

## Utilising Authentic Production Data in A Psycholinguistic-Based Study on Code-Switching: A Conceptual Paper

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### ABSTRACT

*Code-switching is especially common within the Southeast Asian region which is home to a large number of bilinguals and multilinguals. Over the years, code-switching has been studied extensively, both in and out of Asia, via sociolinguistics, structural linguistics, and psycholinguistics. From the psycholinguistic perspective, code-switching is said to be the result of the co-activation of languages during the process of speech production for bilinguals. Grosjean's Language Mode and Green's Control Process Model are two psycholinguistic frameworks focusing on the psycholinguistic as well as interactional factors behind code-switching. However, past studies in this area were mostly experimental in nature. It is necessary to consider authentic production data to develop a greater understanding of the code-switching phenomenon especially within the Southeast Asian context due to its bilingual and multilingual communities. This conceptual paper aims to demonstrate how the interactional and psycholinguistic factors behind code-switching can be examined using authentic production data. In particular, a review of the literature pointed to the Conversation Analysis (CA) approach to code-switching as well as the concepts of triggered code-switching and primed code-switching as being relevant. Accordingly, this paper describes each construct in detail and provides suggestions on how they can be brought together in a single study on code-switching based on authentic production data.*

*Keywords: authentic production; code-switching; conversation analysis; priming; triggering*

### INTRODUCTION

A bilingual is a person who knows and uses two different languages, one of which is typically his or her mother tongue. However, bilingualism is a complex phenomenon and there are many variations to it (Mahmud & Salehuddin, 2023). For example, a person may know two languages but in practice, only speaks one regularly. Another person may use both languages equally but is more fluent in one language compared to the other. Some bilinguals can listen to and read in their second language but they cannot speak or write in it. Accordingly, Mahootian (2020) proposes competency in the four language skills as one of the important considerations when discussing bilingualism. Apart from that, many bilinguals prefer different languages in different 'domains' such as the family domain and the work domain. In other communities, both languages are used across all domains, whether formal or informal.

Despite the many ways with which the phenomenon can be addressed, an enduring observation about bilinguals is that they can switch between different languages when they speak. In bilingualism literature, switching between different languages while speaking is commonly

referred to as ‘code-switching’. Over the years, extensive research has been carried out on code-switching in linguistics. This is because code-switching represents the extent of human creativity when it comes to communicating and connecting with people. Apart from that, code-switching offers a unique window into the human capacity for language and speech as it involves multiple languages operating within a single speech production mechanism (Beatty-Martínez et al., 2020). As a result of the research that has been carried out, multiple frameworks on code-switching were introduced in sociolinguistics as well as structural linguistics (MacSwan, 2020). Most of these frameworks are based on authentic production data. At the same time, from the psycholinguistic perspective, code-switching has been associated with the co-activation of languages during the process of speech production for bilinguals. According to Jong (2013), during speech production, a ‘preverbal’ message is first created based on a person’s communicative intent. The preverbal message is then sent to the ‘formulator’ which is a component of the speech production system that encodes preverbal messages into actual speech plans for articulation. At this point, all of the related lexical items are activated to facilitate the encoding process. However, for bilinguals, a single concept often has representations from two different languages. In a review of multiple studies on bilingual speech production, it was concluded that representations from both languages will be activated during the formulating stage (Shook & Marian, 2019). It is this co-activation of languages that is said to be the reason why bilinguals can alternate between different languages when they speak. Grosjean’s Language Mode and Green’s Control Process Model are two psycholinguistic frameworks that have been developed to account for code-switching in this sense. Most of the studies on code-switching within the psycholinguistic field are based on experimental data.

## LANGUAGE MODE

The Language Mode framework was developed by François Grosjean, a French psycholinguist, in the late 1990s. According to Grosjean (2013), before speaking, a bilingual has to first make the decision on which one of his or her languages to use. This process is referred to as ‘language choice’ and the chosen language forms the ‘base language’ for the bilingual at the moment. The base language then becomes fully activated in the bilingual’s language processing mechanisms while the other language is ‘deactivated’. In cases where the bilingual is speaking to a monolingual, this initial decision is sufficient as the base language does not change throughout the conversation. The bilingual is effectively in the ‘monolingual mode’. Other instances in which bilinguals may find themselves in the monolingual mode include reading books or listening to radio broadcasts in a particular language and writing emails to a person who only knows one language. Thus, the concept of a language mode is not restricted to any language skill but it applies to language use as a whole. However, if the bilingual is speaking with a fellow bilingual who shares the same languages, both of his or her languages will be activated, resulting in the bilingual being in a ‘bilingual mode’. The co-activation of languages allows a bilingual to bring in elements of the other language while using a different base language. The co-activation of languages also allows a bilingual to switch base languages completely. This leads to what is known as code-switching. The two language modes as envisioned by Grosjean (2013) are visualised in Figure 1 below.

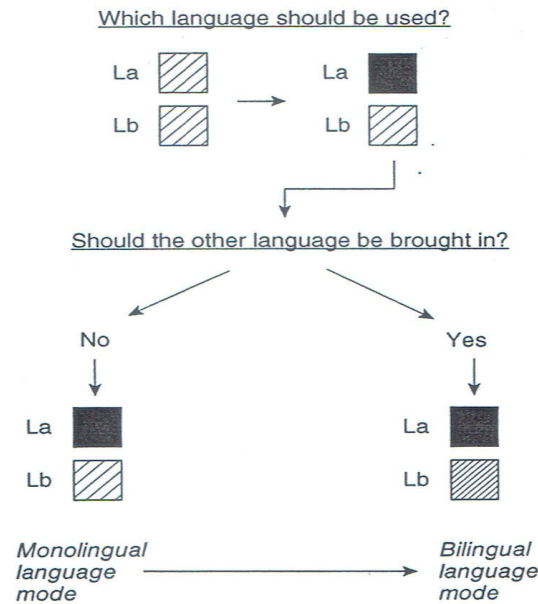


FIGURE 1. The two questions bilinguals have to ask themselves, often subconsciously, when communicating with others

As can be seen, in the monolingual mode (lower left corner), La (fully darkened square) is more active compared to Lb (square with sparse diagonal lines). However, if the bilingual is speaking to another bilingual, there is the possibility of bringing in the other language during the conversation. At this point, the Lb will also become highly activated (lower right square with dense diagonal lines) but the overall level of activation will be slightly lower than La. This is what is referred to as the bilingual mode. Essentially, a bilingual's language mode reflects "the state of activation of the bilingual's languages and language processing mechanisms at a given point in time" (Grosjean, 2013, p. 15).

In addition to that, the two modes are envisioned as being on different ends of a single continuum with the non-target language becoming more activated towards the bilingual end of the continuum (Yu & Schwieter, 2018). However, some bilinguals do not move along the continuum as much as others. For example, bilinguals who live in endogenous bilingual or multilingual societies such as Singapore or Jakarta, will mostly be operating within the bilingual mode on a day-to-day basis. Nevertheless, switching between modes often takes place quickly and subconsciously when it does happen. According to Grosjean (2013), the reasons why bilinguals would switch between modes can be summarised in three broad categories:

- the languages involved (relative proficiency, personal attitudes, societal status etc)
- the communicative context (the presence of monolingual or bilingual interlocutors)
- the topic of conversation (whether the topic is associated with a particular language)

For example, an immigrant who lives in a monolingual society will most probably be in the monolingual mode for his or her daily activities but he or she will switch to the bilingual mode when speaking to family members at home due to a change in the communicative context.

Apart from that, as mentioned earlier, in the bilingual mode, both languages will be activated and the co-activation of languages makes it possible for code-switching to take place.

Under the Language Mode framework, code-switching is defined as “the alternate use of two languages, that is, the speaker makes a complete shift to the other language” (Grosjean, 2013, p. 18). For example, Grosjean (2013) reports on a study on Portuguese-French bilinguals who interacted with two different interlocutors: a French monolingual and a fellow French-Portuguese bilingual. As expected, there was more code-switching during interactions with the bilingual interlocutor. Interestingly, some code-switching was also observed during interactions with the monolingual interlocutor. However, this was eventually attributed to the fact that the participants were interacting in their L2 (French) and some of the participants had a slightly lower level of L2 proficiency. In a more recent study on Spanish-English bilinguals, Olson (2015) investigated the effects of language modes on the suprasegmental features of code-switched sentences being read out loud. Specifically, Olson focused on the intonation and duration of the code-switched sentences. To create the different modes, the sentences were presented to the participants in blocks. It was found that there was a wider pitch range as well as longer stressed vowels for code-switched sentences read in the monolingual mode that is, the sentences were emphasised more. According to Olson, this is because code-switching is less common in the monolingual mode compared to the bilingual mode. Taken together, these studies demonstrate that the co-activation of languages in the bilingual mode results in code-switching.

### CONTROL PROCESS MODEL

The Control Process Model (CPM) is another framework for code-switching based on the co-activation of languages. The CPM was developed by Green and Wei (2014) and is partly based on an earlier model for bilingual speech production known as the Inhibitory Control Model (ICM). Under the ICM, during bilingual speech production, when one language is in use (the selected language), the other language will also be activated but at a lower level (the active language). In other words, there is a co-activation of languages. This means that bilinguals in effect, create two speech plans at the same time, one for the selected language and the other for the active language. However, the plan for the active language is not produced. This is achieved via ‘language task schemas’. Language task schemas control the output from individual language networks into the speech production mechanisms. An ‘inhibitory link’ will be sent to the active language which allows the speech plan involving the selected language to be successfully encoded and articulated. Unfortunately, this explanation is seen as insufficient to account for bilinguals who can switch between languages frequently when they speak (Green & Wei, 2014).

To better account for the use of code-switching among bilinguals, Green and his colleague developed the CPM (Green & Wei, 2014). Under the CPM, most bilinguals operate in one of the three contexts. For bilinguals who only use one of their languages daily, they are in a single-language context. On the other hand, for those who use different languages in different domains, they are in a dual-language context. Under these two contexts, the bilinguals’ languages are in a competitive relationship whereby the unwanted language is inhibited while the target language enters the speech production mechanisms (Green & Wei, 2014). This allows a bilingual to speak in the ‘correct’ language. However, the CPM also denotes that for bilinguals who regularly use two languages together, they are in a code-switching context and their languages are in a cooperative relationship. A cooperative relationship allows for the control of speech production mechanisms to pass from one language to another (coupled control mode). A cooperative relationship also allows the speech production mechanisms to be without any over-arching control

(open control mode). Thus, during the rapid code-switching that is often observed among bilinguals, the speech production system “temporarily cedes local control to the other schema” (Green & Wei, 2014, p. 504). In general, the coupled control mode is associated with the insertion or alternation forms of code-switching (taken from a typology of code-mixing created by Pieter Muysken (Couto et al., 2021)) whereas the open control mode leads to more ‘dense’ code-switching. Importantly, it was noted that the code-switching described here occurs through a bilingual’s “intention to use an item or construction from the other language” (Green & Wei, 2014, p. 504). In other words, this is the top-down processing of code-switching. The overall process of bilingual speech production as envisioned by Green (2018) is visualised in Figure 2 below. As can be seen, language task schemas (language control processes) act as a ‘gate’ to control the output from language networks into the speech planning section (utterance planning processes).

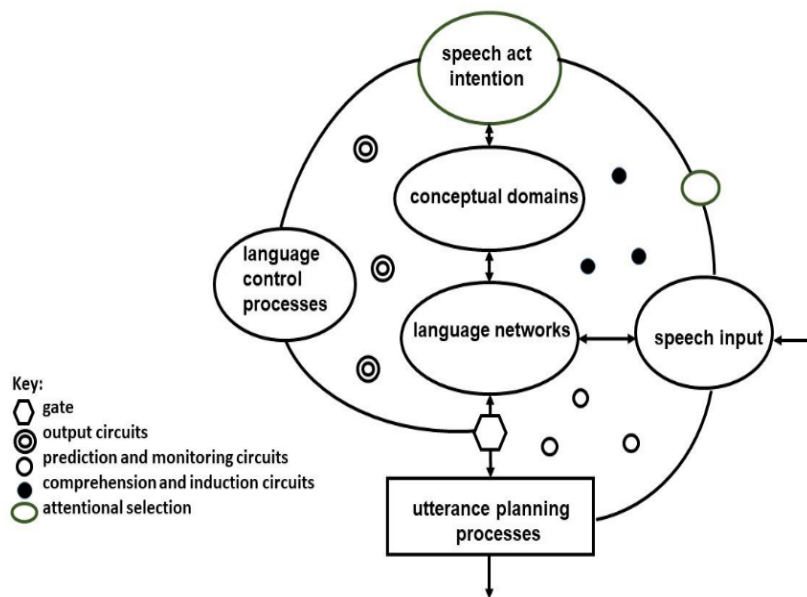


FIGURE 2. Schematic of the process of mapping a speech act into overt speech

Although the CPM is a relatively new framework, several studies have been conducted in relation to it. In fact, the framework itself provides suggestions on ways with which its claims about bilingual speech production and code-switching can be taken up empirically. For example, it was suggested that “a single language context may require enhanced cognitive control relative to a dense CS [code-switching] context, because it is vital to avoid switching between languages in a single language context” (Green & Wei, 2014, p. 506). As such, cognitive control among bilinguals may provide a medium through which the CPM can be put to the test. This idea was recently included in a study on Mandarin-English bilinguals by Han et al. (2022). Using several experimental tasks, it was found that bilinguals who are active in a single-language context displayed higher levels of “goal maintenance and interference control” (Han et al., 2022, p. 14). These results were taken by the researchers as evidence for the claims of the CPM. Apart from that, it was suggested that a navigation task where participants have to describe the path of a moving dot through a map with different objects, may also be relevant to test out the CPM (Green & Wei, 2014). During the task, participants will switch languages according to auditory cues. Participants’ speech rate can then be measured to reveal any changes when their languages shift

from a competitive relationship to a cooperative relationship and vice versa. Beyond suggestions from within the framework itself, a study has also been conducted using picture naming tasks to investigate the switching costs of French-English bilinguals within the CPM context (Zantout, 2019). Taken together, it is clear that the CPM emphasises on the co-activation of languages as well as the cooperative relationship between languages as the main drivers behind code-switching behaviours among bilinguals.

### A STUDY BASED ON AUTHENTIC PRODUCTION DATA

From this brief discussion of the two psycholinguistic frameworks on code-switching, it is apparent that code-switching involves interactional factors as much as psycholinguistic factors. A bilingual's psycholinguistic state is strongly related to his or her immediate communicative needs which subsequently affects their use of code-switching. For example, a bilingual mode can lead to a co-activation of languages and code-switching. On the other hand, a code-switching context creates a cooperative relationship between the co-activated languages in which control of the speech production system can be passed from one language to another. This can also lead to code-switching. The interactional and psycholinguistic factors behind code-switching behaviours are summarised in Figure 3 below.

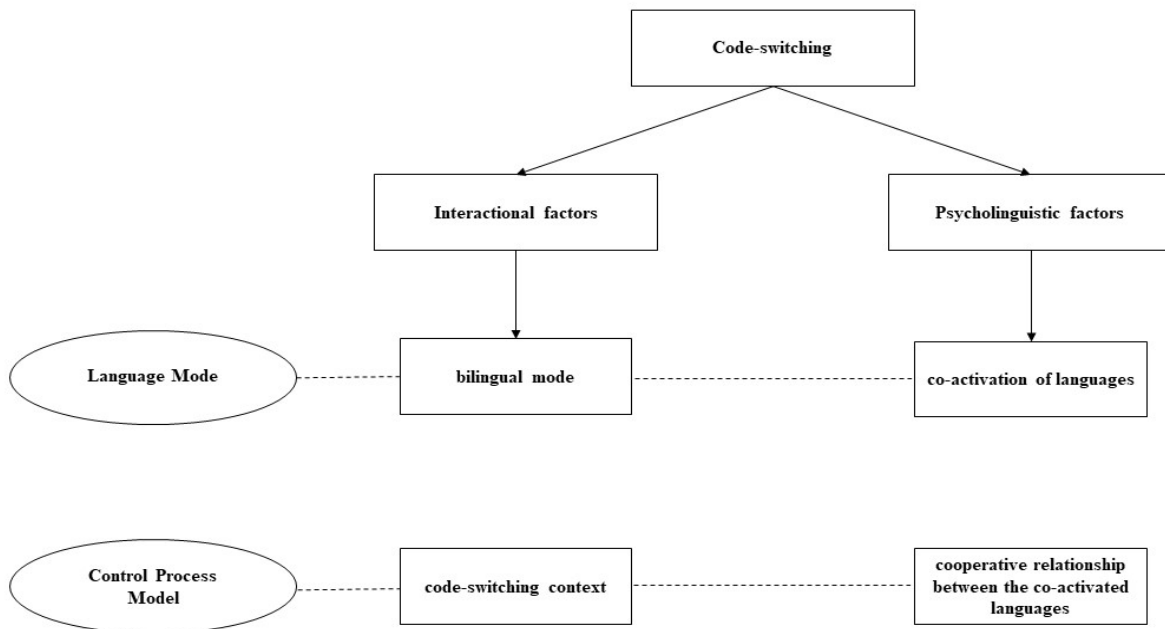


FIGURE 3. Code-switching involves interactional factors and psycholinguistic factors

However, it has been noted that most of the studies that have been conducted in this area are experimental in nature. This is because there is a bias towards experimental methods in general psycholinguistics (Salehuddin, 2018). Psycholinguists prefer to work with controlled production or language that was produced under specific conditions so that the data can be measured along various dimensions. This allows for comparisons between different variables that are then used to

propose or support hypotheses about the cognitive faculties that governed language use in humans. In addition to that, medical techniques such as Functional Magnetic Resonance Imaging (fMRI) and Event-related Potentials (ERPs) as well as eye trackers are also popular among psycholinguists (Salehuddin, 2018). This trend continues in psycholinguistic research on bilingualism. For example, several recent psycholinguistic studies involving bilinguals incorporated experimental tasks (Md Zolkapli & Salehuddin, 2019; Woon et al., 2020; Hamim et al., 2021) and eye tracking (Sulaiman et al., 2020; Tham et al., 2019). In the earlier study on Language Mode, the interlocutors whom participants interacted with were also experimentally manipulated to reflect the monolingual mode and the bilingual mode (Grosjean, 2013). It was assumed that interactions with a monolingual interlocutor were in the monolingual mode and interactions with a bilingual interlocutor were in the bilingual mode. Following that, the code-switching that occurred in the participants' speech was quantified to show the difference between the modes.

One of the main issues with experimental methods in studies that involved code-switching is the fact that the switches were externally-induced. Typically, this is achieved via some form of visual or auditory cue such as the background colours of a visual stimulus or knocking/ringing sounds (Blanco-Elorrieta & Pylkkänen, 2018). The appearance of a certain colour or sound signals to the bilingual that he or she should switch into another language. Needless to say, this is not the same as what bilinguals would experience in real life whereby code-switching, if any, is almost always internally-induced. In the study reported in Grosjean (2013), although it did not involve the use of cues, the interlocutors were orally described to the participants before they began interacting with each other. In other studies, the interlocutors introduced themselves to the participants. The introductions also served as a sign for the participants to engage in code-switching. In reality, people do not receive a point-by-point rundown of their interlocutors' linguistic background and speaking habits before a conversation to help them decide on what language to use. If the interlocutor is known to a person, the relevant knowledge would have developed throughout their acquaintance and be readily available for the current exchange. If the interlocutor is a stranger, then part of the exchange would involve negotiating the language of the conversation. Thus, it is clear that the code-switching that occurred in experimental studies is externally-induced.

As a result, investigations into the interactional and psycholinguistic factors behind code-switching behaviours is set to benefit from data produced under authentic conditions whereby the code-switching is internally-induced. Authentic production data will improve the 'ecological validity' of the related findings that is, the extent to which they reflect language use in real life (Blanco-Elorrieta & Pylkkänen, 2018). The question then becomes how can the two aspects of code-switching, in the capacity described by the two frameworks above, be accounted for with authentic production data? Through this conceptual paper, we propose the Conversation Analysis (CA) approach to code-switching as well as the concepts of triggered code-switching and primed code-switching as the means to achieve this goal. The CA approach can account for the interactional factors behind code-switching while triggering and priming can account for the psycholinguistic factors. The following sections present the different methods for data analysis for a study on the interactional and psycholinguistic factors behind code-switching behaviours based on authentic production data in further detail. Additionally, most of the previous studies in this area were conducted in two parts. Firstly, the studies established the mode or context of the interaction being studied. Secondly, the code-switching that occurred in the participants' speech was analysed. Accordingly, we propose a similar design to be applied for a study based on authentic production data.

PHASE ONE: THE CONVERSATION ANALYSIS (CA)  
APPROACH TO CODE-SWITCHING

In the first part of a study on the interactional and psycholinguistic aspects of code-switching based on authentic production data, it is necessary to establish the mode or context of the interaction being studied. This is because even though a code-switching study will naturally involve bilinguals, it is possible that the bilingual mode or code-switching context will not be sustained throughout the interaction. Thus, it is necessary to first establish specifically the mode or context of the interaction being studied. For this purpose, the CA approach to code-switching is seen to be relevant. The CA approach to code-switching is based on the CA approach to social interactions whereby it is believed that social interactions are sequentially developed (Hutchby & Wooffitt, 2021). Based on this concept, Auer (1995) puts forward the CA approach to code-switching.

Under the CA approach to code-switching, code-switching can either be discourse-related or participant-related. Code-switching to signal a change in the ‘footing’ of the conversation is considered discourse-related whereas code-switching due to participants’ preference for and/or competence in a certain language is participant-related. Below is an example of discourse-related code-switching taken from Auer (1995). During an interview that took place in Nairobi, Kenya, the interviewee, who is a nurse, can be seen code-switching from English to Swahili in (04) and (05) to contrast between the concepts of day and night. A similar switch, this time around from Swahili to English, was made at (09) and (10) to contrast between another pair of concepts (a lot of work and less work).

- 01 Interviewer: Unapenda kufanya kazi yako lini? Mchana au usiku?  
02 Nurse: *As I told you, I like my job,*  
03 *sina ubaguzi wo wote kuhusu wakati ninapofanya kazi.*  
04 *I enjoy working either during the day*  
05 *au usiku yote ni sawa kwangu.*  
06 *Hata family members w-angu wamezoea mtindo huu.*  
07 *There is no quarrel at all.*  
08 Obubi bubulaho.  
09 Saa zengine kazi huwa nyingi sana na.  
10 *There are other times when we just have light duty.*

Translation

- 01 Interviewer: When do you like to work? Days or night?  
02 Nurse: As I told you, I like my job,  
03 I have no difficulty at all regarding when I do work.  
04 I enjoy working either during the day  
05 or at night, all is ok as far as I’m concerned.  
06 Even my family members have gotten used to this plan.  
07 There is no quarrel at all.  
08 There is no badness.  
09 Sometimes there is a lot of work and.  
10 There are other times when we just have light duty.

\*The underlined phrase is in Lwidakho, a local dialect.



On the other hand, a participant-related switch can be seen taking place in the example below (Auer, 1995). In this example, the clerk started the exchange in English but he or she switched to French when it became apparent that the patient (this conversation took place in a Canadian hospital) prefers to speak in French.

- 01 Clerk: Central Booking, may I help you?  
02 Patient: *Oui, allo?*  
03 Clerk: *Bureau de rendez-vous, est-ce que je peux vous aider?*

Translation

- 01 Clerk: Central Booking, may I help you?  
02 Patient: Yes, hello?  
03 Clerk: Appointment office, can I help you?

The CA approach to code-switching is relevant in a study on the interactional and psycholinguistic aspects of code-switching based on authentic production data to establish the mode or context of the interaction being studied. Firstly, the CA approach has been successfully applied in the study of code-switching in both formal and casual settings (Alvanoudi, 2019; Prin, 2021; Rousan & Merghmi, 2019; Thomas, 2021). This suggests that the CA approach would work well in a study based on authentic production data as the interactions may cover a range of contexts. Apart from that, according to Auer (1995), the CA approach can identify the ‘unmarked language’ of an interaction. ‘Unmarked language’ is a term coined specifically to refer to a language that is expected in a specific situation (MacSwan, 2020). Accordingly, if the unmarked language of an interaction is made up of one language, the interaction is likely to be in the monolingual mode or single/dual-language context. However, if the unmarked language consists of two languages, then it can be assumed that the interaction is in the bilingual mode or code-switching context. In this way, the CA approach can reveal if the interaction being studied is in the bilingual mode or code-switching context. At the same time, the CA approach can also reveal any changes in the mode or context throughout an exchange. As mentioned earlier, bilinguals can switch between modes within a single conversation (Grosjean, 2013). Similar observations have also been made about the single/dual-language context and the code-switching context (Green & Wei, 2014). By looking at the sequential development of an interaction, the CA approach can demonstrate that the interaction being studied is indeed in the bilingual mode or code-switching context which sets the stage for code-switching behaviours.

In addition, the CA approach allows individual instances of code-switching that occurred in an interaction to be identified in a systematic manner before the next phase of the study which will focus on analysing the code-switching that occurred. This is because the CA approach denotes that code-switching occurs when:

A language-of-interaction (base language, unmarked language), A, has been established; at a certain point, speaker 1 switches to language B; this new language choice is accepted by speaker 2 as the new language-of-interaction so that beyond the switching point, only B is used.

(Auer, 1995, p. 124)

Based on this definition, it is possible to systematically identify instances of code-switching in an interaction. Moreover, the definition for code-switching under the CA approach is also compatible with the definitions of code-switching under both the Language Mode framework and the Control Process Model. The code-switching that has been identified will not only facilitate the next phase of the study but it can also be analysed at this point to determine if they are discourse- or participant-related such as the examples provided above. This will help to provide further insights into the bilingual mode or code-switching context of an interaction in terms of whether it was brought about by discourse- or participant-related factors. Finally, if it was found that an interaction has multiple modes or contexts, the code-switching that has been identified can be quantified to show the difference between various modes or contexts which is similar to studies within the experimental paradigm. The various features of the CA approach to code-switching are summarised in Table 1 below.

TABLE 1. Features of the CA approach

Phase One	CA Approach to Code-switching
To establish the mode or context of the interaction being studied	<ul style="list-style-type: none"> <li><input type="checkbox"/> has been successfully applied in the study of code-switching in both formal and casual settings</li> <li><input type="checkbox"/> can identify the 'unmarked language' of an interaction</li> <li><input type="checkbox"/> can reveal any changes in the mode or context throughout an exchange</li> <li><input type="checkbox"/> allows individual instances of code-switching to be identified in a systematic manner</li> <li><input type="checkbox"/> the definition for code-switching is compatible with the definitions of code-switching under both the Language Mode framework and the Control Process Model</li> </ul>

In terms of analytical procedures, previous studies on code-switching under the CA paradigm were mostly based on real-life interactions gathered via digital recordings (Alvanoudi, 2019; Rousan & Merghmi, 2019). The interactions that have been captured were transcribed using transcription conventions developed under CA before they were analysed. In this sense, the CA approach will be able to fit into a study based on authentic production data without any issue as it is already equipped to work with naturalistic data. The only requirement is for the interactions in question to be captured clearly and in their entirety, preferably using audio or video recordings. In short, in a study on the interactional and psycholinguistic aspects of code-switching based on authentic production data, the CA approach to code-switching can be incorporated to account for the interactional aspect of code-switching, that is, the bilingual mode or code-switching context of the interaction being studied.

#### PHASE TWO: TRIGGERED CODE-SWITCHING AND PRIMED CODE-SWITCHING

In the second part of the study, the code-switching that occurred in the participants' speech will be analysed in relation to the psycholinguistic aspect. In a previous study based on the Language Mode framework, a high number of code switches in the bilingual mode was linked to the co-activation of languages (Grosjean, 2013). However, in a study of authentic interactions between bilingual individuals, it may not be possible to compare between modes or contexts. Instead, triggered code-switching and primed code-switching can act as the main analysis. This idea is largely based on the aforementioned Control Process Model (CPM). Under the CPM, for bilinguals in the code-switching context, both of their languages are activated and the languages are in a cooperative relationship. A cooperative relationship between languages allows for the control of

speech production mechanisms to pass from one language to another which results in code-switching (Green & Wei, 2014). This is the top-down processing of code-switching based on speaker intentions. At the same time, a cooperative relationship between languages also allows for bottom-up processing of code-switching via two different processes namely, triggering (Green & Wei, 2014) and priming (Green, 2018).

According to Clyne (2003), triggered code-switching is code-switching that occurred because of ‘trigger words’. Trigger words are words that are shared by different languages such as lexical transfers, proper nouns, and bilingual homophones. The use of these words in one language increases the activation of the other language that is not being used as the words belong to both languages. This results in items from that language being selected during the subsequent production, leading to code-switching. In the example below, the word ‘tennis’ which is a shared word between Croatian and English, triggered a switch from one language to the other (Clyne, 2003).

- *Imam puno zadaca I sutra mi igramo tennis... that’s about all*  
Translation: I have a lot of assignments and tomorrow we are playing tennis... that’s about all

From this example, it is clear how triggered code-switching can take place in the code-switching context when there is a co-activation of languages as a bottom-up, stimulus-based form of code-switching. As Green and Wei (2014, p. 504) explain, “where context licenses CS, temporary changes in item activation within the networks are likely to be a major factor influencing the likelihood of CS”. This suggests that triggered code-switching can be a sign of the co-activation of languages as well as the cooperative relationship between languages in the code-switching context. In other words, in order to reveal the psycholinguistic aspect of code-switching, it should be determined if any of the code-switching that occurred in the participants’ speech was due to triggering. In previous studies on triggered code-switching, trigger words in the production data were first identified using dictionaries or based on expert assessment (Broersma et al., 2019; Clyne, 2003). Following that, any code-switching that took place after a trigger word was identified as triggered code-switching. Similar procedures can be adapted for a study on the interactional and psycholinguistic aspects of code-switching based on authentic production data.

On the other hand, primed code-switching is when a code-switched utterance is likely to be followed by another code-switched utterance (Fricke & Kootstra, 2016; Gross et al., 2022; Xu, 2021). This is said to be due to leftover activation from having to process the earlier utterance. When a bilingual’s conversational partner uses code-switching in his or her speech, the bilingual will have to activate both languages to process and comprehend what was being said. With both languages highly activated for processing purposes, the bilingual will have the tendency to engage in code-switching during his or her own turn. Below is an example of primed code-switching between two speakers taken from a study on Spanish-English bilinguals by Fricke and Kootstra (2016).

- JEN: *Bueno, so, entonces, he says and the capitana.*
- JOC: He tells me that *la capitana* threw him under the bus.

*\*English translation was not provided for this example in the original article.*

This example shows that primed code-switching is another bottom-up, stimulus-based form of code-switching. In the code-switching context, whereby there is a co-activation of languages as well as a cooperative relationship between languages, additional activation from having to process a code-switched utterance may lead to the use of code-switching by a bilingual. As such, primed code-switching can also be a sign of the psycholinguistic factors behind code-switching. This means that the psycholinguistic aspect of code-switching can be revealed by investigating if any of the code-switching that occurred in the participants' speech was related to priming. In terms of procedures, in the study by Fricke and Kootstra (2016), if an instance of code-switching was preceded by another code-switched utterance, it was considered primed code-switching. Similar to the analysis for triggered code-switching, this can be easily adapted for a study on the interactional and psycholinguistic aspects of code-switching based on authentic production data.

Taken together, both triggered code-switching and primed code-switching can act as an indication of the psycholinguistic processes underlying the code-switching context in bilingual speech production. However, researchers have the option to explore both phenomena together or separately depending on the specific objectives of a study. The only difference is that the locus of analysis for triggered code-switching lies within the same turn that is, the word directly preceding an instance of code-switching, whereas for primed code-switching, it is in the preceding turn by the other participant in the interaction. More importantly, the analytical procedures for both phenomena do not require production data to be specially manipulated in any way other than full transcriptions. In this sense, the analysis for triggered code-switching and primed code-switching would also fit in well with the CA approach to code-switching suggested earlier. Thus, in a study on the interactional and psycholinguistic aspects of code-switching based on authentic production data, the psycholinguistic aspect of code-switching can be accounted for via triggered code-switching and primed code-switching.

## CONCLUSION

In conclusion, extensive research has been conducted on code-switching from the psycholinguistic perspective where code-switching is largely associated with the co-activation of languages during the process of speech production for bilinguals. Grosjean's Language Mode and Green's Control Process Model are two psycholinguistic frameworks on code-switching which also emphasise on the interactional factors behind code-switching. However, most of the related studies involved experimental data. In line with recent developments in psycholinguistics whereby there is an increasing call for the use of more authentic production data, studies in this area should aim to include data produced under naturalistic conditions as well.

This conceptual paper outlined how a study on the interactional and psycholinguistic factors behind code-switching based on authentic production data can be conducted. In particular, we propose that the study can incorporate the CA approach to code-switching as well as the concepts of triggered code-switching and primed code-switching as the methods for data analysis. The CA approach can account for the interactional factors behind code-switching while triggered and primed code-switching can account for the psycholinguistic factors. Nevertheless, actual studies are needed to assess whether these suggestions are feasible.

In particular, a similar conceptual framework is currently being utilised in a study on the code-switching practices of English teachers in Malaysian secondary classrooms by one of the authors. It is expected that such studies will be able to raise important points to further refine the suggestions brought forward in this conceptual paper.

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