Is there lemma-based language control? The influence of language practice and language-specific item practice on asymmetrical switch costs.

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Abstract

Several models have proposed that language control occurs between language representations, such as language tags, and between lemmas. Yet, most research has solely focused on language-control processes between language representations. In the present study, we investigated whether language control can also occur between lemmas by allowing bilinguals to practice a language or language-specific items prior to a language-switching task, and thus change the relative activation of the language representations and/or lemmas. By changing the activation levels, relatively more language control should occur for this language representation and/or lemma relative to their translation equivalent due to the reactive nature of language control. The results showed that this was all the more so when language-specific items were practiced than when merely a language was practiced. Hence, the current study provides evidence that language control is not restricted to language representations, but could also occur between lemmas.

(144 words)

Keywords: Bilingualism; language control; lemmas; asymmetrical switch costs

A critical process during bilingual processing is language control, since this process ensures that the target language is used. Several accounts have proposed that this control process occurs at two stages: between language representations and between lemmas (e.g., Declerck, Koch, & Philipp, 2015; Green, 1998; Schwieter & Sunderman, 2008). However, little evidence has been given for lemma-based language control. In the current study, we wanted to further explore the possibility of language control processes at the lemma level, next to language control between language representations, by manipulating the activation of languages and language-specific items in a language-switching task.

Language switching

One of the standard language-switching paradigms in language production consists of stimuli, presented as pictures or digits, and language cues (e.g., Costa & Santesteban, 2004; Meuter & Allport, 1999). The former is to indicate the concepts that need to be named, whereas the latter indicate in which language the concepts need to be produced. Next to this cued-language switching paradigm, other paradigms, such as the sequence-based language switching paradigm (e.g., Declerck et al., 2015; Declerck, Philipp, & Koch, 2013), require no visual stimuli or language cues. In turn, participants have to perform a language-switching task with a previously learned concept sequence (e.g., numbers 1-5) and an alternating language sequence (i.e., target language changes after every second trial). A German-English example of a trial sequence with this paradigm would be: eins ("one" in English) – zwei ("two" in English) – three – four – fünf ("five" in English) – eins – two – three – vier ("four" in English) – fünf – etc.

It is typically found with both these language-switching paradigms that switching from one language to another (i.e., switch trials) is costly relative to staying in the same language as the previous trial (i.e., repetition trials; e.g., Costa & Santesteban, 2004; Declerck et al., 2013, 2015; Meuter & Allport, 1999). This performance decrease is typically termed "switch costs" and is considered a marker of language control (e.g., Green, 1998).

Switch costs can also be asymmetric across languages (for reviews see, Bobb & Wodniecka, 2013; Declerck & Philipp, 2015a), which means that first language (L1) switch costs are larger than second language (L2) switch costs (e.g., Meuter & Allport, 1999; Philipp, Gade, & Koch, 2007). This asymmetry across languages has typically been explained with persisting, reactive inhibition (Green, 1998; yet see Finkbeiner, Almeida, Janssen, & Caramazza, 2006; Verhoef, Roelofs, & Chwilla, 2009). More specifically, the non-target language will be inhibited when producing in the target language on trial n-1. When the previously inhibited language is required for production in the next trial (trial n; i.e., switch trial), the inhibition that was exercised on trial n-1 will persist into trial n and thus needs to be overcome. This is not the case when producing in the same target language on consecutive trials (i.e., repetition trial). Hence, it should be harder to switch between languages than repeating the same language due to persisting inhibition.

The reactive aspect encompasses the difference in L1 activation compared to L2 activation for unbalanced bilinguals. Since unbalanced bilinguals are more experienced with L1 than L2, their L1 activation will be larger than their L2 activation. To counter this difference in activation across languages, L2 production requires relatively stronger inhibition of the more dominant L1 than inhibition of L2 during L1 production. As a consequence, it is relatively more difficult to switch from L2 to L1, since a relatively larger amount of persisting inhibition has to be overcome, than when switching from L1 to L2.

However, asymmetrical switch costs can also be explained by persisting, reactive activation (Philipp et al., 2007). This explanation is similar to the persisting, reactive inhibition account, with the crucial difference that instead of inhibition of the non-target language persisting into the next trial, it is assumed that the target language will receive additional activation, which persist into the next trial. In turn, a more considerable competitor will be generated, if the target language switches to another language in the next trial. This competitor should be even more pronounced during L1 than L2 production, since L2 will require a larger amount of activation to be selected, which will persist into the next trial and cause an even more substantial competitor. Since the present study does not allow for a comparison between the inhibition account and the activation account, we will use a term that incorporates both: persisting, reactive language control.

Two-stage language control

Several models assume that this language control process occurs between language representations. This can either be between language schemas (e.g., Schwieter & Sunderman, 2008), which are mental devices that are implemented to achieve task-specific goals, language tags (e.g., Declerck et al., 2015), which provide information about language membership in an all-or-nothing fashion, or both (e.g., Green, 1998).

Some language switching studies have investigated language control between language schemas/tags. By manipulating the time to prepare for an upcoming language, which allows for advanced (i.e., preparatory) language control at the language level, several studies have observed that a longer language preparation time leads to smaller switch costs (Costa & Santesteban, 2004; Fink & Goldrick, 2015; Ma, Li, & Guo, 2016; Mosca & Clashen, 2015), thus providing evidence for language control to occur between language schemas/tags.

The models discussed above also assume that language control occurs between lemmas (e.g., Declerck et al., 2015; Green, 1998; Schwieter & Sunderman, 2008). Declerck et al. (2015), for example, proposed that language control occurs between language tags (i.e., language-based language control). These language tags then inhibit all lemmas of the other language(s). Finally, competition between the target lemma and its translation-equivalent should result in the selection of the target lemma (i.e., lemma-based language control).

However, while these models propose that language control is not restricted to language schemas/tags, very little research has investigated this claim. Declerck et al. (2015) investigated the possibility of lemma-based language control, by implementing hybrids of the cued- and sequence-based language switching paradigm. Using these two paradigms, the effect of both language and concept preparation (i.e., language-specific item preparation) were considered on switch costs by manipulating the predictability of the language sequence or concept sequence (predictable vs. random sequence). The results indicated that switch costs decreased to a larger extent when both the language and concept sequence, and thus the language-specific items, were predictable relative to when only one of these sequences were predictable. This provides evidence that language control can occur between lemmas.

In the current study, we wanted to further investigate whether language control occurs between lemmas by means of a sequence-based language switching task (cf., Declerck et al., 2013, 2015). The important methodological manipulation here is the use of pure language blocks prior to the language-switching blocks. In these pure language blocks participants would either practice a sequence of five language-specific items in English different than those implemented in the following language-switching task (language practice) or practice the same five language-specific items as in the language switching task in English (language-specific item practice). This practice should result in inhibition of the other language (i.e., German) and the translation-equivalent lemmas (cf. Van Assche, Duyck, & Gollan, 2013). However, practice might also lead to an increase of the activation of the practiced language (English) or the practiced lemmas due to priming. Either way, practice should result in a relatively higher activation of the practiced language schema/tag and/or lemmas, which should result in higher switch costs for that language (i.e., English) and those language-specific items than without practice due to the reactive nature of language control (cf. Green, 1998, Philipp et al., 2007). This entails that the typically observed asymmetry would be smaller, abolished, or even reversed relative to when no practice occurred.

Moreover, if language control affects the lemma level, than the practice effect should be even larger when language-specific items have been practiced, since the relative activation is influenced twice: once at the language schema/tag level and once at the lemma level. When solely the language has been practiced, on the other hand, only the language schemas/tags will be influenced but not the lemmas. Hence, if there is lemma-based language control, one would expect smaller asymmetrical switch costs with language-specific item practice, of English items, than with solely language practice.

Method

Participants. 40 German natives took part that spoke English as their L2 (35 female, mean age = 22.4). Prior to the experiment they filled in a questionnaire about their formal English education and self-rated scores of English (see Table 1).

--Table 1--

Apparatus and material. Participants had to produce words in one or two predefined sequences. The two sequences consisted of five concepts each (both sequences can be found in the correct serial order in the Appendix). The two sequences were controlled across German and English for the amount of syllables, frequency, and neighborhood frequency (Baayen, Piepenbrock, & Gulikers, 1995)[1]. None of the words were cognates or false friends.

The experiment was programmed using E-prime. Speech onset of vocal responses was recorded with a voice-key and errors were coded online by the experimenter in a subject file.

Procedure. Prior to the experiment, the instructions were presented both orally and visually, with an emphasis on speed and accuracy. Then, the participants performed seven pure English blocks of 20 trials each with the same sequence, followed by four mixed language blocks (i.e., sequence-based language switching with German-English; Declerck et al., 2013, 2015) with 20 trials each. The sequence used in the pure English blocks was counterbalanced across participants, as was using either the same sequence in the mixed language blocks in the pure English blocks or not, with half of the participants using the same concept sequence in the pure English blocks as in the language-switching blocks and the other half of participants using a different concept sequence. With respect to the sequence of the mixed language blocks, the starting language of each block was altered after every block, so that half of the blocks started in German and half started in English.

At the beginning of each block the participants were informed about the characteristics of the block (i.e., which sequence to use and which language to use (pure language blocks)/start with (mixed language blocks)). This was followed by a fixation cross (+), presented in the centre of the screen that stayed visible throughout the entire block. Each trial started with an auditory response-signal of 50 ms, which indicated the production of one word. This response had to be in the correct serial position, in relation to the other words, and in the correct language. The language sequence in the mixed language blocks was also memory-based and alternated after every second trial (e.g., L1-L1-L2-L2-L1-L1). After the participant´s response there was a pacing-interval, constituting the time between the response-onset and the next response-signal, of 1500 ms (cf. Declerck et al., 2013, 2015).

Analysis. The first trial of each block and the error trials, which constituted the production of a wrong concept and/or production in the wrong language, were excluded from reaction time (RT) analyses, as were trials following an error trial. Furthermore, RTs that were larger or smaller than two standard deviations from the mean were discarded as outliers. Taking these three criteria into account resulted in the exclusion of 15.2% of the data.

The data were analyzed using mixed-effects models (Baayen, Davidson, & Bates, 2008) with the lme4 package (Bates, Maechler, Bolker, & Walker, 2014) in the statistical software R (RdevelopmentCoreTeam, 2008). P-values were determined using the lmerTest package (Kuznetsova, Brockhoff, & Christensen, 2014).

The factors consisted of production language (German vs. English), language transition (switch vs. repetition trials), and practice in the pure English blocks (different vs. same item sequence in pure and mixed language blocks). Both participants and items were considered random factors, with all fixed effects varying by all random factors (Barr, Levy, Scheepers, & Tily, 2013). However, some convergence issues arose, which were resolved by not allowing the interactions of the fixed effects to vary by participants and items[2].

Results

As can be seen in Table 2, the RT data revealed a significant main effect of language transition, with switch trials (673 ms) being slower than repetition trials (597 ms). The interactions between practice and language transition was also significant, with smaller switch costs when the same items were used (34 ms) than when the different items were used (117 ms) in the pure English blocks and the mixed language blocks, as was the interaction between language and language transition, with smaller English (66 ms) than German switch costs (85 ms; i.e., asymmetric switch costs).

--Table 2--

Importantly, the three-way interaction was significant, showing a modulation of the asymmetric switch costs by practice (see Table 3). The data pattern showed larger German (158 ms) than English switch costs (76 ms) when different items were used in the pure and mixed language blocks. However, German switch costs (12 ms) were smaller than English switch costs (56 ms) when the same items were used in the pure and mixed language blocks.

This three-way interaction indicates that prior practice of language-specific items has a larger influence on asymmetrical switch costs than when practicing a language. Furthermore, larger German (L1) than English (L2) switch costs when solely practicing a language does not mean that there was no effect of language practice on asymmetrical switch costs. It could be that practicing English with different items than in the mixed language block reduced the asymmetrical switch costs relative to when English would not have been practiced. Hence, we provide no direct evidence for solely an effect of language practice.

--Table 3--

Discussion

In the current study, we investigated whether language control can occur at the lemma level, next to the language schema/tag level. To this end, a language-switching task was implemented, which was preceded by pure English blocks. In these pure English blocks, participants practiced five English words, different from those implemented in the following language switching task (i.e., language practice), or the same (i.e., language-specific item practice). We assumed that language-specific item practice should result in diminished asymmetrical switch costs compared to language practice alone. The results showed that asymmetrical switch costs were not only diminished but even reversed when the same items were used in the pure English blocks and the mixed language blocks.

These findings indicate that prior language experience can have an impact on language control. Van Assche et al. (2013) observed a similar pattern, with a performance decrease when a pure language block was preceded by a pure language block of the other language. Our study provides additional evidence for the effect of prior pure language blocks on language production by showing that also asymmetrical switch costs can be affected in mixed language blocks.

As we discussed in the introduction, the influence of prior language/language-specific item practice on asymmetrical switch costs can be explained with reactive language control (Green, 1998; Philipp et al., 2007): by increasing the relative activation of a language schema/tag and/or lemmas due to practice, more language control will be necessary for this language and/or these lemmas (cf. reactive language control). This entails that it will take longer to overcome this increase of language control when switching from one language to another and thus that switch trials will be even harder. Consequently, the switch cost pattern across languages should be affected, with a relative switch cost increase of the practiced language (i.e., English) with respect to the switch costs of the not-practiced language (i.e., German).

More importantly, the observation of a huge impact due to language-specific item practice indicates that more reactive language control had to be used in this condition. This could be explained within the framework of Declerck et al. (2015; see also Green, 1998; Schwieter & Sunderman, 2008), where language control occurs between languages and between lemmas. More specifically, when solely the language was practiced in the pure English blocks, the activation of the English language tag should have increased relative to the German language tag by the time the bilinguals started the mixed language blocks. This should also have occurred when the language-specific items were practiced, but additionally the activation of the English lemmas should have increased relative to their translation equivalents. Hence, a higher overall activation for English lemmas should have been obtained when the language-specific items were practiced. Due to this higher activation of the English lemmas relative to the German lemmas, reactive inhibition became a lot larger for English than for German, resulting in relatively larger L2 than L1 switch costs when the same items were used in the pure and mixed language block. This pattern was found in the results. Similar to the finding of Declerck et al. (2015), this finding provides evidence for lemma-based language control. Yet, in the current study we additionally found evidence that this language control process between lemmas is reactive.

However, while the assumption that language control occurs between lemmas, next to languages, is the most favored (e.g., Declerck et al., 2015; Green, 1998; Schwieter & Sunderman, 2008), other, related accounts have been proposed. It could be that language control occurs between language-specific phonemes and/or that activation from the phonemes influence language control through feedback loops to the lemmas (Olson, 2013; Gollan, Schotter, Gomez, Murillo, & Rayner, 2014; Declerck & Philipp, 2015b). The current finding could also be in line with both these accounts, as the item-specific phonemes were also practiced in the pure language blocks when the same items were used as in the mixed language blocks. Hence, more language control at this level could also have been instigated for these English phonemes and/or more language control between English lemmas could have been instigated due to increased activation of English phonemes that feedback to the English lemmas.

Conclusion

Several models assume that language control occurs between language representations, but subsequently also between lemmas. By changing the relative activation of language schemas/tags and/or lemmas due to prior practice, the current study provides evidence that language control is not restricted to language schemas/tags but also occurs on the lemma level.

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References

Baayen, R. H., Piepenbrock, R., & Gulikers, L. (1995). *The CELEX Lexical Database* (CD-ROM). Linguistic Data Consortium, University of Pennsylvania, Philadelphia, PA.

Baayen, R. H., Davidson, D. J., & Bates, D. M. (2008). Mixed-effects modeling with crossed random effects for subjects and items. *Journal of Memory and Language, 59*, 390–412. http://dx.doi.org/10.1016/j.jml.2007.12.005

Bates, D., Maechler, M., Bolker, B., & Walker, S. (2014). lme4: Linear mixed-effects models using Eigen and S4. R package version 1.1-5.

Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language, 68,* 255–278. http://dx.doi.org/10.1016/j.jml.2012.11.001

Bobb, S. C., & Wodniecka, Z. (2013). Language switching in picture naming: What asymmetric switch costs (do not) tell us about inhibition in bilingual speech planning. *Journal of Cognitive Psychology, 25*, 568-585. http://dx.doi.org/10.1080/20445911.2013.792822

Costa, A., & Santesteban, M. (2004). Lexical access in bilingual speech production: Evidence from language switching in highly proficient bilinguals and L2 learners. *Journal of Memory and Language, 50*, 491-511. http://dx.doi.org/10.1016/j.jml.2004.02.002

Declerck, M., Koch, I., & Philipp, A. M. (2015). The minimum requirements of language control: Evidence from sequential predictability effects in language switching. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 41*, 377-394. http://dx.doi.org/10.1037/xlm0000021

Declerck, M., Lemhöfer, K., & Grainger, J. (2016). Bilingual language interference initiates error detection: Evidence from language intrusions. *Bilingualism: Language and Cognition*. http://dx.doi.org/10.1017/S1366728916000845

Declerck, M., & Philipp, A. M. (2015a). A review of control processes and their locus in language switching. *Psychonomic Bulletin & Review, 22*, 1630-1645. http://dx.doi.org/10.3758/s13423-015-0836-1

Declerck, M., & Philipp, A. M. (2015b). The unusual suspect: influence of phonological overlap on language control. *Bilingualism: Language and Cognition, 18*, 726-736. http://dx.doi.org/10.1017/S1366728914000236

Declerck, M., Philipp, A. M., & Koch., I. (2013). Bilingual control: Sequential memory in language switching. *Journal of Experimental Psychology: Learning, Memory and Cognition, 39, 1793-1806.* http://dx.doi.org/10.1037/a0033094

Fink, A., & Goldrick, M. (2015). Pervasive benefits of preparation in language switching. *Psychonomic Bulletin & Review*, *22,* 808-814. doi:10.3758/s13423-014-0739-6

Finkbeiner, M., Almeida, J., Janssen, N., & Caramazza, A. (2006). Lexical selection in bilingual speech production does not involve language suppression. *Journal of Experimental Psychology: Learning, Memory and Cognition, 32*, 1075-1089. http://dx.doi.org/10.1037/0278-7393.32.5.1075

Gollan, T. H., Schotter, E. R., Gomez, J., Murillo, M., & Rayner, K. (2014). Multiple levels of bilingual language control: Evidence from language intrusions in reading aloud. *Psychological Science*, *25*, 585-595. http://dx.doi.org/10.1177/0956797613512661

Green, D. W. (1998). Mental control of the bilingual lexico-semantic system. *Bilingualism: Language and Cognition, 1*, 213-229. http://dx.doi.org/10.1017/S1366728998000133

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2014). lmerTest: Tests for random and fixed effects for linear mixed effect models (lmer objects of lme4 package): R package version 2.0-6.

Ma, F., Li, S., Guo, T. (2016). Reactive and proactive control in bilingual word production: An investigation of influential factors. *Journal of Memory and Language, 86*, 35-59. http://dx.doi.org/10.1016/j.jml.2012.11.001

Meuter, R. F. I., & Allport, A. (1999). Bilingual language switching in naming: Asymmetrical costs of language selection. *Journal of Memory and Language, 40,* 25-40. http://dx.doi.org/10.1006/jmla.1998.2602

Mosca, M., & Clashen, H. (2015). Examining language switching in bilinguals: The role of preparation time. *Bilingualism: Language and Cognition*, *19*, 415-424. http://dx.doi.org/10.1017/S1366728915000693

Olson, D. J. (2013). Bilingual language switching and selection at the phonetic level: Asymmetrical transfer in VOT production. *Journal of Phonetics*, *41*, 407-420. http://dx.doi.org/10.1016/j.wocn.2013.07.005

Philipp, A. M., Gade M., & Koch I. (2007). Inhibitory processes in language switching: Evidence from switching language-defined response sets. *European Journal of Cognitive Psychology, 19*, 395-416. http://dx.doi.org/10.1080/09541440600758812

RDevelopmentCoreTeam. (2008). R: A language and environment for statistical computing: R package version 1.1-5.

Schwieter, J. W., & Sunderman, G. (2008). Language switching in bilingual speech production: In search of the language-specific selection mechanism. *The Mental Lexicon*, *3*, 214-238. http://dx.doi.org/10.1075/ml.3.2.06sch

Slevc, L. R., Davey, N. S., & Linck, J. A. (2016). A new look at "the hard problem" of bilingual lexical access: evidence for language-switch costs with univalent stimuli. *Journal of Cognitive Psychology, 28,* 385-395. http://dx.doi.org/10.1080/20445911.2016.1152274

Van Assche, E., Duyck, W., & Gollan, T. H. (2013). Whole-language and item-specific control in bilingual language production. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *39*, 1781-1792. http://dx.doi.org/10.1037/a0032859

Verhoef, K. M. W., Roelofs, A., & Chwilla, D. J. (2009). Role of inhibition in language switching: Evidence from event-related brain potentials in overt picture naming. *Cognition*, *110*, 84-99. http://dx.doi.org/10.1016/j.cognition.2008.10.013

Footnotes

[1] There was no significant difference in German frequency, $t < 1$, or English frequency, $t = 1.43$. Neither was there a significant difference in German and English neighborhood effect and amount of syllables, *t*s < 1.

[2] When comparing the fit of our reduced model (AIC: 39239) with a full random effects model (AIC: 39789), we found that there was no difference between the two ($p = .991$). Thus, the observed effects were not due to variability that was not captured by the model (cf. Declerck, Lemhöfer, & Grainger, 2016; Slevc, Davey, & Linck, 2016).

Table 1. Overview of demographic information of the participants. The information consists of a self-rated score of English speaking, writing, and reading from 1-7, with 1 being very bad and 7 being very good, the average years of formal English education, and an average of known languages (not including the first language or English).

	Average	Standard deviation
English speaking	5.0	1.0
English writing	5.0	1.0
English reading	5.7	1.3
Formal English education	9.4	1.6
Other languages	1.2	0.9

Table 2. *b*- and *t*-values, along standard errors of the language switching, with variables: production language (German vs. English), language transition (switch vs. repetition trials), and practice in the pure English blocks (different vs. same item sequence in pure and mixed language blocks).

Effects	*b*-value	Standard error	*t*-value
Intercept	637.4	54.9	11.6 ***
Language transition	163.7	44.0	3.7 ***
Language	5.0	32.0	0.2
Practice	55.2	76.6	0.7
Language transition x language	86.4	40.6	2.1 *
Language transition x practice	147.2	48.9	3.0 **
Language x practice	35.6	39.6	0.9
Language transition x language x practice	123.9	57.2	2.2 *

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 3. Overall RT in ms and error rates in percentage (standard deviations between brackets) as a function of language (German vs. English), language transition (switch vs. repetition trials), and practice in the pure English blocks (different vs. same item sequence in pure and mixed language blocks).

	German		English	
	Different	Same	Different	Same
		Reaction times		
Switch	796 (379)	594 (238)	706 (344)	594 (276)
Repetition	638 (241)	582 (255)	630 (249)	538 (214)
Switch costs	158	12	76	56
		Error rates		
Switch	3.8 (3.2)	5.0 (5.8)	3.4 (4.3)	4.5 (4.3)
Repetition	2.4 (1.6)	7.9 (22.3)	1.6 (2.3)	2.4 (3.2)
Switch costs	1.4	-2.9	1.8	2.1

Figure captions.

Figure 1. Switch costs in ms (Bars; left axis) and in percentage of errors (Line; right axis) as a function of training in pure English blocks (different vs. same item sequence in pure and mixed language blocks), and language (German vs. English).

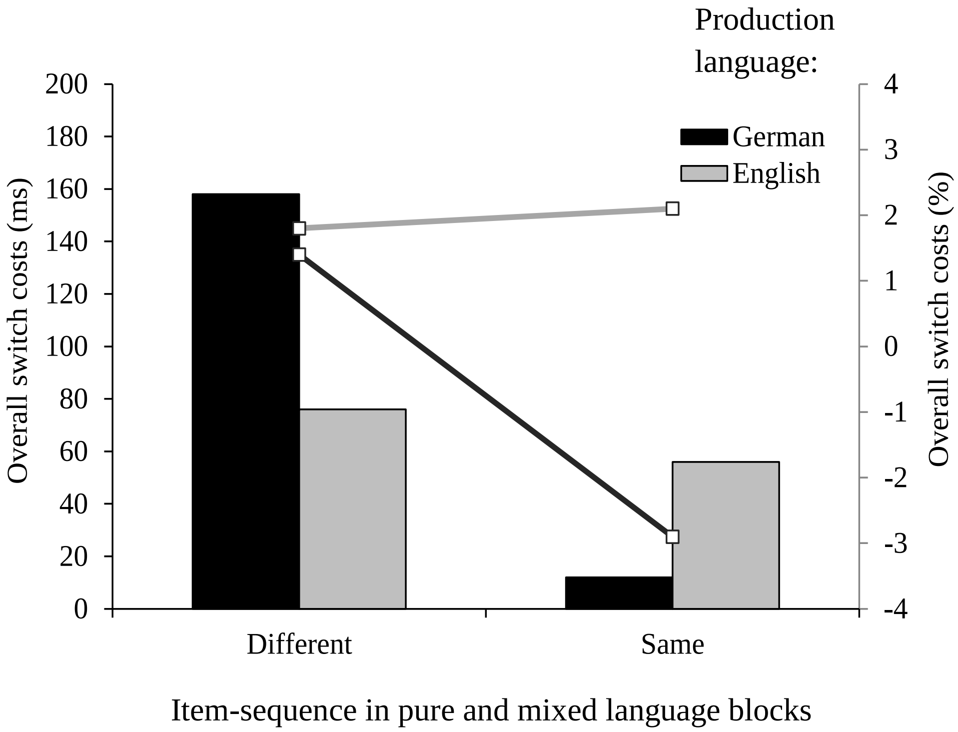
Production
language:
German
English
Overall switch costs (ms)
Overall switch costs (%)
200
180
160
140
120
100
80
60
40
20
0
4
3
2
1
0
-1
-2
-3
-4
Different
Same
Item-sequence in pure and mixed language blocks

Figure 1.

Appendix.

Fixed response sequences.

	Languages	
	German	English
Item sequence A	Kleid	dress
	Messer	knife
	Stuhl	chair
	Ei	egg
	Junge	boy
Item sequence B	Pferd	horse
	Kreis	circle
	Baum	tree
	Auto	car
	Bein	leg