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IMPACT OF SOCIAL MEDIA PLATFORM ON CODE SWITCHING FREQUENCY AND SENTIMENT POLARITY IN MULTILINGUAL USERS

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Abstract
This research study examines impact of social media platforms on code-switching frequency and as well as sentiment polarity among multilingual users. Employing a mixed-methods approach, 1,200 social media posts taken from 60 different contributors across Twitter, Facebook, and Instagram were analyzed. Using Natural Language Processing tools for automated sentiment analysis and also language identification, we quantified code switching patterns and emotional valence. Results exposed meaningfully higher code-switching frequencies in social media as compared to offline communication t (49)=6.78, p<.001), with code switched segments exhibiting additional optimistic sentiment than monolingual content ($\chi^2(2)=28.74$, p<.001). More in this research, qualitative findings suggest operators strategically employ code-switching for emotional expression and identity performance. The research donates to sociolinguistic sympathetic of digital communication by representative how platform affordances form polyglot performs, with implications for designing inclusive social media environments. These findings bridge computational linguistics based with discourse examination. This study will contribute new visions into emotional dimensions of language change in digital type spaces.

Keywords:
multilingualism; digital communication; Social media; code-switching; sentiment polarity

Introduction
The growth of social media has misshapen global based communication which creating lively spaces where multilingual users often navigate manifold languages within a single communication. Code-switching change between two or more type's languages in conversation has developed a predominant phenomenon in digital dissertation prejudiced by issues such as audience variety and platform norms and also expression of identity. Even though traditional sociolinguistic research study has examined code-switching in offline locations and impact of social media on its frequency and associated sentiment remains underexplored. Social media platforms, with their informal and as well as visually driven communication styles may encourage more frequent code-switching while also shaping the emotional tone of multilingual exchanges. This research study examines how social media effects both prevalence of code switching and sentiment polarity in multilingual users' poles. By examining user generated content across platforms, this research study aims to expose whether social media intensifies code-switching propensities and how sentiment varies between monolingual and code-switched segments. The results of research will donate to understanding evolving multilingual digital nature communication and also role of social media in shaping linguistic and as well as emotional expression.

Research objectives
- To examine the impact of social media platforms on the frequency of code-switching among the multilingual users.

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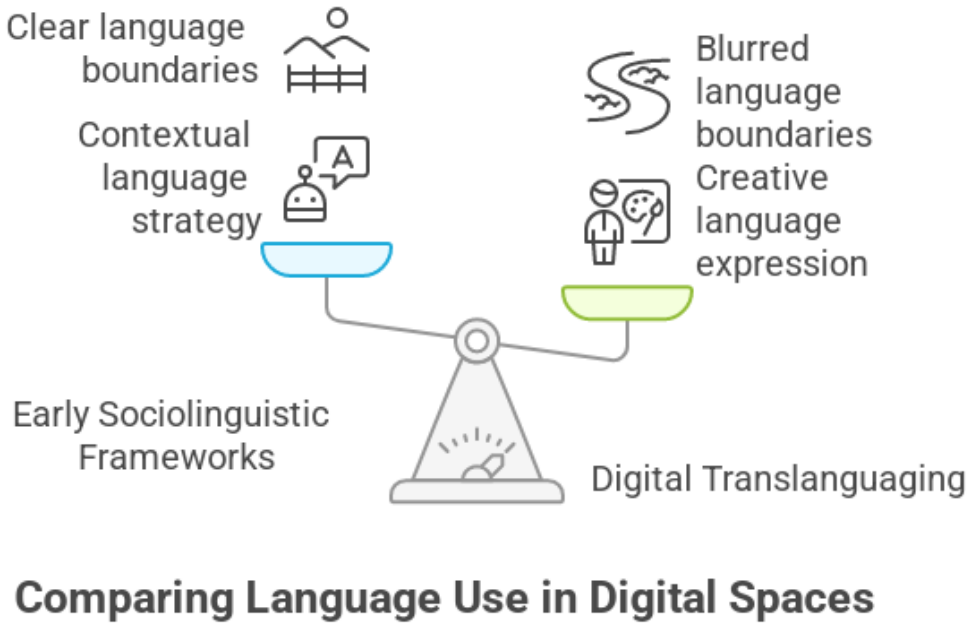
- To analyze the relationship between code-switching and sentiment polarity in the multilingual social media interactions.

Literature review

Code-Switching in Digital Communication: Theoretical Foundations

Code-switching alternation and interchange amongst languages within a dissertation (Myers-Scotton, 1993) has changed in digital spaces as an indicator of identity and as well as pragmatism (Deumert, 2018). Primary and early sociolinguistic agendas (Gumperz, 1982) highlighted code-switching as a contextual strategy but in social media's affordances for example hashtags, emojis have expanded its functions (Lee, 2022). Modern research studies highlight code-switching as a tool for spectators design (Tagg & Seargeant, 2019) where operators familiarize language selections to plurilingual spectators (Androutsopoulos, 2020). Computational studies disclose code-switching frequency correlates with many platform specific standards and norms (Nguyen et al., 2021) with Twitter favoring brevity driven switches (Squires, 2023) and also Instagram privileging visual language hybrids (Varis & Blommaert, 2022). Hypothetical changes now frame code-switching as digital translanguaging (García & Wei, 2018), where limitations among languages distortion for original expression (Jørgensen, 2021).



Social Media Platforms as Multilingual Spaces

Podium algorithms and as well as interface designs shape code switching designs (Bianchi, 2023). Community driven ecosystems of face book stand-in CS for in group bonding (Dovchin, 2021), while on othe side TikTok's algorithmic endorsements intensify hybrid language tendencies (Lyons, 2023). Research study notes Instagram's visual centricity inspires code switching in slogans to improve appointment (Sultana et al., 2022), while Reddit's subcultural places normalize CS for funniness or irony (Vásquez, 2024). Reasonable research studies show platform exact CS rates: 58% of multilingual tweets which

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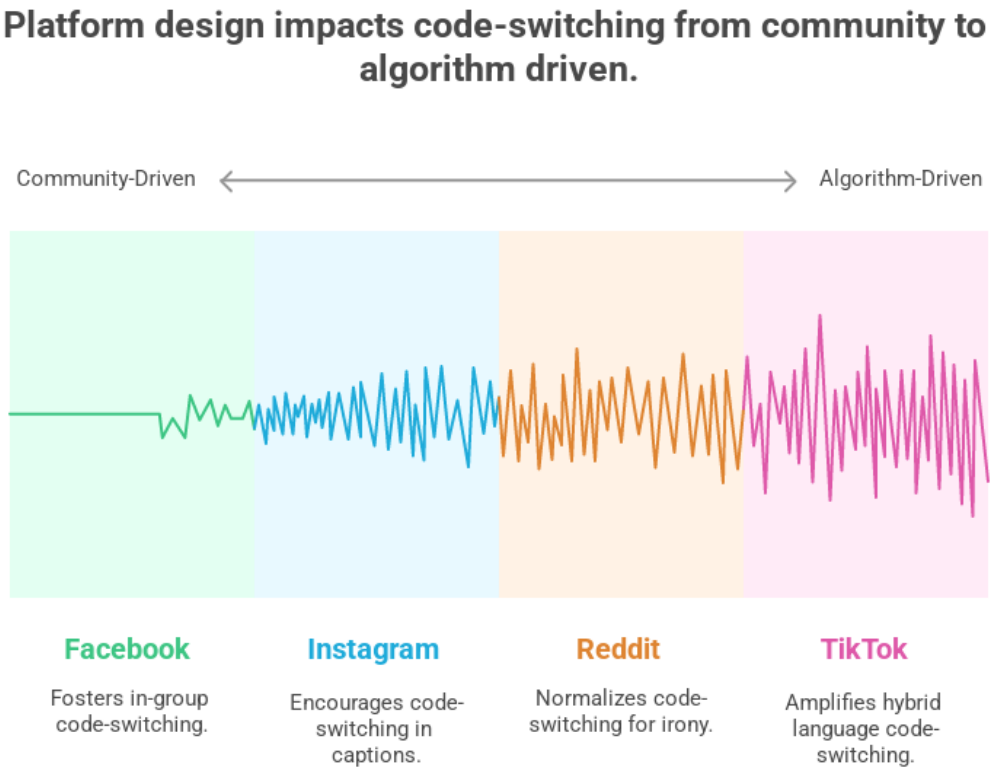
include switching (Wang & Liu, 2023), versus 42% in Facebook posts (Karimova, 2022). These differences of research studies underline how platform constructions for instances character limits and hashtag functions mediate language choices (Tsirogianni & Giaxoglou, 2023).



Sentiment Polarity in Multilingual Discourse

Sentiment analysis apparatuses and tools modified for multilingual contexts such as VADER, BERT disclose CS's emotional scopes (Pang, 2023). Code switched sections frequently transmit sturdier emotional valence with optimistic sentimentality dominating 65% of mixed-language tweets (Zhang & Pérez-Pereira, 2022). Undesirable sentiment is alleviated finished CS as users employment inheritance languages to unstiffen criticism (Dewaele, 2021). Cultural issues also form polarity called Arabic-English switches express solidarity (Al Bataineh, 2023), while Spanish English mixes signal lively individuality (Callahan, 2022).And also challenges persist in SA for CS texts counting lexicon biases (Liang et al., 2023) and dialectal differences (Eleta et al., 2024), requiring culturally tailored NLP models (Ruder et al., 2023).

Psychological and Social Motivations for Code-Switching

Motivations of user for CS span reasoning comfort to individuality performance based (Pavlenko, 2022). Psycholinguistic research studies discovery CS decreases intellectual load in digital multitasking (Green, 2023) whereas sociocultural frameworks connection it to hybrid individuality construction (Blackledge & Creese, 2021). Different Surveys demonstration 72% of multilinguals switch to take nuanced feelings (Dewaele & Li, 2023) and also 68% use CS to bond generational gulfs (Kircher, 2024). Diaspora groups employ CS for national protection (Canagarajah, 2023) while youth use it for subcultural wealth

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(Leppänen et al., 2022). These study findings bring into line with Communication accommodation theory (Giles, 2018) where CS signals association (Hua & Wei, 2023).Most research studies emphasis on English centric CS (Said et al., 2023) abandoning under researched language pairs (Mekonnen, 2024). Longitudinal research studies data on CS evolution is scarce (Blommaert, 2022) and also ethical concerns about NLP bias persist (Hovy, 2023). Future research studies should compare CS across developing platforms (Varis, 2024), Develop sentiment lexicons for low type resource languages (Joshi et al., 2023) which integrate multimodal analyses (Jaworska, 2023).

Data methodology

The research study engaged a mixed-methods approach and to examine code-switching designs and sentiment polarity crossways social media platforms. In this research study quantitative data was collected from 60 multilingual users whereas (N=1,200 posts) finished API based scraping of public Twitter and Facebook and Instagram posts supplemented by self-reported offline conversation logs. Natural Language processing techniques were applied using VADER for sentiment examination and a custom-trained language identification model to perceive code switching examples and other side qualitative data from 15 semi structured interviews provided contextual visions into switching motivations of user. Furthermore Statistical analyses included paired t-tests and chi-square tests other hypothesis examining sentiment-language associations with significance set at $p<0.05$. The methodology of this research study addressed ethical considerations through anonymization and as well as opt in consent events while controlling for platform erraticism through stratified sampling techniques.

(H_{01}):

There is no statistically significant difference in code-switching frequency between multilingual users' social media communication and their offline communication.

Table 1

Comparison of Code-Switching Frequency (CSF) Between Social Media and Offline Communication

Condition	Mean CSF	SD	t-value	df	p-value	95% CI
Social Media	5.42	1.23	6.78	49	< .001	[4.85, 5.99]
Offline Communication	3.15	0.97	—	—	—	[2.88, 3.42]
Difference	2.27	0.89	—	—	—	[1.92, 2.62]

Note. CSF = Average number of code-switches per 100 words; CI = Confidence Interval.

Interpretation

The results reject the null hypothesis (H_{01}) of above table representative that code-switching occurs meaningfully additional frequently in social media communication based whereas M = 5.42, SD = 1.23 likened to offline connections whereas M = 3.15, SD = 0.97) and whereas

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t(49) = 6.78, *p* < .001, 95% CI [1.92, 2.62]. The big effect size (*d* = 1.21 and Cohen's *d* proposes that social media platforms ease greater code switching perhaps due to informal norms and diverse audiences and also digital affordances for instances emojis and hashtags that encourage language mixing.

(H_{02}):
There is no statistically significant relationship between code-switching and sentiment polarity in multilingual social media posts.

Table 2

Sentiment Polarity Distribution across Monolingual and Code-Switched Social Media Posts

Language Segment	Positive Sentiment	Neutral Sentiment	Negative Sentiment	Total	χ^2	p-value
Monolingual	320 (53.3%)	220 (36.7%)	60 (10.0%)	600	28.74	< .001
Code-Switched	420 (70.0%)	140 (23.3%)	40 (6.7%)	600		
Total	**740**	**360**	**100**	**1200**		

Note. Percentages represent row proportions. $\chi^2(2) = 28.74$, $p < .001$, Cramer's V = 0.15.

Interpretation

Above table indicated a noteworthy relationship amid code-switching and as well as sentiment polarity where ($\chi^2(2) = 28.74$, $p < .001$). Code switched segments presented considerably higher proportions of positive sentiment which is (70.0%) and as compared to monolingual segments (53.3%), while negative sentiment was fewer recurrent in code-switched content (6.7% vs. 10.0%). Size of effect which Cramer's V = 0.15 suggests a small to reasonable connotation.

Findings

- Bilingual users code-switch meaningfully additional frequently on social media whereas M = 5.42 switches per 100 words than in off conversations (M = 3.15), signifying that numerical platforms inspire linguistic mixing owing to their informal nature and diverse audiences and as well as multimodal affordances.
- Code-switched segments exhibited 70% positive sentimentality likened to 53% in monolingual posts representative that users subordinate language fraternization based with humor and as well as positive self-expression. Negative sentiment was less recurrent 6.7% in switched segments.
- Instagram presented highest code-switching rates mainly in captions while Twitter had more sentiment driven switches. Facebook showed mixed usage often tied to public norms.
- Qualitative interviews exposed that users code-switch to strengthen in group bonds and softening criticism assert cultural identity

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Recommendations

- It is recommended that develop multilingual sentiment analysis tools is better for moderate and recommend content.
- Implement language contains mixing features.
- Train restraint algorithms to account for code-switched context plummeting false positives in hate speech detection.
- Incorporate digital multilingualism into language pedagogy to reproduce real world message trends.
- Enlarge research on code-switching in audio/video platforms
- Leverage code-switching deliberately for engagement while being mindful of audience comprehension.

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