DEPARTMENT of PSYCHOLOGY

The Relation between Switching Languages and Perceived Personality Change: A Comparative Study of Bilinguals and Monolinguals

Josephine Ahrendt
Miriam Nicolai

Master's Thesis (30 hp)
Spring 2023

CrediT author statement
Josephine Ahrendt: Conceptualization, Methodology, Formal analysis, Investigation, Writing, Visualization. **Miriam Nicolai**: Conceptualization, Methodology, Formal analysis, Investigation, Writing, Visualization.

Supervisor: Petri Kajonius

Abstract

With increasing bilingualism, it becomes vital to understand the relation of language to personality. Language is essential for expressing our thoughts, and personality impacts our thoughts and behavior. This study investigates the extent of a perceived personality change when switching between languages and its connection with participants' cultural and language backgrounds and personality profiles by comparing bilinguals with monolinguals. N = 199 participants completed a Perceived Personality Change Questionnaire (PPCQ) and the HEXACO Personality Inventory-Revised (PI-R). To evaluate the extent of perceived change, two MANOVAs with bilingual/monolingual as independent and the PPCQ and specific personality items as dependent variables were conducted. A Pearson correlation between the HEXACO PI-R scores and the PPCQ assessed the relationship between participants' personality profiles and perceived change. The results show that overall, participants perceive a small personality change while bilinguals indicated a larger change than monolinguals with a medium effect size ($r = -.33$). The personality dimensions honesty-humility, emotionality, and openness to experience are correlated with interlocutor and conversation. These results suggest that switching languages and perceived personality changes interact with cultural and language backgrounds. Due to implications during intercultural interactions, this could impact how practitioners work with bilinguals. Understanding diverse expressions of personality in practice could facilitate effective communication and highlight the importance of developing intervention strategies that acknowledge the complex relationship between language, personality, and cultural factors.

Keywords: bilingualism, language switch, perceived personality change, HEXACO Personality Inventory-Revised

The Relation between Switching Languages and Perceived Personality Change: A Comparative Study of Bilinguals and Monolinguals

Our lives are shaped by the interwoven relationship between personality and language since personality affects our thoughts and behavior, and language allows individuals to communicate and interact with their environment. With increasing global interrelation, speaking multiple languages has become indispensable. Although many bilinguals report experiencing a change in their personality when speaking different languages, research has not provided conclusive evidence of an actual change (Chen & Bond, 2010; Huang et al., 2022; Ramírez-Esparza et al., 2006). It is argued that bilinguals only perceive a change instead of having an actual personality alteration (Fabbro et al., 2020; Mijatovic & Tytus, 2019). The perceived change could be influenced by cultural adaptation, the contexts in which languages are used, and the personality traits agreeableness, extraversion, and openness to experience (Ożańska-Ponikwia, 2012; Wilson, 2008). Due to previous inconsistent results and the increasing prevalence of individuals proficient in multiple languages (proficient monolinguals), the phenomenon of perceived personality changes when switching languages remains an area of interest in personality psychology. Thus, the research question being raised is: To what extent is switching between languages related to a perceived change in personality among monolingual and bilingual individuals? By investigating whether individuals perceive a personality change and its relation to specific personality traits, the study can contribute to understanding the connection between language and personality and, consequently, its implications for communication and interaction in today's globalized world.

Perceived personality change

Many individuals report perceiving a personality change when switching between languages. Personality attributes to certain characteristics and behavior that influence a person's interests, thoughts, and first and foremost their behavior (APA, 2023). Personality traits depend, to a large extent, on genetic heritage (Kajonius & Giolla, 2017) and are moderately consistent over time (Allport, 1961; Roberts & DelVecchio, 2000). This contradicts the self-reports of multilingual individuals that indicate perceived changes in personality when switching between languages. However, actual differences between personality in two languages were either not present or weak when letting bilinguals complete a Big Five personality questionnaire in both of their native languages respectively (Chen & Bond, 2010; Huang et al., 2022; Ramírez-Esparza et

al., 2006). This highlights the need to explore the perception of a personality change instead of measuring an actual change, as other factors may influence the perceived change when switching between languages.

The perception of change in one's personality can be influenced by several factors, including the context in which languages are used and cultural adaptation (Fabbro et al., 2020; Grosjean, 2015). Thus, studying self-perception of personality changes in multilingual individuals can help gain a better understanding of how language use and cultural adaptation may impact one's perception of personality. Additionally, perceived personality changes in bilingual individuals have been linked to specific personality traits such as agreeableness, extraversion, openness to experience, and high emotionality (Mijatovic & Tytus, 2019; Ożańska-Ponikwia, 2012; Wilson, 2008). Further exploration of this topic has the potential to offer valuable insights to individuals who frequently interact across diverse cultural and linguistic contexts and can enhance our comprehension of how various factors shape personality.

Language context and cultural adaptation

Utilizing one language predominantly in, for instance, academic settings and the other with family may elicit perceiving a change in one's personality. This can be attributed to the capacity of language to elicit diverse meanings, emotions, and memories that are connected to distinct social contexts (Fabbro et al., 2020). Bilingual individuals have reported experiencing personality changes while conversing with interlocutors in different languages (Chen & Bond, 2010; Fabbro et al., 2020). Socio-linguistic factors such as the complexity of vocabulary and cultural associations evoked during language use could be responsible for this. Furthermore, the extent of one's vocabulary can impact the perception of personality (Panicacci & Dewaele, 2017). Individuals with lower proficiency in their second language (L2) may feel less confident and extroverted when speaking, leading to a different perception of their personality.

The Complementary Principle (CP) provides a theoretical explanation for the perceived personality change based on language use. Language development is proposed to depend on the purpose, the interlocutors with whom it is spoken, and the degree of necessity (Grosjean, 1985). Consequently, if a language is never used in a specific context or to a significant extent, the linguistic abilities developed for that context will not be produced (Grosjean, 2016). This may result in feeling more restricted in one language than the other and subsequently perceiving a difference in personality between languages.

Cultural adaptation while speaking a language may also impact the magnitude and disparity of personality changes experienced by monolinguals and bilinguals. The theory of Cultural Frame Switching (CFS) proposes that language is inseparable from culture. This implies that a person's behavior when speaking a language is influenced by cultural norms, attitudes, and traditions connected to that language (Ramírez-Esparza et al., 2006). Bilinguals who exhibited personality changes also reported shifts in values and attitudes connected to the culture of their respective languages when switching between them (Mijatovic & Tytus, 2019; Ramirez-Esparza et al., 2006; Rezapour & Zanjirani, 2020). Thus, it is proposed that the socio-cultural environment in which a language is employed can activate culturally-bound beliefs and values that can shape one's behavior, potentially resulting in a perceived change of personality across languages.

Personality traits

Understanding the role of personality traits in shaping behavior across different languages can provide insights into how individuals may adapt their behavior when switching between languages and cultures in various domains, such as occupational performance. For instance, high conscientiousness levels positively influenced academic and work performance (Bakker et al., 2012). In this regard, certain personality traits may influence the perception of personality changes. For example, higher levels of extraversion were associated with a lower likelihood of perceiving a personality change (Wilson, 2008), while higher levels of agreeableness were positively correlated with change (Mijatovic & Tytus, 2019; Ożańska-Ponikwia, 2012; Wilson, 2008). Personality research has traditionally focused on the Big Five personality model, which does not assess specific personality dimensions such as emotionality. However, recent studies suggest that individuals with higher emotionality scores may be more sensitive to personality changes than those with lower emotionality scores (Dewaele, 2016; Ożańska-Ponikwia, 2012). Nevertheless, emotional intelligence received more attention than the trait emotionality in personality research. Consequently, a more differentiated personality profile should yield a more detailed picture of the participants' personality, particularly in the emotionality and agreeableness dimension. Thus, the current study implements the HEXACO personality inventory, which provides a more comprehensive assessment of emotionality and agreeableness, along with the inclusion of the sixth dimension, honesty-humility (Ashton & Lee, 2007).

Differences between monolinguals and bilinguals

The perception of a personality change is not limited to those who grew up as bilinguals. Monolingual individuals with high proficiency in two languages also reported personality changes when switching between different languages (Benet-Martinez et al., 2002). This phenomenon could be influenced by cultural and linguistic factors, as described in the theories of CFS and CP. Monolingual individuals living abroad, such as international students, could also adapt to cultural contexts, leading to a perceived personality change when switching languages. Nevertheless, growing up with two native languages can uniquely shape an individual's cognition, perception, and identity, leading to deeper integration of linguistic and cultural norms in bilinguals (Grosjean, 2015). Hence, switching languages may involve a more considerable adjustment in cognitive and behavioral patterns in bilingual individuals, potentially leading to a larger perceived change compared to monolinguals. However, this remains unclear, and thus, investigating the concern can help individuals to understand cultural diversity and improve their ability to communicate with individuals from different cultural and linguistic backgrounds.

Present study

The study aims to investigate whether individuals perceive a personality change when switching between languages, comparing monolinguals and bilinguals, and whether certain personality traits influence this perception. Previous research showed inconsistent results, prompting the focus on the perception of personality changes rather than actual changes. This could have practical implications for individuals navigating diverse cultural contexts, as adapting to a language involves adjusting to its linguistic structures and cultural norms. This knowledge is crucial in today's globalized world, where bilingualism is increasingly common, and many individuals learn additional languages later in life. Therefore, the study explores differences in perceived changes between monolinguals and bilinguals. Participants are expected to perceive a significant personality change, with bilinguals reporting a larger change than monolinguals. Applying the HEXACO Personality Inventory-Revised (PI-R) provides a unique approach to assessing a perceived personality change. Based on previous research, agreeableness, extraversion, openness to experience, and emotionality are expected to be associated with a perceived personality change.

Methods

Participants

A total of 199 individuals completed the entire study, including 152 females, 44 males, and 3 non-binary participants. The ages ranged from 18 to 60 years, averaging 26.18 years ($M =$ 26.18, $SD =$ 7.08). 59% of the participants were students, 37% were employed, and 4% indicated "other" as their occupation. Participants were grouped by their native language proficiency. Overall, 95 bilingual and 104 monolingual individuals participated in the study. Bilingual participants were required to speak two native languages at an equally high proficiency level and utilize both in their daily lives. Monolingual participants were required to speak at least one language at a high proficiency level in addition to their native language (e.g., English as a second language acquired in school). Approximately 47.2% of all participants originate from Germany, while the rest represents a diverse range of origins. Most participants (39.7%) resided in Germany, and 26.6% indicated Sweden as their country of residence. 49.3% of all participants reported German as their first language, and 72.3% specified English as their second language. All socio-demographic characteristics are presented in Table 1 in Appendix A.

Procedure

Convenience sampling was used to recruit participants by uploading the survey to the online platforms SurveySwap, Poll Pool, and SurveyCircle, as well as the social media platforms Instagram, Facebook, and LinkedIn. Participants could access the online survey via a provided link directing them to the Qualtrics questionnaire (Qualtrics software, version March 2023). The entire survey took approximately 15 minutes to complete and was conducted in English to ensure the generalizability of the study by including participants regardless of their languages. Hence, it was required to speak English at a high proficiency level. First, relevant information about the survey and ethics was presented, followed by demographic questions and the questionnaires as stated in the material section. Upon completion, participants could close the questionnaire and their data was saved automatically.

Materials

A questionnaire study with the software Qualtrics (Qualtrics software, version March 2023) was conducted to increase the feasibility of obtaining a large and diverse sample in a geographically dispersed population for better generalizability. The entire questionnaire can be found in Appendix B.

Descriptive information

  The demographic questions included gender, age, highest educational level, occupation, country of origin, and residence. Both country of origin and residence were inquired to understand how many participants lived abroad and emerged into another culture.

Perceived personality change

  Perceived personality change questionnaire. The authors created a 17-item Perceived Personality Change Questionnaire (PPCQ; $\alpha = .95$) using a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely) to assess the perceived personality change when switching languages. The items were grouped into four subcategories: culture ($\alpha = .61$), context ($\alpha = .76$), interlocutor ($\alpha = .77$), and conversation ($\alpha = .90$). For the subcategory culture, an example question was "To what extent do you feel a personality change when speaking your languages in an associated culture?". For context, among others, it was inquired, "I feel a change when traveling to another country". An example item for the subcategory interlocutor was "I feel a change when talking to my family/friends". An example question of the subcategory conversation was "I feel a change when switching between my languages within a single conversation".

  Single-item measurement. The perceived personality change was additionally assessed with a single-item measurement. The question "To what extent do you feel a personality change when you switch between your languages?" was evaluated to test whether a perceived change occurs merely by switching languages. Notably, single-item measurements can be reliable and valid (Robins et al., 2001).

  Personality items. Differences in participants' confidence, humor, emotionality, honesty, insecurity, extraversion, and openness to new experiences between their L1 and L2 were evaluated with 7 items using a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely). An example item was: "How confident would you rate yourself in both of your languages?" The measurement of specific personality items was conducted with the purpose of testing whether participants perceived changes not in overall personality dimensions but rather in specific personality items. The aim was also to investigate whether traits such as confidence or humor were related to language proficiency in bilingual and monolingual participants.

Personality profile

The short form of the HEXACO Personality Inventory-Revised (HEXACO PI-R; 60 items) was used in order to assess the personality dimensions honesty-humility ($\alpha = .76$), emotionality ($\alpha = .76$), extraversion ($\alpha = .85$), agreeableness ($\alpha = .65$), conscientiousness ($\alpha = .76$), and openness to experience ($\alpha = .76$) with a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree; Ashton & Lee, 2009).

Language background

All participants indicated their (first) native language and their second (native) language. Even if participants were multilingual, only L1 and L2 were included for the feasibility of the study and given that individuals reported changes predominantly in their first two languages (Dewaele & Nakano, 2013). A self-measurement scale, adapted from the Language Experience and Proficiency Questionnaire (LEAP-Q; Marian et al., 2007), with the item "How do you rate yourself in speaking, listening, reading, and writing?" for both languages measured using a 5-point Likert scale ranging from 1 (poor) to 5 (excellent) evaluated the participants' language skills (L1: $\alpha = .88$, L2: $\alpha = .75$). They were also asked about their frequency of use of each language.

In addition, they were asked about their use of informal, formal, academic, and business vocabulary in each language with a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely). An example question was "To what extent does your vocabulary (the kind of words you use) differ between your languages?". Additionally, it was examined to what extent participants discussed personal matters, professional matters, and everyday life in their two languages.

To determine the extent of the participants' exposure to the cultures connected to their two languages, 3 questions using a 5-point Likert scale ranging from 1 (not at all) to 5 (always) were included, such as "How familiar are you with the traditions/customs of a culture connected to your different languages?".

Study design

The study employed a between-group design, with perceived personality change as the dependent variable and bilingual/monolingual as the independent variable. Furthermore, a within-group design was utilized to analyze the impact of an individual's personality profile on

their perception of personality change when switching languages, assessed by the HEXACO PI-R.

Data Analysis

The statistical program IBM SPSS Statistics (version 28) was employed to analyze the results. Descriptive statistics were utilized to present demographic data and information regarding the language and cultural background of the participants. Out of 251 participants, 62 were excluded due to incompletion of the questionnaire, reducing the sample size to 199.

GPower analysis

A GPower analysis was conducted to determine a sufficient number of participants for reaching a middle effect size with a significance level of $\alpha < .05$ (Faul et al., 2009; version 3.1). A minimum of 88 participants was required in both the bilingual and monolingual group for a statistically relevant multivariate analysis of variance (MANOVA) with bilingual/monolingual as the independent grouping variable and the PPCQ and the single-item measurement as dependent variables. To reach a middle effect size for a Pearson correlation (significance level of $\alpha < .05$), a total sample size of 115 was needed.

Perception of change

To investigate whether participants perceived a personality change when switching between languages, the mean of the 5-point Likert scale of the single-item measurement "To what extent do you feel a change in personality when you switch between your languages?" was calculated. The data was not normally distributed, therefore, a one-sample Wilcoxon Signed Rank Test was conducted. The statistical method determined whether the sample median, which was set to 3 (median of the scale 1-5), differed significantly from the median value to the answer to the main question of personality change. A second one-sample Wilcoxon Signed Rank Test was also conducted for the PPCQ.

Secondly, to evaluate the relation of bilingualism to perceiving a personality change, a MANOVA was performed. Bilingual/monolingual served as the independent variable, while the single-item measure of personality change and the PPCQ score were treated as dependent variables. For significant results, a post-hoc, independent sample t-test was conducted to test the difference in perceiving a personality change between the monolingual and bilingual participants.

Thirdly, a second MANOVA was conducted to examine whether being bilingual is connected to the perception of specific personality items. Bilingual/monolingual was the independent variable, while the scores of the items confident, humorous, emotional, honest, insecure, extravert, and openness to new experiences in L1 and L2 respectively were the dependent variables. Independent sample t-tests were computed to confirm the results of the MANOVA.

Personality traits measurements

Further, the participants' personality profile was assessed with the HEXACO PI-R to understand whether participants scoring high on specific dimensions of the personality questionnaire perceived a greater change than individuals scoring lower on that dimension. The personality profile for each participant was calculated with the mean scores for each of the six HEXACO PI-R dimensions. To assess the relationship between the participants' personality and the perceived personality change, a Pearson correlation coefficient between all HEXACO PI-R personality traits, the single-item measurement, the overall PPCQ scores, and the scores of its subcategories interlocutor, context, conversation, and culture was computed.

To test whether the collected data fit the HEXACO PI-R, a first-order confirmatory factor analysis (CFA) was conducted using the lavaan package of the statistical program RStudio, version 2023.03.0+386. The goodness of fit indices were used to evaluate the model, such as the comparative fit index (CFI), the Tucker-Lewis Index (TLI), and the root mean square error of approximation (RMSEA). The results of the CFA can be found in Appendix C.

Language usage and cultural background

To assess the language use of each participant, descriptive tables for the differences in the use of vocabulary and the context in which they use their languages for L1 and L2 respectively were created. Independent sample t-tests for proficiency in each language, frequency of use, the extent of differing vocabulary use, and the discussion of different topics were computed to compare monolinguals with bilinguals.

Furthermore, to evaluate to what extent the participants were exposed to the cultures of their respective languages, independent sample t-tests for familiarity with traditions, exposure to culture, and their participation in cultural traditions, were computed to compare monolinguals and bilinguals in both languages.

Ethical consideration

The study was conducted as part of the Master's program at the Department of Psychology and followed the given regulations and guidelines of ethical consideration. All participants were informed about the anonymity of their data. Furthermore, the data was stored securely with no identifiable information. The participants were informed about their right to withdraw from the study at any time and that there were no negative consequences to their participation in the study. Each participant had to declare consent, otherwise, participation was not possible.

<div align="center">

Results

</div>

Perception of change

The outcome of the single-item measurement showed a "somewhat" perceived personality change when switching between languages on a 5-point Likert scale ranging from "not at all" to "extremely" ($M = 2.69$, $N = 199$), measuring the scores of both monolingual and bilingual participants. The one-sample Wilcoxon Signed Rank Test indicated that the median was significantly different from 3 ($z = -3.23$, $p < .001$), with a small effect size ($r = .21$). Another one-sample Wilcoxon Signed Rank Test with the overall scores of the PPCQ ($M = 2.75$) indicated a significant difference between the sample median and the specified value of 3 ($z = -4.59$, $p < .001$) with a medium effect size ($r = -.33$). Thus, it can be concluded that participants overall perceive a small personality change when switching between languages.

Comparing bilinguals with monolinguals, the MANOVA, with the independent variable bilingual/monolingual and the dependent variables single-item measurement and PPCQ, showed that bilingualism significantly affected perceiving a personality change when switching between languages ($F(2, 196) = 4.83$, $p = .009$). However, only the PPCQ showed a significant effect of bilingualism ($p = .003$), whereas the single-item measurement was only almost significant ($p = .051$). A post-hoc t-test confirmed a significant difference between the groups ($M\_monolingual = 2.52$, $SD = 0.78$; $M\_bilingual = 2.87$, $SD = 0.89$; $t(197) = 2.98$, $p = .003$) and indicated that bilingual participants perceive a larger personality change when switching between their languages than monolinguals.

Rating personality items

The second MANOVA with the participants' ratings of their confidence, humor, emotionality, honesty, insecurity, extraversion, and openness to new experiences in L1 and L2 as

the dependent variables and the independent variable bilingual/monolingual showed a significant effect of bilingualism (Pillai's Trace = .13, $F(12, 183) = 2.19$, $p = .014$). The effect size estimates showed a small effect ($\eta^2 = .008$). The observed power was .94 ($N = 199$, $\alpha < .05$).

Independent samples t-tests were computed as post-hoc tests, which confirmed the significant difference between monolinguals and bilinguals. Overall, monolinguals differed significantly from bilinguals in their perception of the personality items in L2 ($M\_bilingual = 3.77$, $SD = 0.58$; $M\_monolingual = 3.54$, $SD = 0.56$; $t(197) = 2.92$, $p = .002$, Cohen's $d = 0.57$). Bilinguals scored significantly higher on being extraverted and humorous in L2 than monolinguals. For L1, there was no significant difference between the groups in extraversion. However, a difference existed in L2, which indicated that monolinguals feel more extraverted in their L1 than in L2. Also, monolinguals showed a large difference between being confident in L1 and L2, whereas bilinguals only differed slightly between L1 and L2. The results are presented in Table 1.

Table 1.

Independent sample t-tests for personality items scores of monolinguals and bilinguals in their first and second language

Variables	Bilinguals		Monolinguals		t	p	Cohen's d
	M	SD	M	SD			
Confident L1	4.42	0.81	4.72	0.60	-2.96	**.00****	0.71
Confident L2	4.04	0.87	3.95	0.87	0.71	.48	0.90
Humorous L1	4.05	0.95	4.20	0.78	-1.38	.17	0.86
Humorous L2	3.81	0.90	3.38	0.97	3.28	**.00****	0.97
Emotional L1	3.88	1.10	4.02	0.97	-0.92	.36	1.03
Emotional L2	3.78	1.03	3.50	1.02	1.88	.06	1.05
Honest L1	4.42	0.81	4.45	0.61	-1.17	.25	0.71
Honest L2	4.27	0.89	4.16	0.89	0.87	.39	0.89
Insecure L1	2.45	1.37	2.11	1.18	1.91	.06	1.27
Insecure L2	2.73	1.17	2.50	0.99	1.48	.14	1.08
Extraverted L1	3.63	1.19	3.46	1.15	1.03	.31	1.17
Extraverted L2	3.66	1.16	3.27	1.15	2.40	**.02***	1.16
Open to experience L1	4.07	1.01	4.05	0.86	0.19	.85	0.94

Open to experience L2	4.13	1.03	4.03	0.92	0.70	.48	0.98

Note. Ratings of the participants' scores of the personality items ranged from 1 = "not at all" to 5 = "extremely". *M* = Mean, *SD* = Standard Deviation.

*indicates a significance level of *p* < .05.

** indicates a significance level of *p* < .001.

Personality dimensions

Table 2 displays the Pearson correlation results that show the relationship between the HEXACO personality traits and the PPCQ score and its subcategories: interlocutor, context, culture, and conversation. There was a negative correlation between interlocutor and honesty-humility ($r(197) = -.17$, $p = .02$), indicating that the more honest an individual is, the less of a change they perceive. Emotionality was positively correlated with interlocutor ($r(197) = .15$, $p = .04$), suggesting that individuals with higher levels of emotionality are more likely to perceive a change. Further, the results indicated a positive correlation between conversation and openness to experience ($r(194) = .15$, $p = .03$), indicating that participants who are more open to experience reported a larger change in their personality when switching languages during a conversation.

Table 2.

Pearson correlation between variables of perception of change and personality dimensions

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Honesty-humility	-										
2. Emotionality	.86	-									
3. Extraversion	.17	-.11	-								
4. Agreeableness	.28	-.22	.06	-							
5. Conscientiousness	.26	.01	.13	.13	-						
6. Openness to experience	.16	-.05	.04	.11	.10	-					
7. PPCQ	-.11	.14	-.06	-.03	.00	.12	-				
8. Interlocutor	**-.17***	**.15***	.08	-.02	-.03	.11	.84	-			
9. Context	-.09	.11	-.02	.04	.03	.10	.83	.65	-		
10. Culture	-.09	.09	.03	-.07	-.09	.01	.65	.50	.46	-	

| 11. Conversation | -.09 | .08 | -.07 | .02 | .06 | **.15*** | .82 | .67 | .61 | .44 | - |

Note. Variables 1-6 are dimensions of the HEXACO model. Variables 8-11 are the Perceived Personality Change Questionnaire (PPCQ) subcategories.

* correlation is significant at *p* < .05 level (2-tailed).

Language usage and cultural background

Bilingual participants indicated a higher language proficiency in their L2 than monolinguals (*t*(197) = 3.49, *p* < .001). Nevertheless, both groups use each language on a high-frequency level (see Table 3). Personal, professional, and everyday matters were reported to be discussed from a moderate to a high extent in both languages. However, L1 is used more frequently in all categories than L2 in both groups. The language usage of monolingual and bilingual participants is presented in Table 3.

The t-test, measuring the difference in vocabulary usage in L1 and L2 in both groups, was not significant (*t*(197) = 0.15, *p* = .88). However, considering the descriptive statistics, bilingual and monolingual participants use different vocabulary in their languages (see Table 1 in Appendix D). 70.2% of monolinguals indicated that they use their second language for academic purposes, whereas only 65.4% use academic vocabulary in their first language. Bilinguals indicated a similar level of usage for their vocabulary in both their languages, whereas the difference in vocabulary use between L1 and L2 was higher for monolinguals. The descriptive statistics analysis further demonstrated that 61.5% of monolingual participants reported frequent or constant usage of their L2 within their country of residence, while an additional 25.9% indicated a period of 1-5 years spent abroad conversing in their L2.

Table 3.

Language background, proficiency, frequency of use, and discussion topics in both languages of bilinguals and monolinguals

Variables	Bilinguals		Monolinguals		*t*	*p*	Cohen's *d*
	M	*SD*	*M*	*SD*			
Proficiency in language							
L1	4.63	0.54	4.80	0.38	-2.60	**.01***	0.46
L2	4.41	0.71	4.05	0.73	3.49	**.00****	0.72

Frequency of use							
L1	4.79	0.58	4.93	0.25	-2.29	**.02***	0.44
L2	4.62	0.67	4.45	0.94	1.44	.15	0.83
Discuss personal matters							
L1	4.33	1.02	4.73	0.56	-3.52	**.00****	0.81
L2	4.06	1.06	3.66	1.31	2.35	**.01***	1.20
Discuss professional matters							
L1	3.92	1.37	4.32	0.92	-2.45	**.01***	1.15
L2	3.78	1.43	3.93	1.24	-0.81	.21	1.34
Discuss everyday life							
L1	4.32	1.10	4.57	0.90	-1.76	**.04***	1.00
L2	3.99	1.18	3.83	1.32	0.91	.18	1.25

Note. Language background was inquired with the language questionnaire of the current study to explore how participants used their first and second language in their daily life. Ratings of the participants' scores on the language questions ranged from 1 = "not at all" to 5 = "extremely". *indicates a significance level of $p < .05$ level.

** indicates a significance level of $p < .001$.

The cultural engagement for L1 and L2, respectively separated in bilinguals and monolinguals, is presented in Table 1 in Appendix E. Bilingual participants showed significantly higher exposure to the culture connected to their L2 ($t(197) = 3.32, p < .001$) than monolinguals and showed less difference in exposure to culture between L1 and L2 ($M\_L1 = 4.22, SD = 104$; $M\_L2 = 4.13, SD = 0.99$). Bilinguals reported to be significantly more familiar with the culture connected to their L2 than monolinguals ($t(197) = 6.00, p < .001$). Participation in cultural tradition in L2 was lower for both groups than in L1. However, bilinguals indicated to still be more involved in the culture connected to their L2 than monolinguals ($t(197) = 5.71, p < .001$). The results suggest that bilinguals are similarly involved in the cultures connected to both languages, whereas monolinguals are more engaged in the culture of their native language instead of L2.

Discussion

The object of the present study was to investigate the perception of personality change among bilingual and proficient monolingual individuals when switching between languages and whether such changes are associated with specific personality traits of the HEXACO model. The

results show that participants perceive personality changes when switching between languages despite the outcome not being of a large magnitude. However, bilinguals reported a greater perceived change than monolinguals. This supports the notion that bilinguals may possess a deeper assimilation of linguistic and cultural norms, leading to a more substantial adaptation process when switching between languages. The correlation between the HEXACO model and perceived personality change revealed that the personality dimensions honesty-humility, emotionality, and openness to experience, and the subcategories interlocutor and conversation of the Perceived Personality Change Questionnaire (PPCQ) are related. These findings support that specific personality traits can influence a perceived change when switching between languages.

Perception of change

While previous research has suggested that bilinguals perceive personality changes to a large extent when switching between languages (Huang et al., 2022; Ramírez-Esparza et al., 2006), the findings of the current study reveal merely a small change when jointly measuring bilingual and monolingual participants. Thus, the first hypothesis, stating that participants perceive a personality change when switching between languages, cannot be entirely accepted or rejected as several factors may have contributed to this outcome. One possible explanation concerns the Cultural Frame Switch (CFS) theory (Ramírez-Esparza et al., 2006). Some participants indicated living in countries where neither of their languages was spoken, which could have led to reduced exposure to the cultural influences associated with their language and, thus, a smaller perceived change. Another factor is the complex nature of the construct personality, which aggravates measuring it accurately (Flake et al., 2017). While the 5-point Likert scale applied in the present study is considered reliable and valid (Joshi et al., 2015), it may not have captured all the nuances of perceived changes in personality and could make it more difficult for participants to indicate their personality changes precisely.

Nevertheless, the study's results are consistent with prior research that found limited evidence of significant personality changes among bilingual individuals when switching languages (Chen & Bond, 2010; Mijatovic & Titus, 2019). Although bilingual individuals may experience changes in their personality when shifting between languages, the majority may not perceive substantial alterations. The study sample may also account for the small perceived change, as the extent of perceived change was analyzed among both monolingual and bilingual participants. However, it was hypothesized that monolinguals might perceive a smaller change

than bilinguals, which is supported by the study's findings. Thus, the small perceived change of the monolingual participants may have contributed to the overall results of a small perceived change.

Influence of bilingualism

The result that bilingual participants perceive a more remarkable change when switching languages than monolinguals may be due to increased exposure to cultural norms connected to their languages. This can lead to a stronger attachment between culture and language, resulting in different attitudes and behaviors (Ramírez-Esparza et al., 2006). The degree of intercultural integration correlates with how individuals who speak two languages perceive themselves in their L1 and L2 (Hammer, 2016). The findings indicate that bilingual individuals are more familiar with the cultures of their two languages and participate more frequently in cultural traditions than monolinguals. Bilingual individuals likely experienced a greater perceived change compared to monolinguals, indicating a heightened sensitivity to language transitions due to their bilingual proficiency.

However, while the study found a statistically significant difference in perceived personality change between bilinguals and monolinguals when switching languages, the difference is small. It may be attributable to the fact that monolinguals can also experience exposure and assimilation to multiple cultures, such as when studying abroad (Huang et al., 2022; Veltkamp et al., 2012). This is also present in the current study, where a considerable number of monolingual participants reported living abroad for at least a year while speaking their L2. Further, it is suggested that acquiring new languages changes how individuals perceive themselves and increases their variety in personality (Veltkamp et al., 2012). The sample consisted of participants from diverse cultural and language backgrounds, and even the monolingual participants reported moderate familiarity and exposure to cultures connected to their L1 and L2. This suggests that in a globalized world, monolingual individuals may also have a connection to several cultures and be influenced by similar processes as bilinguals and hence, experience a personality change. Therefore, further research with a more distinct sample of monolinguals who are less proficient in their second language and with no experience living abroad is necessary to determine whether the observed differences are solely attributable to the language background.

Considering the measurement employed in the present study, only the Perceived Personality Change Questionnaire (PPCQ) exhibited a statistically significant change, while the single-item measurement did not. This indicates that considering factors such as the influence of the interlocutor, cultural and conversational context, and language, when asking about participants' perceptions of personality change, offers a deeper understanding of the subject matter. This highlights the importance of measuring the perceived change with a comprehensive survey to capture all factors that contribute to it.

Personality items

To investigate whether a perceived change in specific personality traits when switching languages occurred, participants rated their confidence, humor, emotionality, honesty, insecurity, extraversion, and openness to experience in both languages. Monolinguals indicated to perceive themselves as less humorous, extraverted, and confident in their L2 compared to their L1, whereas bilinguals did not exhibit such differences. Perceiving oneself differently in these items in two languages can be elicited by a lower proficiency in L2 than in one's native language. This may lead to feeling restricted in one language and less able to express oneself. The Complementary Principle (CP) proposes that such containments can lead to attributing these restrictions to changing one's personality (Grosjean, 2016). In the current study, monolinguals indicated a lower proficiency in L2 than in L1, whereas bilinguals did not report such a difference. This suggests that monolinguals may perceive themselves differently in their two languages due to lower language proficiency in L2.

Although statistical results showed no significant difference in vocabulary use between monolinguals and bilinguals, the descriptive results revealed notable distinctions with monolinguals exhibiting a more significant divergence in their use of vocabulary between L1 and L2. Notably, monolinguals use their L2 for academic purposes more frequently (70.2%) than their L1 (65.4%), while their L1 is more commonly applied in all other contexts. This aligns with the idea that bilingual individuals exhibit a stronger linguistic attachment to both languages, as suggested by their balanced vocabulary usage in both languages, in contrast to monolinguals who display a more pronounced disparity in vocabulary utilization between L1 and L2.

The implications of perceived changes in personality could have significant consequences for individuals who regularly switch between languages. For instance, the discrepancies in how individuals perceive themselves when using different languages could lead to misunderstandings,

which could affect personal and professional relationships. For example, if a bilingual individual acts more extraverted in their L2 compared to their monolingual counterpart, an interlocutor not aware of this difference may perceive them as overly talkative or extraverted, leading to potential miscommunications. However, if the interlocutor is aware of the potential influence, they may be able to adjust their communication strategies accordingly to facilitate effective communication. The findings suggest that individuals interacting with bilinguals may need to understand that language and cultural assimilation can impact their personality and communication style.

Relation to personality dimensions

The relationship between participants' HEXACO personality dimensions and their scores on the PPCQ and its subcategories culture, context, conversation, and interlocutor was investigated. The initial hypothesis predicted that extraversion, openness to experience, emotionality, and agreeableness are related to the perception of personality change. However, the findings show that the dimensions of honesty-humility, emotionality, and openness to experience were associated with the subcategories of interlocutor and conversation of the PPCQ. Thus, the hypothesis is only partially supported by the results. There was a negative relationship between honesty-humility and interlocutor, suggesting that participants who scored lower on this dimension perceived a greater personality change when talking to different interlocutors. This may be due to individuals with higher levels of honesty struggling more with changing their behavior or attitudes when interacting with interlocutors in different languages. Conversely, those with lower levels of honesty may be more likely to adjust themselves to their conversation partner. However, honesty-humility was never investigated in relation to perceiving a personality change. Thus, the current study reveals novel insights into what personality dimensions contribute to the perception of change when switching between languages.

Further, emotionality and interlocutor were positively correlated, suggesting that individuals scoring high on the emotionality dimension perceived a greater personality change when conversing with interlocutors in different languages. This is in line with previous findings where individuals with high levels of emotionality exhibited heightened sensitivity to personality changes, which allowed them to perceive changes more accurately than those with low emotionality (Dewaele, 2016; Ożańska-Ponikwia, 2012, 2013). This may be attributed to the fact that emotionally expressive individuals are generally more attuned and sensitive to their environment (Mayer et al., 2016). Accordingly, it can be concluded that high emotionality

contributes to perceiving a personality change because it increases the sensitivity to a change and adaptation to interlocutors.

A positive correlation between openness to experience and the PPCQ subcategory conversation suggests that individuals who score high on this dimension are more likely to perceive a personality change when switching between languages within a conversation. More receptive individuals could preferably seek out new conversations within their languages and therefore, encounter situations where they could perceive a change. Many participants in the present study indicated living abroad and traveling frequently, which could provide ample opportunities to engage in conversations that trigger a perceived change in their personality. Further, more open-minded participants may be more inclined to embrace cultural adaptation, especially in conversations with individuals who speak their L2.

One possible explanation for the lack of correlation between the entire PPCQ and the HEXACO personality traits is that participants only perceive a limited extent of personality change when switching languages. Thus, it is suggested that the change is primarily due to an adaptation to interlocutors and conversation context rather than an actual personality change. However, the results align with the assertion that perceiving personality changes is due to changes in environment and interlocutors rather than the language switch itself (Grosjean, 2012). Additionally, participants may be susceptible to their interlocutors and adjust their behavior accordingly but do not notice a change in other situations (Mijatovic & Titus, 2019). It is also argued that perceived personality changes occur due to shifting attitudes, behavior, and social norms to fit the demands of a new linguistic and cultural context while speaking different languages (Chen, 2015).

The present study provides further evidence for the positive relationship between openness to experience and emotionality in perceiving a personality change when switching languages. However, only two subcategories, interlocutor and conversation of the PPCQ, were related to the three personality dimensions honesty-humility, emotionality, and openness to experience. These findings imply that the specific context and the person one is communicating with when switching languages play a significant role. Also, personality traits can influence sensitivity and willingness to adapt to the interlocutor. This is particularly noteworthy given the previously unknown correlation between honesty-humility and perceiving a change.

Consequently, future studies should employ the HEXACO model to investigate the factors that can influence the perception of change and replicate the present results.

Limitations

The study's sample size was limited and diverse in origin, potentially compromising the ability to detect significant differences in perceived personality changes between bilinguals and monolinguals. However, previous studies have assessed changes in personality by letting bilinguals fill out a Big Five questionnaire in two distinct languages, which yielded small effect sizes (Chen & Bond, 2010; Huang et al., 2022; Ramírez-Esparza et al., 2006). These findings suggest that the perceived personality change when switching between languages may be subtle and difficult to detect by applying self-report questionnaires. Applying self-report measurements is also a limitation of the current study since participants served as both the target and the rater of the questions. This is further substantiated by the results of the CFA of the present study, where the data did not fit the model well, which is not uncommon for a complex construct such as personality (Hopwood & Donnellan, 2010). Self-bias may also have affected the accuracy of self-reported changes in personality, as participants may have reported minor changes to avoid social desirability bias. This can be especially prevalent in cultures valuing consistency and stability in personality traits, potentially limiting the robustness of conclusions drawn from self-report data in bilingual and monolingual individuals (Rezapour & Zanjirani, 2020).

Despite the substantial research invested into creating the PPCQ, self-created questionnaires may fail to capture certain aspects of personality relevant to the phenomenon of perceived personality change when switching between languages. The questionnaire could have benefited from additional validation in other populations to provide better consistency over time and across different populations. Furthermore, the self-created questionnaire may have been subject to biases of the researchers who created it since the authors had preconceptions about the phenomenon, which may have led to constructing items in a certain way.

Future implications

Future research should explore such discrepancies to minimize the disparity between individuals stating that they perceive personality changes and the ambiguous results from previous studies. One approach to reducing the impact of self-bias is to use objective behavioral observations to supplement self-report data. That could provide a more objective and comprehensive assessment of personality changes, including unconscious changes. Further, a

larger sample size could be employed in future studies to provide more precise and generalizable results. This would allow for greater statistical power and the ability to examine potential subgroup differences between low and high-proficient monolinguals. By addressing the limitations of the present study and pursuing avenues for further research, future studies can provide a more nuanced understanding of the perception of personality change in bilingual and monolingual individuals.

Conclusion

The study suggests that individuals perceive a personality change when switching between languages, with bilingual individuals reporting a larger change compared to monolinguals. Furthermore, the personality dimensions honesty-humility, emotionality, and openness to experience were associated with a perceived personality change. These findings support that switching between languages elicits a perceived personality change and suggest that language shapes how individuals perceive themselves and may influence their thoughts and behaviors. Recognizing these influences can provide important insights into how individuals navigate and adapt to multilingual environments. This knowledge could be used in professional contexts when working with individuals from various language and cultural backgrounds. Understanding the impact of language on personality expression and perceived change while considering the relationship between personality dimensions and language use contains the potential to improve current intervention strategies in practice.

References

Allport, G. W. (1961). *Pattern and growth in personality.* Holt, Reinhart & Winston.

Ashton, M. C., & Lee, K. (2009). The HEXACO-60: A short measure of the major dimensions of personality. *Journal of Personality Assessment, 91*, 340-345. https://doi.org/10.1080/00223890902935878

Ashton, M. C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review, 11*, 150-166. https://doi.org/10.1177/1088868306294907

American Psychological Association (2023). *APA Dictionary of Psychology: Personality*. https://dictionary.apa.org/personality.

Bakker, A. B., Demerouti, E., & ten Brummelhuis, L. L. (2012). Work engagement, performance, and active learning: The role of conscientiousness. *Journal of Vocational Behavior*, *80*(2), 555-564. https://doi.org/10.1016/j.jvb.2011.08.008

Benet-Martinez, V., Leu, J., Lee, F., & Morris, M. W. (2002). Negotiating biculturalism: CFS in biculturals with oppositional versus compatible cultural identities. *Journal of Cross-Cultural Psychology, 33*, 492-516. https://doi.org/10.1177/0022022106288476

Chen, S. X., & Bond, M. H. (2010). Two languages, two personalities? Examining language effects on the expression of personality in a bilingual context. *Personality and Social Psychology Bulletin, 36,* 1514-1528. https://doi.org/10.1177/0146167210385360

Chen, S. X. (2015). Toward a social psychology of bilingualism and biculturalism. *Asian Journal of Social Psychology*, *18*(1), 1-11. https://doi.org/10.1111/ajsp.12088

Dewaele, J.-M. (2016). Why do so many bi- and multilinguals feel different when switching languages? *International Journal of Multilingualism, 13*(1), 92-105. https://doi.org/10.1080/14790718.2015.1040406

Dewaele, J. M., & Nakano, S. (2013). Multilinguals' perceptions of feeling different when switching languages. *Journal of Multilingual and Multicultural Development*, *34*(2), 107-120. https://doi.org/10.1080/01434632.2012.712133

Fabbro, A., Crescentini, C., Pascoli, E., Screm, S., Cantone, D., & Fabbro, F. (2020). Differences in personality traits in children and adult bilinguals: A pilot study in a bilingual Friulian–Italian context. *Bilingualism: Language and Cognition*, *23*(3), 631-638. https://doi.org/10.1017/S136672891900052X

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*, 1149-1160. https://doi.org/10.3758/BRM.41.4.1149

Flake, J. K., Pek, J., & Hehman, E. (2017). Construct validation in social and personality research: Current practice and recommendations. *Social Psychological and Personality Science*, *8*(4), 370-378. https://doi.org/10.1177/1948550617693063

Grosjean, F. (1985). The bilingual as a competent but specific speaker-hearer. *Journal of Multilingual and Multicultural Development, 6,* 457-477. https://doi.org/10.1080/01434632.1985.9994221

Grosjean, F. (2012). Bilingualism: A short introduction. In F. Grosjean & P. Li (Eds.), The Psycholinguistics of Bilingualism (pp. 5–25). Hoboken, NJ: John Wiley & Sons.

Grosjean, F. (2015). Bicultural bilinguals. *International Journal of Bilingualism, 19*(5), 572-586. https://doi.org/10.1177/1367006914526297

Grosjean, F. (2016). The Complementarity Principle and its impact on processing, acquisition, and dominance. In Carmen Silva-Corvalan and Jeanine Treffers-Daller (eds.). *Language Dominance in Bilinguals: Issues of Measurement and Operationalization*, 66-84. Cambridge: Cambridge University Press.

Hammer, K. (2016). Bilingual bonds: Acculturation, attachment, and being yourself in a new language. *International Journal of Language and Culture*, *3*(2), 253-279. https://doi.org/10.1075/ijolc.3.2.05ham

Hopwood, C. J., & Donnellan, M. B. (2010). How should the internal structure of personality inventories be evaluated? *Personality and Social Psychology Review*, *14*(3), 332-346. https://doi.org/10.1177/1088868310361240

Huang, S., Deng, Y., Jin, R., Ouyang, X., & She, S. (2022). Analyzing the Influence of Linguistic and Cultural Background on Chinese-English Bilingual Personality. In *2022 International Conference on Social Sciences and Humanities and Arts (SSHA 2022)* (pp. 328-333). Atlantis Press.

IBM Corp. (2020). IBM SPSS Statistics for Windows, Version 28.0. Armonk, NY: IBM Corp.

Joshi, A., Kale, S., Chandel, S., & Pal, D. K. (2015). Likert scale: Explored and explained. *British Journal of Applied Science & Technology*, *7*(4), 396. http://doi.org/10.9734/BJAST/2015/14975

Kajonius, P., & Mac Giolla, E. (2017). Personality traits across countries: Support for similarities rather than differences. *PloS One*, *12*(6), e0179646. https://doi.org/10.1371/journal.pone.0179646

Marian, V., Blumenfeld, H. K., & Kaushanskaya, M. (2007). The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing language profiles in bilinguals and multilinguals. *Journal of Speech, Language, and Hearing Research, 50*(4), 940-967. https://doi.org/10.1044/1092-4388(2007/067)

Mayer, J. D., Caruso, D. R., & Salovey, P. (2016). The ability model of emotional intelligence: Principles and updates. *Emotion Review*, *8*(4), 290-300. https://doi.org/10.1177/1754073916639667

Mijatović, M., & Tytus, A. E. (2019). The bi-personal bilingual: a study of the perceived feeling of a changed self. *International Journal of Bilingual Education and Bilingualism*, *22*(2), 224-236. https://doi.org/10.1080/13670050.2016.1248373

Ożańska-Ponikwia, K. (2012). What has personality and emotional intelligence to do with 'feeling different' while using a foreign language? *International Journal of Bilingual Education and Bilingualism, 15*(2), 217-234. https://doi.org/10.1080/13670050.2011.616185

Ożańska-Ponikwia, K. (2013). *Emotions from a bilingual point of view: Personality and emotional intelligence in relation to perception and expression of emotions in the L1 and L2*. Newcastle: Cambridge Scholars.

Panicacci, A., & Dewaele, J. M. (2017). 'A voice from elsewhere': acculturation, personality and migrants' self-perceptions across languages and cultures. *International Journal of Multilingualism, 14*(4), 419-436. https://doi.org/10.1080/14790718.2016.1273937

Ramírez-Esparza, N., Gosling, S., Benet-Martínez, V., Potter, J. P., & Pennebaker, J. W. (2006). Do bilinguals have two personalities? A special case of cultural frame switching. *Journal of Research in Personality, 40*, 99-120. https://doi.org/10.1016/j.jrp.2004.09.001

Rezapour, R., & Zanjirani, S. (2020). Bilingualism and personality shifts: different personality traits in Persian-English bilinguals shifting between two languages. *Iranian Journal of Learning & Memory*, *3*(10), 25-32. https://doi.org/10.22034/IEPA.2020.230347.1169

Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: a quantitative review of longitudinal studies. *Psychological Bulletin*, *126*(1), 3-25. https://doi.org/10.1037/0033-2909.126.1.3

Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring global self-esteem: Construct validation of a single-item measure and the Rosenberg Self-Esteem Scale. *Personality & Social Psychology Bulletin*, 27, 151-161. https://doi.org/10.1177/0146167201272002

Veltkamp, G. M., Recio, G., Jacobs, A. M., & Conrad, M. (2013). Is personality modulated by language?. *International Journal of Bilingualism*, *17*(4), 496-504. https://doi.org/10.1177/1367006912438894

Wilson, R. J. (2008). Another language is another soul: Individual differences in the presentation of self in a foreign language. Ph.D. diss., Birkbeck College, University of London.

Appendices

Appendix A

Table 1.

Sociodemographic characteristics of participants

Baseline characteristic	Bilinguals		Monolinguals		Full sample	
	n	*%*	*n*	*%*	*n*	*%*
Gender						
Female	76	80.0	76	73.1	152	76.0
Male	18	18.9	26	25.0	44	22.0
Non-binary	1	1.1	2	1.9	3	1.5
Highest educational level						
High School	26	27.4	28	26.9	54	27.1
Bachelor	42	44.2	47	45.2	89	44.7
Master	23	24.2	23	22.1	46	23.1
Doctorate	2	2.1	2	1.9	4	2.0
Other	2	2.1	4	3.8	6	3.0
Employment						
Student	56	58.9	62	59.6	118	59.3
Working	35	36.8	37	35.6	72	36.2
Other	4	4.2	5	4.8	9	4.5
Country of Origin						
Germany	30	31.6	64	61.5	94	47.2
Sweden	7	7.4	8	7.7	15	7.5
Canada	7	7.4	1	1.0	8	4.0
USA	4	4.2	3	2.9	7	3.5
Other	47	49.4	28	26.9	75	37.8
Country of Residence						
Germany	26	27.4	53	51.0	79	39.7
Sweden	25	26.3	28	26.9	53	26.6
UK	9	9.5	2	1.9	11	5.5
Austria	2	2.1	6	5.8	8	4.0
Other	33	34.7	15	14.4	48	24.2
Native Language						
German	27	28.4	71	68.3	98	49.3
Swedish	12	12.6	8	7.7	20	10.0
English	13	13.7	4	3.9	17	8.5
Other	43	45.3	21	20.1	64	32.2
Second Language						
German	7	7.4	3	2.9	10	5.0
Swedish	4	4.2	3	2.9	7	3.5
English	50	52.6	94	90.4	144	72.3
Other	34	35.8	4	3.8	38	19.2

Note. The division shows the answers to the demographic questions into the total sample ($N = 199$), bilinguals ($N\_bilinguals = 95$), and monolinguals ($N\_monolingual = 104$). The answers to the country of origin, country of residence, native language, and second language were open-ended.

Appendix B

Perceived Personality Change Questionnaire (PPCQ)

<u>Language background questions:</u>

Q1: Are you bilingual by the following definition of **this study**?

   "You speak two languages at an equally balanced high proficiency level **and** consider both as your native languages because you grew up speaking both in your daily life."

   a) Yes
   b) No

Q1a: Please indicate your **native** language./ Q1c_What is your **first native** language? (Please remember your choice, as this is important for further questions.)

Q1b: Please indicate the language in which you are **most fluent** after your native language./ Q1c_What is your **second native** language? (Please remember your choice as this is important for further questions.)

Q2: How do you rate yourself in speaking, listening, reading, and writing in your **(first) native language**?

   - Poor, Fair, Good, Very good, excellent (answer for each category)

Q3: How do you rate yourself in speaking, listening, reading, and writing in your **second (native) language**?

   - Poor, Fair, Good, Very good, excellent (answer for each category)

Q4: Please estimate how **frequently** you use the languages you speak.

   - Never, a few times per year, every month, weekly, daily

Q5: To what extent do you discuss **personal matters** (e.g., emotions) in your different languages?

   - Not at all, slightly somewhat, moderately, extremely

Q5b: To what extent do you discuss **professional matters** (e.g., work, academia) in your different languages?

- Not at all, slightly somewhat, moderately, extremely

Q5c: To what extent do you discuss **everyday life** (e.g., small talk, making appointments) in your different languages?

- Not at all, slightly, somewhat, moderately, extremely

Q6: To what extent does your **vocabulary** (the kind of words you use) differ between your languages?

- Not at all, slightly somewhat, moderately, extremely

Q7: What **vocabulary** do you use in your languages? (Several answers are possible)

Examples:
"Informal": Using slang etc.
"Formal": Writing a letter etc.
"Academic": University assignments etc.
"Business": In a company etc.

Cultural background questions

Q1: To what extent do you speak your languages while **staying in your country of residence**? (E.g. You speak English while you are studying in Sweden)

- Not at all, seldom, sometimes, often, always

Q2: How **familiar** are you with traditions/ customs of a culture connected to your different languages? (E.g., If you speak Swedish, do you also know what traditions/feasts are celebrated in Sweden?)

- Not at all, slightly, somewhat, moderately, extremely

Q3: To what extent are you **exposed to a culture** connected to your languages? Exposure can be, among others, through social media and/or through living with people from your culture. (E.g., If you speak Swedish, are you exposed to Swedish adverts, music, food, feasts, etc.)

- Not at all, slightly, somewhat, moderately, extremely

Q4: How **often** do you participate in **cultural traditions/ customs** connected to your languages in person? (E.g., If you speak Swedish, do you celebrate Christmas with Swedish traditions? Do you attend cultural holidays?)

- Not at all, seldom, sometimes, often, always

 Personality questions:

Q1a: To what extent do you feel a **change in personality** when you switch between your languages?

- Not at all, Slightly, Somewhat, Moderately, Extremely, Not applicable

Q1b/c/d: **To what extent do you feel a change in ... when using your different languages?**

	Not at all	Slightly	Somewhat	Moderately	Extremely	Not applicable
... body language...	o	o	o	o	o	o
...facial expression...	o	o	o	o	o	o
...your character...	o	o	o	o	o	o

 Q2a/b/c/d: In which **contexts** do you feel a change in your personality when switching languages?

I feel a change when...

	Not at all	Slightly	Somewhat	Moderately	Extremely	Not applicable
…traveling to another country	o	o	o	o	o	o
…living in a country (e.g., country of residence)	o	o	o	o	o	o
…in a professional context (e.g., university, work)	o	o	o	o	o	o
…Other (Please specify in the text field)	o	o	o	o	o	o

Q3a/b/c: When **talking with whom** do you feel a personality change while using your languages?

I feel a change when talking to...

	Not at all	Slightly	Somewhat	Moderately	Extremely	Not applicable
...Family/Friends	o	o	o	o	o	o
...Coworkers/ Fellow students /Acquaintances	o	o	o	o	o	o

Other (Please specify in the text field)	o	o	o	o	o	o

Q4a/b/c/d: Do you feel a personality change when switching between languages within **one single conversation**?

I feel a change when switching languages in conversations with...

	Not at all	Slightly	Somewhat	Moderately	Extremely	Not applicable
...Family/Friends	o	o	o	o	o	o
...Strangers	o	o	o	o	o	o
...Coworkers/Fellow students	o	o	o	o	o	o
Other (Please specify in the text field)	o	o	o	o	o	o

Q5: How **confident** would you rate yourself in your languages?

- Not at all, Slightly, Somewhat, Moderately, Extremely, Not applicable

Q6: How **humorous** would you rate yourself in your languages?

- Not at all, Slightly, Somewhat, Moderately, Extremely, Not applicable

Q7: How **emotional** would you rate yourself in your languages?

- Not at all, Slightly, Somewhat, Moderately, Extremely, Not applicable

Q8: How **honest** would you rate yourself in your languages?

- Not at all, Slightly, Somewhat, Moderately, Extremely, Not applicable

Q9: How **insecure** would you rate yourself in your languages?

- Not at all, Slightly, Somewhat, Moderately, Extremely, Not applicable

Q10: How **extroverted** would you rate yourself in your languages?

- Not at all, Slightly, Somewhat, Moderately, Extremely, Not applicable

Q11: How **open to new experiences** would you rate yourself in your languages?

- Not at all, Slightly, Somewhat, Moderately, Extremely, Not applicable

Q12: To what extent do you feel a personality change when speaking your languages **in an associated culture**? (E.g., feeling a change when speaking Italian in Italy instead of your usual country of residence.)

- Not at all, Slightly, Somewhat, Moderately, Extremely, Not applicable

Q13: To what extent do you feel a personality change when switching between your languages in your regular **daily life**?

- Not at all, Slightly, Somewhat, Moderately, Extremely, Not applicable

Appendix C

Confirmatory factor analysis

For the confirmatory factor analysis (CFA), 6 participants, out of the $N = 199$ participants of the sample in the current study who completed the HEXACO questionnaire, were excluded due to incomplete questionnaire answers. The first-order CFA model, with one level consisting of the six factors of the HEXACO, showed poor fit, χ^2 (df = 1685) = 3066.26, $p < .001$, CFI = .58, TLI = .56, RMSEA = .065, 90% CI [.061, .068]. Although all factor loadings were significant (see Tables 1-6), the results suggest that the six-factor model does not provide the best fit for the current data. High multicollinearity was not identified since no correlation coefficient was larger than 0.7. Since this is usually an indicator of high multicollinearity, multicollinearity was excluded as a reason for poor model fit. Furthermore, it is unlikely that the model was misspecified since the HEXACO is a long-standing model of measure for a personality profile. The most likely explanation for a poor model fit is the sampling error of having too few participants for the analysis. Nevertheless, having a poor model fit for personality constructs is not uncommon, as personality is a complex structure to measure (Hopwood & Donnellan, 2010).

Table 1.

Factor Loadings for the HEXACO model for the dimension of honesty-humility

Factor	Item	Estimate	SE	Z	p
Honesty-Humility					
	HEX_6	0.60	0.09	6.79	< .001
	HEX_30	0.66	0.09	7.45	< .001
	HEX_54	0.56	0.10	5.58	< .001
	HEX_12	0.71	0.11	6.52	< .001
	HEX_36	0.54	0.09	5.82	< .001
	HEX_60	0.71	0.09	7.56	< .001
	HEX_18	0.51	0.09	5.84	< .001
	HEX_42	0.56	0.10	5.62	< .001
	HEX_24	0.47	0.08	5.84	< .001
	HEX_48	0.57	0.09	6.63	< .001

Note. SE = standard error. The factor loadings for all items corresponding to the honesty-humility dimension are shown.

Table 2.

Factor Loadings for the HEXACO model for the dimension of emotionality

Factor	Item	Estimate	SE	Z	p
Emotionality					
	HEX_5	0.32	0.10	3.21	.001
	HEX_29	0.44	0.09	4.73	< .001
	HEX_53	0.70	0.10	7.83	< .001
	HEX_11	0.65	0.09	7.47	< .001
	HEX_35	0.79	0.09	8.49	< .001
	HEX_17	0.62	0.09	6.93	< .001
	HEX_41	0.55	0.09	5.85	< .001
	HEX_23	0.49	0.09	5.36	< .001
	HEX_47	0.61	0.09	6.91	< .001
	HEX_59	0.70	0.08	8.32	< .001

Note. *SE* = standard error. The factor loadings for all items corresponding to the emotionality dimension are shown.

Table 3.

Factor Loadings for the HEXACO model for the dimension of extraversion

Factor	Item	Estimate	SE	Z	p
Extraversion					
	HEX_4	0.58	0.08	7.17	< .001
	HEX_28	0.69	0.08	9.02	< .001
	HEX_52	0.83	0.10	8.33	< .001
	HEX_10	0.61	0.08	7.28	< .001
	HEX_34	0.84	0.08	10.64	< .001
	HEX_58	0.64	0.09	7.15	< .001
	HEX_16	0.59	0.09	6.88	< .001
	HEX_40	0.78	0.08	9.57	< .001
	HEX_22	0.75	0.08	9.75	< .001
	HEX_46	0.78	0.08	9.78	< .001

Note. *SE* = standard error. The factor loadings for all items corresponding to the extraversion dimension are shown.

Table 4.

Factor Loadings for the HEXACO model for the dimension of agreeableness

Factor	Item	Estimate	SE	Z	p
Agreeableness					
	HEX_3	0.60	0.10	6.19	< .001
	HEX_27	0.50	0.09	5.67	< .001
	HEX_9	0.61	0.09	6.59	< .001
	HEX_33	0.35	0.08	4.56	< .001
	HEX_51	0.29	0.09	3.34	< .001
	HEX_15	0.59	0.09	6.56	< .001
	HEX_39	0.22	0.09	2.40	.016
	HEX_57	0.36	0.09	4.09	< .001

HEX_21	0.76	0.09	8.50	< .001
HEX_45	0.74	0.08	9.55	< .001

Note. SE = standard error. The factor loadings for all items corresponding to the agreeableness dimension are shown.

Table 5.

Factor Loadings for the HEXACO model for the dimension of conscientiousness

Factor	Item	Estimate	SE	Z	p
Conscientiousness					
	HEX_2	0.47	0.09	5.28	< .001
	HEX_26	0.67	0.11	6.18	< .001
	HEX_8	0.40	0.07	5.35	< .001
	HEX_32	0.73	0.09	7.92	< .001
	HEX_14	0.61	0.08	7.34	< .001
	HEX_38	0.49	0.08	6.40	< .001
	HEX_50	0.64	0.09	6.93	< .001
	HEX_20	0.51	0.08	6.40	< .001
	HEX_44	0.35	0.07	4.77	< .001
	HEX_56	0.41	0.08	4.98	< .001

Note. SE = standard error. The factor loadings for all items corresponding to the conscientiousness dimension are shown.

Table 6.

Factor Loadings for the HEXACO model for the dimension of openness to experience

Factor	Item	Estimate	SE	Z	p
Openness to experience					
	HEX_1	0.62	0.09	6.51	< .001
	HEX_25	0.59	0.10	6.10	< .001
	HEX_7	0.40	0.08	5.18	< .001
	HEX_31	0.37	0.11	3.45	< .001
	HEX_13	0.95	0.09	10.58	< .001
	HEX_37	0.72	0.83	8.65	< .001
	HEX_49	0.86	0.11	7.71	< .001
	HEX_19	0.27	0.09	2.97	.003
	HEX_43	0.30	0.07	4.04	< .001
	HEX_55	0.54	0.10	5.25	< .001

Note. SE = standard error. The factor loadings for all items corresponding to the openness to experience dimension are shown.

Appendix D

Table 1.

Differences in vocabulary use between L1 and L2 for bilinguals, monolinguals, and total sample separated by types of language

Vocabulary use	Bilinguals		Monolinguals		Full sample	
	n	*%*	*n*	*%*	*n*	*%*
Informal						
L1	84	88.4	101	97.1	185	93.0
L2	79	83.2	86	82.7	165	82.9
Formal						
L1	71	74.7	91	87.5	162	81.4
L2	71	74.7	78	75.0	149	74.9
Academic						
L1	48	50.5	68	65.4	116	58.3
L2	51	53.7	73	70.2	124	62.3
Business						
L1	46	48.4	63	60.6	109	54.8
L2	49	51.6	51	49.0	100	50.3
Other						
L1	9	9.5	8	7.7	17	8.5
L2	4	4.2	12	11.5	16	8.0

Note: Several answer possibilities were possible for the question of the participants' vocabulary in their two languages.

$N = 199$ ($N\_bilinguals = 95$, $N\_monolingual = 104$)

Appendix E

Table 1.

Differences in culture exposure between L1 and L2 for bilinguals, monolinguals, and total

sample separated by language

Variables	Bilinguals		Monolinguals				
	M	*SD*	*M*	*SD*	*t*	*p*	Cohen's *d*
Familiarity with traditions/customs							
L1	4.53	0.78	4.68	0.56	-1.63	.11	0.68
L2	4.01	0.95	3.18	0.99	6.00	**.00****	0.97
Exposure to culture							
L1	4.22	1.04	4.55	0.71	-2.61	**.01***	0.88
L2	4.13	.99	3.65	1.07	3.23	**.001***	1.03
Participation in culture/tradition							
L1	4.04	0.99	4.09	0.88	-0.34	.74	0.94
L2	3.18	1.21	2.28	1.01	5.71	**.00****	1.11

Note. The cultural background was inquired with the questionnaire of the current study to explore how familiar and exposed participants were to their first and second language.

*indicates significance at the 0.05 level.

** indicates a significance level below .001.