

Comparing speaking fundamental frequency in bilingual and L2-accented speech

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Background

Effect of L2/language on speaking fundamental frequency (F0)

- Effect of language: Mean F0 & F0 range dependent on language-specific features (Andreeva et al., 2014; Graham, 2013; Lee, 2016; Shin & Lee, 2016)
- Effect of L2: Higher mean F0 & Narrower F0 range in the L2 production due to lack of confidence in L2 (Busà & Urbani, 2011; Ullakonoja, 2007; Zimmerer et al., 2014)

Effect of speech mode on F0

- Significantly higher mean F0 under controlled mode in both L1 (Arabic) and L2 (English) (Abu-Al-Makarem & Petrosino, 2007)
- Broader F0 range under spontaneous mode in L1 (English) (Park, 2012)

Research Questions

Experiment 1

- Will cross-linguistic differences b/w L1 and L2 (syllable-timed vs. stressed-timed) influence the use of F0? (Lee, 2016)
- If proficiency affects the use of F0 in L1 and L2, will bilingual speakers also show a similar difference as L2 speakers?
- Will the different consonant inventories between L1 and L2 affect the use of F0? (Lee, 2016 vs. Shin & Lee, 2016)

Experiment 2

- Will the speech mode affect the use of F0 differently b/w the two speaker groups?
- Will the speech mode affect the use of F0 differently b/w L1 and L2?

Methods

Participants

- 12 Korean L2 speakers (6 females)
 - Age = 26 (sd = 3); AOA = 11 (sd = 4); Proficiency = 31/50
- 12 Korean/English bilingual speakers (6 females)
 - Age = 26 (sd = 4); AOA = 5 (sd = 4); Proficiency = 41/50

Stimuli for Experiment 1

- Balanced material: 10 declarative sentences both in Korean and English
- Unbalanced material: 12 declarative sentences both in Korean and English

Stimuli for Experiment 2

- Controlled mode: "The North Wind and the Sun"
- Spontaneous mode: "Snow White and Seven Dwarves" & "Cinderella"

Procedure

- Experiment 1
 - Participants were asked to read aloud the stimuli once in Korean & once in English with 2 repetitions.
 - Counterbalanced reading order b/w languages
- Experiment 2
 - Participants were asked to read aloud "The North Wind and the Sun", and then to summarize 2 fairy tales in Korean and English (counterbalanced).

Acoustic analysis: Mean F0 & F0 range measured by using Xu script (2013)

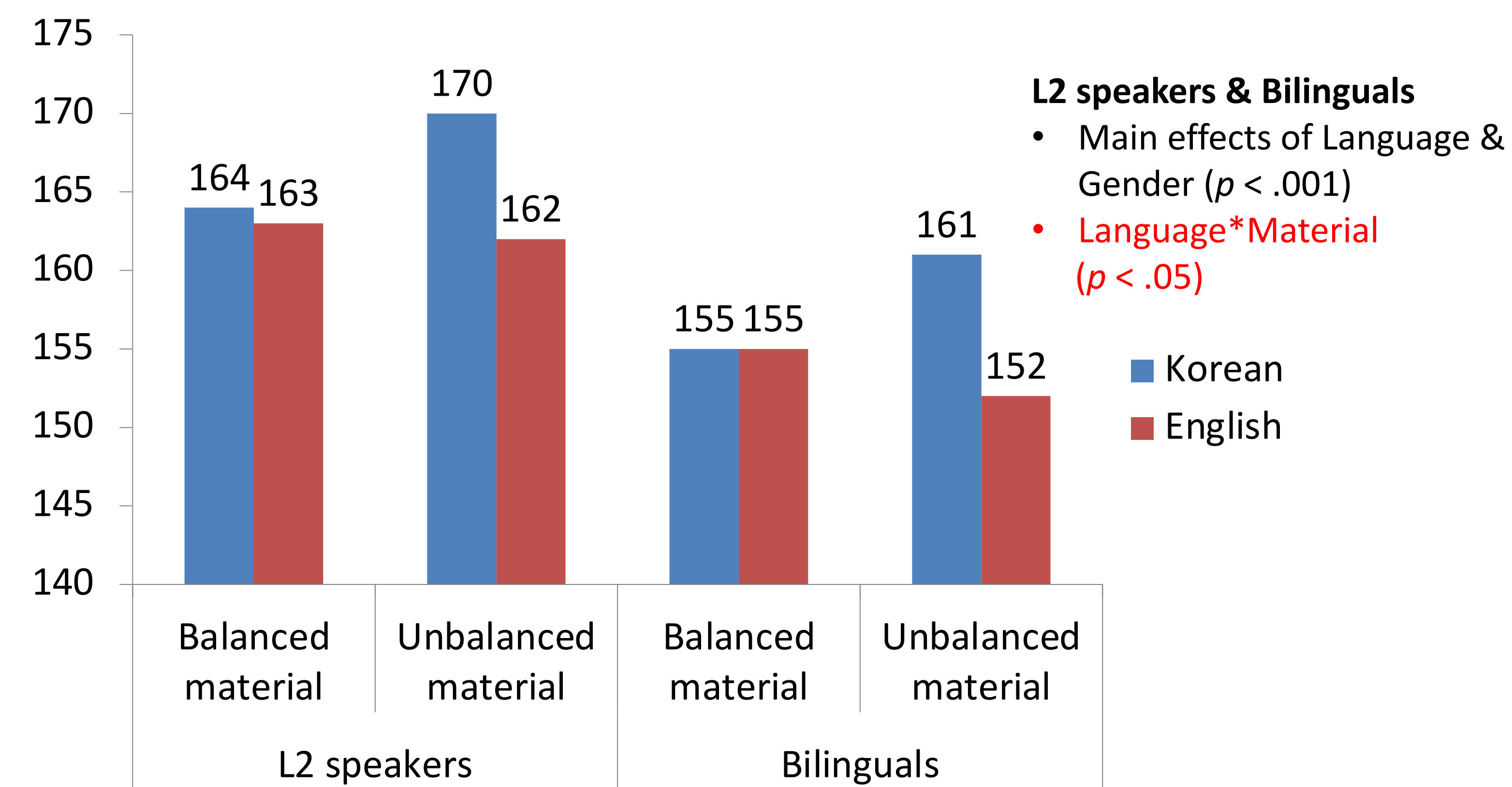
- Each sentence (for controlled speech) / clause (for spontaneous speech) is manually labeled, and then each interval is divided into 10 points.
- F0 values of each point are calculated.

Experiment 1

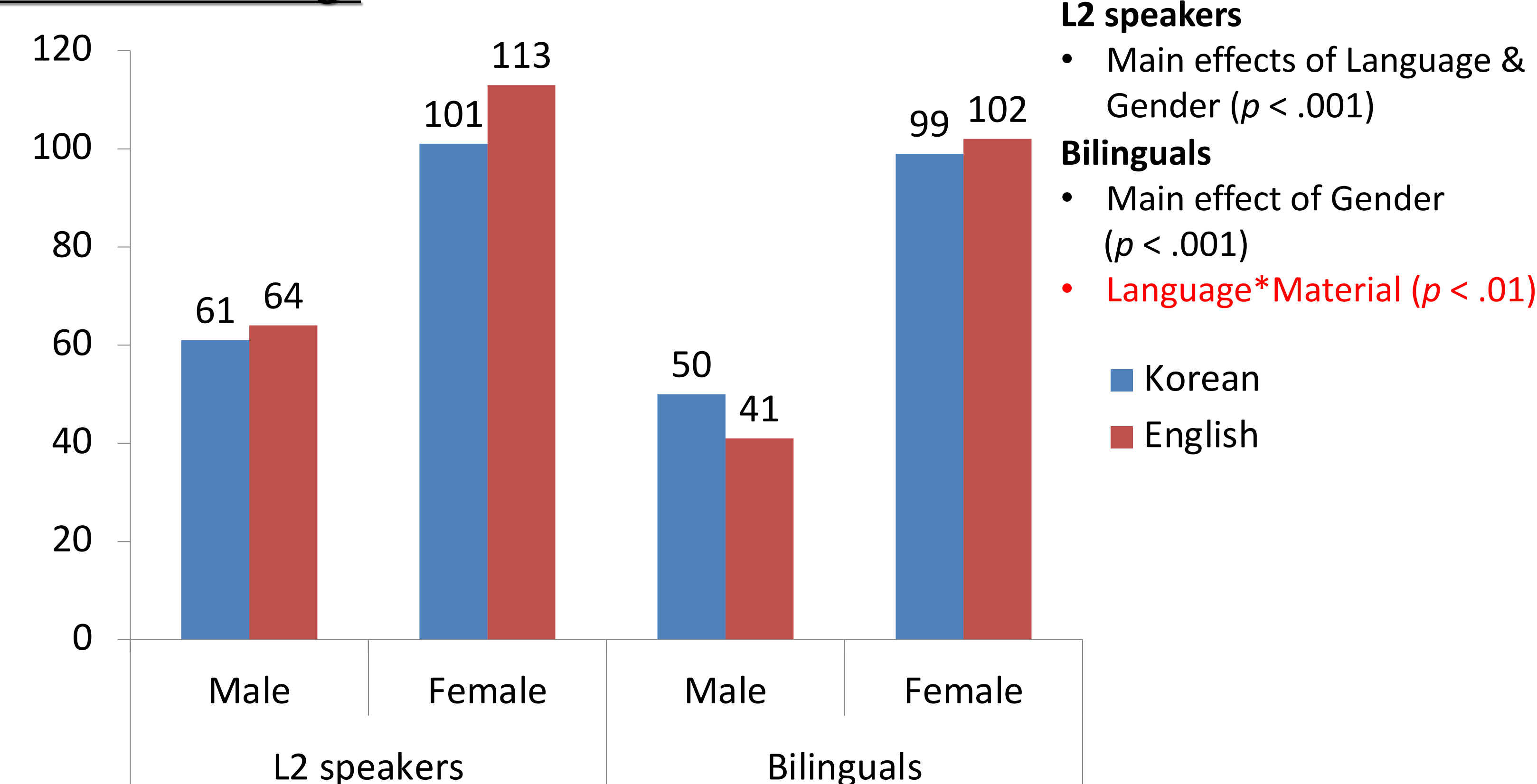
Analysis: Linear mixed effect model

- DV = Mean F0 & F0 range
- IV = Language (Korean, English); Speaker group (L2 speakers, Bilinguals); Gender (Male, Female); Material (Balanced material)

Results for mean F0



Results for F0 range

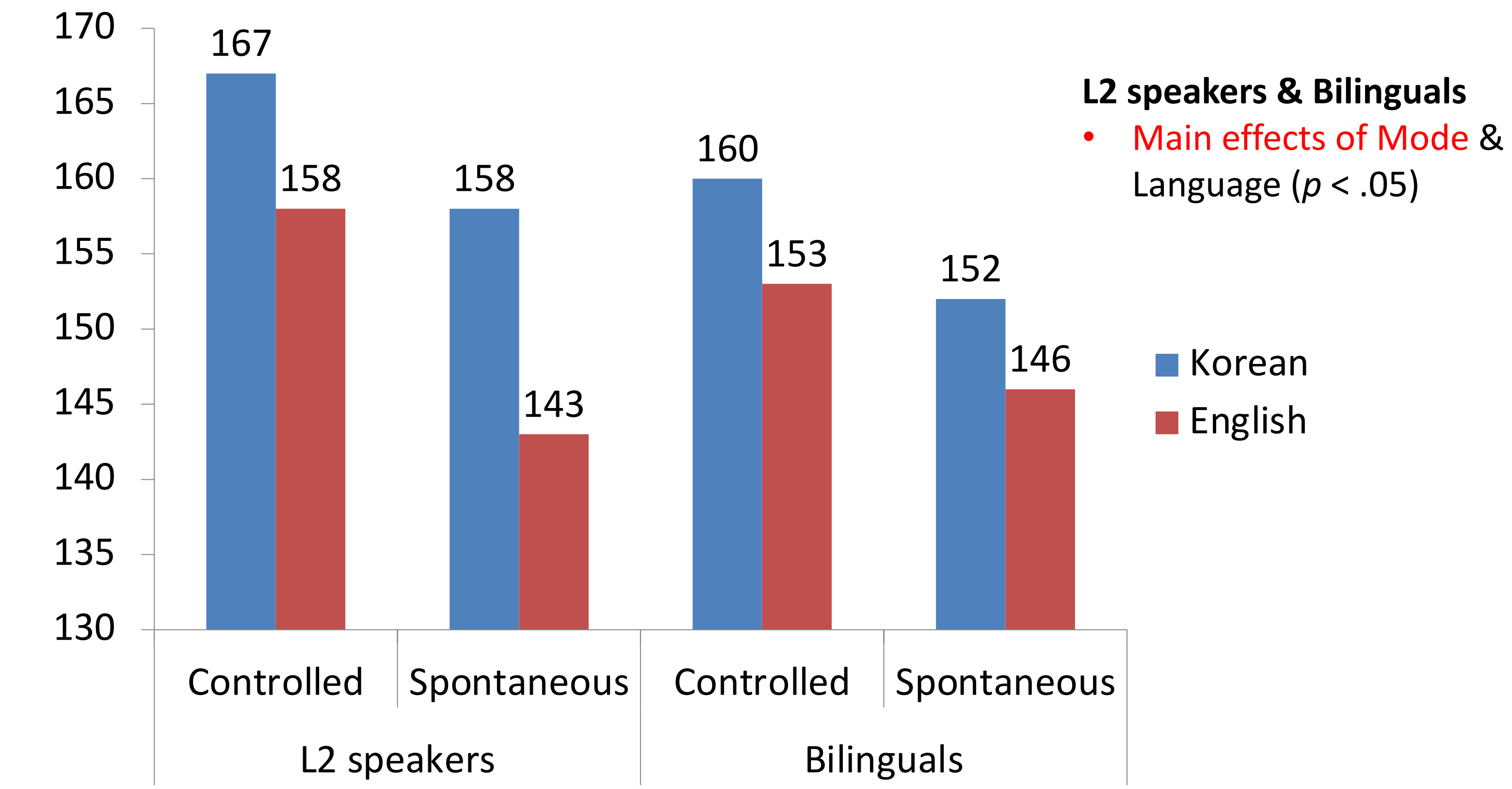


Experiment 2

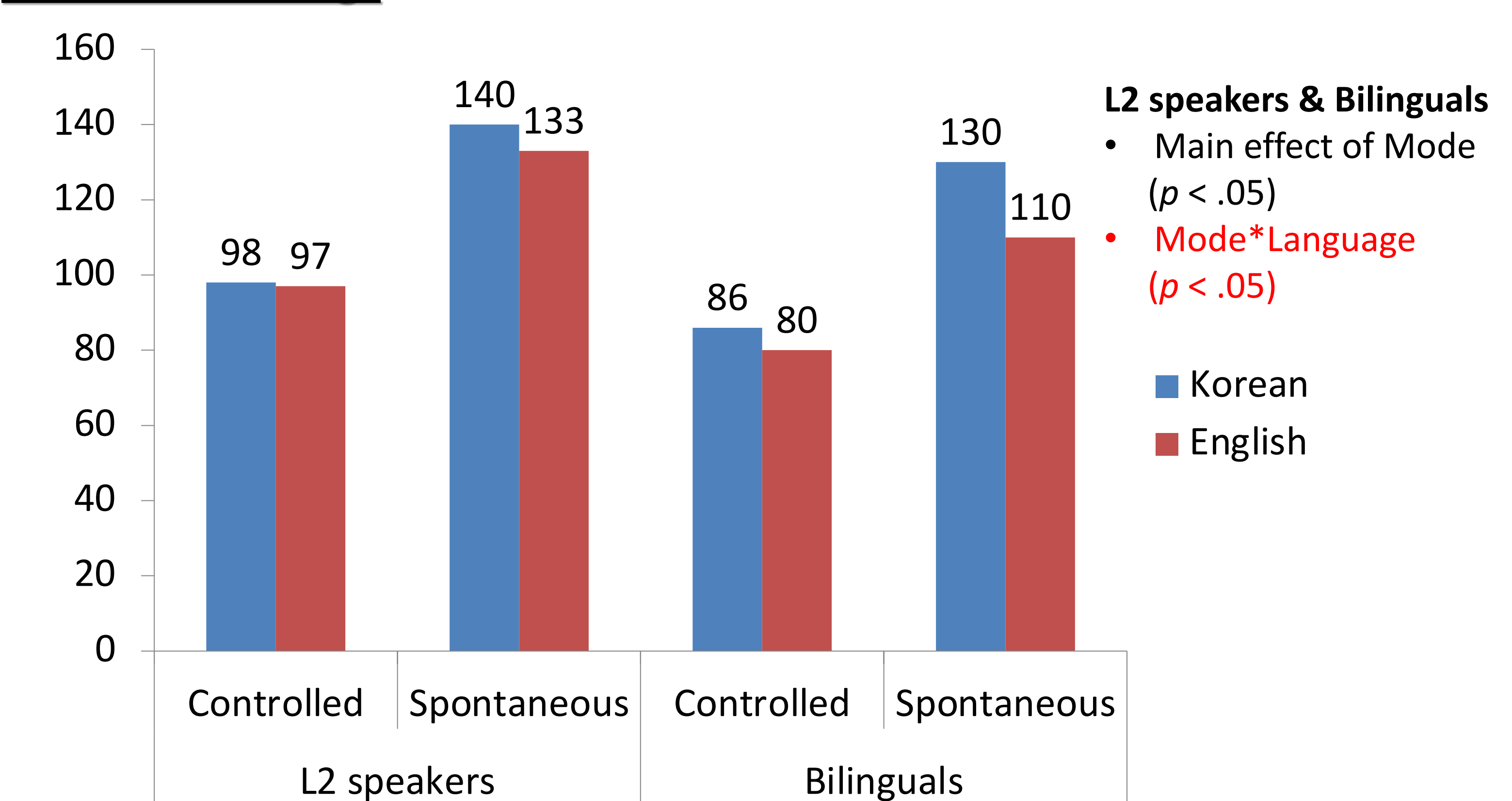
Analysis: Linear mixed effect model

- DV = Mean F0 & F0 range
- IV = Mode (Controlled, Spontaneous); Speaker group (L2 speakers, Bilinguals); Language (Korean, English)

Results for mean F0



Results for F0 range



Discussion & Conclusion

Results for Experiment 1

- Mean F0: Higher mean F0 values in Korean than in English only from the Unbalanced material
 - More voiceless consonants in Korean than in English (Major & Faudree, 1996)
- F0 range: No compressed F0 range in L2; No greater use of F0 range in English for bilingual speakers
 - Neither L2 effect nor effect of language-specific features
 - Expansion/Compression of F0 range for various reasons other than L2 effect or language-specific features (Carlson et al., 1992; Flemming, 2008; Pereira & Watson, 1998)

Results for Experiment 2

- Mean F0: Higher mean F0 in Controlled mode than in Spontaneous mode
 - Lack of familiarity of the reading passages
- F0 range: Larger F0 range in Spontaneous mode than in Controlled mode
 - Greater degree of speaker involvement in spontaneous mode (Bolinger, 1986)
 - Greater F0 range difference in Korean as a function of the speech modes may be due to the participants' language dominance

Overall conclusion

- F0 characteristics show language-specific features.
- Universality of mode effect exists on vocal characteristics.