



Voluntary language switching: When and why do bilinguals switch between their languages?



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ABSTRACT

Bilingual language switching has been studied extensively in cued picture naming paradigms, instructing bilinguals when to switch between languages. However, in daily life, bilinguals often switch freely, without external instruction. This study examined when and why bilinguals switch voluntarily. Spanish-Basque bilinguals frequently switched between their languages and their language choice was related to the ease of lexical access. Words that were slow to be accessed in Basque were more often named in Spanish and vice versa. In terms of response times, switching costs were observed not only in the cued but also in the voluntary task. However, while cued switching showed a mixing cost (reflecting the cost associated with using two languages rather than one), a mixing benefit was observed for the voluntary task. This suggests that voluntarily using two languages may be less costly than having to stay in one language.

Introduction

Bilinguals frequently switch between their languages in daily life. Sometimes, language switching is imposed by the circumstances and interlocutors. For instance, when different languages are used with different interlocutors, monitoring of the context is needed to select the appropriate target language and to switch at the right time. Laboratory studies have focused on this type of language switching by using cued picture or digit naming tasks in which cues (e.g., the flag of a country) indicate the language that needs to be used. In daily life, however, language switching does not always follow cues but can also take place freely. When both conversational partners speak the same languages, bilinguals are free to switch between languages when they want. Indeed, several studies have reported that language switching occurs naturally both in conversations as well as within sentences (e.g., Milroy & Muysken, 1995; Myers-Scotton & Lake, 1995). In the current study, we examine when and why bilinguals switch between languages when they are free to name pictures in their language of choice. In this context, we measure whether there are differences in the amount of language control needed during cued and voluntary switching.

Language switching paradigms

Many studies have examined language switching through the use of a cued picture or digit naming paradigm (e.g., Costa & Santesteban, 2004; Meuter & Allport, 1999). In these paradigms, participants are asked to name items in a *blocked* and a *mixed* context. Within the blocked context, all items must be named in one pre-specified language. The mixed context, in contrast, requires participants to switch between languages according to a cue. This produces switch trials (the current trial's language differs from the previous one) as well as non-switch trials (two consecutive trials are named in the same language). Bilinguals usually take longer to respond on switch than on non-switch trials (the 'switching cost'), reflecting the effort associated with system re-configuration. Inhibitory control may be an important mechanism underlying language switching through inhibition of the non-target language and subsequent (re)activation of the previously inhibited representations (Green, 1998). These switching costs reflect a temporally local type of language control at the trial level. When non-switch trials from the mixed condition are compared to trials in the blocked condition, response times (RT) are typically longer in the mixed condition (the 'mixing cost'). This mixing cost is taken as an indication that more global, proactive control mechanisms are needed to maintain two languages or tasks (cf. Rubín & Meiran, 2005), and that such

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maintenance requires cognitive resources.

Voluntary language switching

In daily life, bilinguals need to monitor cues (e.g., the language(s) spoken by the interlocutor) in order to switch between languages when needed. However, in some circumstances, bilinguals can freely switch between languages. In Green and Abutalebi's (2013) Adaptive Control Hypothesis, three bilingual language contexts are described that are associated with different levels of language control. In the single language context, bilinguals use their two languages in strictly separated settings (e.g., one language at home, one language at work). This type of language use mainly places demands on global control mechanisms such as goal maintenance and conflict monitoring. In the dual-language context, both languages can be used in the same setting but with different interlocutors (e.g., both languages are used at work, but one language with person A and the other language with person B). In this setting, language switching occurs frequently but not with the same interlocutor. This type of language context requires constant monitoring of the circumstances in order to select the appropriate language and as such is argued to require a relatively high level of language control. In contrast, in the third context ('dense code-switching'), less control is needed. In this context, a bilingual speaker is surrounded by other bilinguals who speak the same languages, allowing them to switch freely, even within conversations. According to the Adaptive Control Hypothesis, this switching context does not place additional demands on cognitive processes such as goal maintenance, cue detection, and response inhibition. In contrast, the dual-language context, which is most similar to the typical cue-based laboratory measurements of language switching, does increase the need for these cognitive processes. Thus, the switching and mixing costs that have been linked to language switching may be related to the use of a cue-based switching paradigm that requires a higher level of control. If lower levels of control are needed in a voluntary context, these switching and mixing costs may be smaller or even absent.

Despite voluntary language switching frequently occurring in daily life in many bilingual societies, relatively little experimental research has examined when and why bilinguals switch between languages and how voluntary switching may affect the costs observed in cued paradigms. While cued language switching explicitly requires top-down control (as switches are driven by explicit instructions), it is unclear whether voluntary switching also requires top-down control. Instead (or in addition), voluntary switching may be driven by bottom-up processes (i.e., lexical access) if bilinguals just use the language that comes to mind first.

Gollan and Ferreira (2009) examined voluntary language switching in Spanish-English bilinguals and showed that participants switched frequently. They also found that unbalanced bilinguals on average switched less often (24% of the trials) than balanced bilinguals (35% of the trials). A switching cost was observed, suggesting that switching remained costly even though done voluntarily.¹ The mixing costs showed a more complex pattern, with mixing costs for balanced bilinguals and mixing benefits for unbalanced bilinguals when using the non-dominant language. Gollan and Ferreira linked this mixing benefit to unbalanced bilinguals monitoring the accessibility of items in the weaker language and only choosing this weaker language when an item is easily accessible. As a consequence, the mixing benefit in this group of bilinguals may be interpreted as reflecting the avoidance of naming less accessible items in the voluntary condition, something that cannot be avoided in the blocked condition. However, further analyses in Gollan and Ferreira (2009, Experiment 1) showed that a mixing benefit was not only found for items that were always named in the weaker

language, but also for items that did not show such a strong language preference. This suggests that lexical access cannot fully explain the mixing benefit.

A study on voluntary language switching in children (Gross & Kaushanskaya, 2015) provides further evidence that language choice is related to lexical access. Items were more frequently named in the non-dominant language when they had a higher frequency of use, were more likely to be acquired early in life in the non-dominant language, and were less likely to have alternative naming options in the non-dominant language. Furthermore, as in Gollan and Ferreira (2009), different mixing effects were observed for the dominant and non-dominant language. A mixing cost was found in reaction times for the dominant but not for the non-dominant language. This asymmetry was also present in the accuracy scores, but here a mixing benefit was found for the non-dominant language while no effect was observed for the dominant language. However, the presence of switching costs suggested that voluntary switching remained costly.

While most studies on voluntary language switching have reported costs associated with switching, Blanco-Elorrieta and Pykkänen (2017) demonstrated that voluntary switching can be cost-free. Participants named pictures in response to artificial cues (colours), faces of monolinguals ('monolingual cued', requiring them to use a specific language), and faces of bilinguals ('bilingual voluntary'). The authors observed behavioural switching costs in response to artificial cues, but not when bilinguals responded to natural cues (i.e., the monolingual cued or bilingual voluntary conditions). Furthermore, when bilinguals had to switch in response to artificial cues, increased activation was observed in the anterior cingulate cortex (ACC) and dorsolateral prefrontal cortex (dlPFC), two areas that have been linked to language switching and executive control. In the monolingual cued condition using natural cues, this increased switch activation was found in the earliest time window of analysis only. For bilingual voluntary trials, this increased activation was not found at all. Thus, language switching was argued to be most effortful in response to artificial cues and not costly at the behavioural or neural level when done voluntarily.

Lexical access and top-down control

Taken together, studies investigating voluntary language switching suggest that mechanisms related to inhibitory/executive control as well as lexical access may be involved. Language choice appears to be at least partly driven by lexical access because easier items are often named in the non-dominant language while the dominant language is used for more difficult items. Furthermore, mixing benefits rather than costs have been observed for the non-dominant language of unbalanced bilinguals, which could be due to naming easier items in the non-dominant language. However, it has been suggested that the mixing benefit cannot fully be explained by lexical access (Gollan & Ferreira, 2009) and might reflect a more general benefit of voluntary language mixing.

The presence of switching costs even in voluntary switching tasks suggests that top-down control processes are involved. However, not all studies have observed switching costs (cf. Blanco-Elorrieta & Pykkänen, 2017). Others have suggested that switching costs may depend on the extent to which voluntary language switching is bottom-up and driven by lexical access (Kleinman & Gollan, 2016). Switching costs were absent when participants were instructed to choose the easiest language for each picture and then use that language to name that picture for the rest of the task. In contrast, when participants were given the instruction to just choose the language that came to mind first for each item, without having to use that language for the rest of the task, switching costs were similar for the voluntary and cued switching tasks. Furthermore, Gollan, Kleinman, and Wierenga (2014) noted that switching costs in voluntary tasks may be affected by item repetition. When pictures were not repeated, switching costs were similar for cued and voluntary language switching. However, when pictures were

¹ Note, however, that Gollan and Ferreira's (2009) Fig. 2 suggests that this switching cost was not present in balanced bilinguals.

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