SG any theory.ACC then
piš beletrii.
write.IMP fiction.ACC
'If you believe any theory, then write fiction.'

a. $(\ldots \forall \ldots) \rightarrow ()$

(14) Pokud věříš sebehorší teorii, tak
if believe.2SG worst theory.ACC then
piš beletrii.
write.IMP fiction.ACC
'If you believe the worst theory, then write fiction.'

a. $(\ldots \iota/\exists \ldots) \rightarrow ()$

- existential or maybe unique interpretation (the worst theory you can think of)

References i

Asher, Nicholas, and Michael Morreau. 1995. "What Some Generic Sentences Mean." *The Generic Book*, 300–338.

Barker, Chris. 2018. "Negative Polarity as Scope Marking." *Linguistics and Philosophy* 41 (5): 483–510.

Brilleman, SL, MJ Crowther, M Moreno-Betancur, J Buros Novik, and R Wolfe. 2018. "Joint Longitudinal and Time-to-Event Models via Stan." https://github.com/stan-dev/stancon_talks/.

Chierchia, Gennaro. 2013. *Logic in Grammar: Polarity, Free Choice, and Intervention*. Oxford University Press.

References ii

Dočekal, Mojmír, and Martin Juřen. 2023. "Part-Whole Structure and NPIs Licensing: Experimental Evidence." https://olinco.upol.cz/wp-content/uploads/2023/05/Olinco2023_book_of_abstracts.pdf.

Gajewski, Jon. 2011. "Licensing Strong Npis." *Natural Language Semantics* 19: 109–48.

———. 2016. "Another Look at NPIs in Definite Descriptions: An Experimental Approach." *Negation and Polarity: Experimental Perspectives*, 307–27.

Kadmon, Nirit, and Fred Landman. 1993. "Any." *Linguistics and Philosophy*, 353–422.

Kirkpatrick, James Ravi. 2019. "Essays on Genericity." PhD thesis, University of Oxford.

References iii

Ladusaw, William Allen. 1979. *Polarity Sensitivity as Inherent Scope Relations.* The University of Texas at Austin.

Nishiguchi, Sumiyo. 2003. "Non-Monotonic Negativity." In *Language, Information and Computation: Proceedings of the 17th Pacific Asia Conference, 1-3 October, 2003, Sentosa, Singapore*, 204–15. Waseda University.

R Core Team. 2024. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.