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INDIVIDUAL DIFFERENCES IN LANGUAGE LEARNING: TEMPERAMENT, COGNITIVE STYLES AND PERSONALIZATION OF INSTRUCTION

Abstract

This empirical study examines the relationship between individual psychological differences and English language learning outcomes among university students. A sample of 80 students (mean age = 19.8 years, SD = 1.2) from a large urban university participated in this research. The study utilized standardized instruments including the Eysenck Personality Questionnaire (EPQ) to assess temperament, the Riding Cognitive Style Analysis to measure cognitive styles (verbal-imagery and wholist-analytic dimensions), and Cambridge English Placement Test to evaluate language proficiency. Results indicate significant correlations between extraversion and speaking performance ($r = 0.42$, $p < 0.01$), between imagery cognitive style and vocabulary acquisition ($r = 0.38$, $p < 0.01$), and between analytic style and grammar comprehension ($r = 0.44$, $p < 0.01$). Multiple regression analysis revealed that cognitive style dimensions predicted 31% of variance in overall English proficiency ($R^2 = 0.31$, $p < 0.001$). Based on these findings, we propose a framework for personalized language instruction that considers learner temperament and cognitive preferences. The study demonstrates that individual differences significantly impact language learning processes and outcomes, suggesting the need for differentiated pedagogical approaches in EFL contexts.

Keywords: individual differences, temperament, cognitive styles, English language learning, personalized instruction, university students.

Introduction

The field of applied psycholinguistics has long recognized that language learners differ substantially in their approaches to learning and ultimate achievement levels [1, 2]. Despite widespread acknowledgment of individual differences in second language acquisition research, practical applications in classroom settings remain limited. Understanding the psychological foundations of these differences is essential for developing effective, personalized teaching methodologies that can accommodate diverse learner profiles [3].

Temperament, defined as biologically-based individual differences in behavioral tendencies and emotional reactivity, has been shown to influence various aspects of academic performance [4]. In language learning contexts, temperamental characteristics such as extraversion-introversion may affect learner willingness to communicate, risk-taking in language use, and preferred learning activities [5]. Extraverted learners typically demonstrate greater oral participation and fluency development, while introverted learners may excel in written tasks and reflective learning activities [6].

Cognitive styles represent another crucial dimension of individual differences. Riding and Rayner define cognitive style as "an individual's preferred and habitual approach to organizing and representing information" [7]. The two fundamental dimensions identified in cognitive style research are: (1) the verbal-imagery dimension, concerning whether individuals prefer to represent information verbally or in mental images; and (2) the wholist-analytic dimension, referring to whether individuals process information holistically or in parts [7, 8]. These cognitive preferences may significantly influence how learners approach vocabulary acquisition, grammar learning, and text comprehension.

Research on cognitive styles in language education has produced mixed results. Some studies report strong associations between particular cognitive styles and language learning success [9], while others find minimal or inconsistent effects [10]. These discrepancies may stem from methodological differences, varying definitions of cognitive style constructs, or failure to consider the interaction between cognitive styles and instructional methods. Oxford suggests that matching teaching strategies to learners' cognitive profiles can enhance learning outcomes, though empirical evidence for such matching remains inconclusive [11].

The present study aims to address gaps in current understanding by examining relationships between temperament, cognitive styles, and English language proficiency in a university student population. Specifically, we investigate: (1) whether temperamental characteristics predict performance in different language skills; (2) how cognitive style dimensions relate to various aspects of English proficiency; and (3) which individual difference variables most strongly predict overall language achievement. Understanding these relationships can inform the development of personalized instructional approaches that align with learners' psychological characteristics, potentially enhancing both learning efficiency and student motivation [12].

The context of this research is particularly relevant given the ongoing shift toward learner-centered education and adaptive learning technologies in language teaching. As educational institutions increasingly recognize the importance of individualization, empirical evidence regarding which learner characteristics matter most for language acquisition becomes essential for effective curriculum design and resource allocation [13, 14].

Materials and methods

Eighty students (45 female, 35 male) enrolled in English language courses at a large public university in Kazakhstan participated in this study. The sample included students from various academic majors (Engineering = 28, Business = 23, Humanities = 18, Natural Sciences = 11) to ensure diversity in educational backgrounds. Participants ranged in age from 18 to 23 years ($M = 19.8$, $SD = 1.2$) and had been studying English for an average of 10.4 years ($SD = 2.1$). All participants were native speakers of Russian or Kazakh. English proficiency levels ranged from A2 to C1 on the Common European Framework of Reference (CEFR) scale, with the majority classified as B1-B2 level. Participation was voluntary, and students received no compensation or course credit for participation. The study was approved by the university ethics committee, and all participants provided informed consent.

Temperament Assessment. The Eysenck Personality Questionnaire-Revised (EPQ-R) [15] was used to assess temperament dimensions. This 100-item self-report instrument measures four dimensions: Extraversion (E), Neuroticism (N), Psychoticism (P), and a Lie scale (L). For the purposes of this study, we focused primarily on the Extraversion and Neuroticism scales, as these dimensions have been most consistently linked to learning behaviors in previous research. The Russian-language version of the EPQ-R, which has demonstrated adequate reliability and validity in Central Asian populations, was administered. Internal consistency coefficients in the present sample were $\alpha = 0.84$ for Extraversion and $\alpha = 0.81$ for Neuroticism.

Cognitive Style Assessment. The Cognitive Style Analysis (CSA) [7] was employed to measure two fundamental cognitive style dimensions: verbal-imagery and wholist-analytic. The CSA is a computer-based assessment that presents participants with items requiring them to judge whether two stimuli are the same or different. Response times and accuracy on these tasks allow calculation of position on each cognitive style dimension. The verbal-imagery dimension is assessed through tasks comparing verbal labels with pictorial representations, while the wholist-analytic dimension is evaluated through tasks requiring segmentation of complex figures. Scores were standardized with a mean of 0 and standard deviation of 1, where negative scores indicate a verbal/wholist tendency and positive scores indicate an imagery/analytic tendency.

English Proficiency Assessment. English language proficiency was measured using the Cambridge English Placement Test, which assesses grammar, vocabulary, reading comprehension, and listening comprehension. Additionally, speaking proficiency was evaluated through a standardized oral interview conducted by two trained raters (inter-rater reliability = 0.89). Writing samples were collected through a timed argumentative essay task, scored using an analytic rubric covering content, organization,

language use, and mechanics (inter-rater reliability = 0.87). The placement test scores were converted to a standardized scale ranging from 0 to 100 for analysis purposes.

Data collection took place over a four-week period during the spring semester of 2024. Participants completed the EPQ-R and CSA during week one in a computer laboratory under supervised conditions. English proficiency assessments were conducted during weeks two through four, with written and computer-based components administered in week two, speaking assessments in week three, and additional proficiency measures in week four. All assessments were conducted in standardized conditions to ensure reliability. Participants were informed that their performance would not affect their course grades and that all data would be kept confidential and used solely for research purposes.

Statistical analyses were conducted using SPSS version 28.0. Descriptive statistics were calculated for all variables. Pearson correlation coefficients were computed to examine bivariate relationships between individual difference variables and English proficiency measures. Multiple regression analysis was performed to determine the relative contribution of temperament and cognitive style variables in predicting overall English proficiency. Hierarchical regression analysis was used to assess whether cognitive styles added significant predictive power beyond temperament alone. Statistical significance was set at $p < 0.05$ for all analyses. Effect sizes were calculated and reported alongside significance tests to facilitate interpretation of practical significance.

Results and discussion

Table 1 presents descriptive statistics for all study variables. English proficiency scores indicated that the sample represented a range of ability levels, with mean scores suggesting intermediate proficiency overall. Temperament scores on the EPQ-R were comparable to published norms for university student populations. Cognitive style scores showed normal distribution across both dimensions, indicating adequate variability for correlation analysis.

Table 1 – Descriptive Statistics for Study Variables (N = 80)

Variable	Mean	SD	Min	Max
Overall English Proficiency	68.4	12.8	42	91
Speaking Proficiency	6.8	1.6	4.0	9.5
Writing Proficiency	71.2	14.3	45	95
Extraversion (EPQ-R)	14.6	4.2	5	23
Neuroticism (EPQ-R)	12.3	4.8	3	22
Verbal-Imagery Style	0.08	0.96	-1.82	2.14
Wholist-Analytic Style	0.12	0.89	-1.65	1.98
Note: Compiled by author.				

Pearson correlation analysis revealed several significant relationships between individual difference variables and English proficiency measures (Table 2). Extraversion showed a significant positive correlation with speaking proficiency ($r = 0.42$, $p < 0.01$), indicating that more extraverted students demonstrated better oral communication skills. This relationship was specific to speaking; extraversion was not significantly related to writing proficiency ($r = 0.14$, $p > 0.05$) or overall proficiency ($r = 0.23$, $p > 0.05$). Neuroticism demonstrated a weak negative correlation with overall proficiency ($r = -0.26$, $p < 0.05$), suggesting that emotional instability may interfere with language learning, though this effect was modest.

Cognitive style dimensions showed more robust and specific patterns of association with language proficiency. The verbal-imagery dimension correlated negatively with vocabulary scores ($r = -0.38$, $p < 0.01$), indicating that students with a verbal cognitive preference (negative scores) performed better on vocabulary measures. The wholist-analytic dimension demonstrated a significant positive correlation with grammar comprehension ($r = 0.44$, $p < 0.01$), suggesting that analytic thinkers excel at parsing grammatical structures. Interestingly, the wholist-analytic dimension also correlated with overall proficiency ($r = 0.39$, $p < 0.01$), while the verbal-imagery dimension showed a weaker relationship with overall achievement ($r = -0.28$, $p < 0.05$).

Table 2 – Correlation Matrix for Individual Differences and English Proficiency Variables

Variable	Overall	Speaking	Writing	Vocabulary	Grammar
Extraversion	0.23	0.42**	0.14	0.18	0.11
Neuroticism	-0.26*	-0.19	-0.22	-0.15	-0.24*
Verbal-Imagery	-0.28*	-0.12	-0.21	-0.38**	-0.19
Wholist-Analytic	0.39**	0.16	0.31*	0.29*	0.44**
* $p < 0.05$, ** $p < 0.01$					
Note: Compiled by author.					

Hierarchical multiple regression analysis was conducted to examine the unique contribution of temperament and cognitive style variables in predicting overall English proficiency. In Step 1, temperament variables (extraversion and neuroticism) were entered, accounting for 8.4% of variance in proficiency scores ($R^2 = 0.084$, $F(2,77) = 3.53$, $p < 0.05$). In Step 2, cognitive style dimensions were added to the model, resulting in a significant increase in explained variance ($\Delta R^2 = 0.226$, F change$(2,75) = 11.82$, $p < 0.001$). The final model explained 31.0% of variance in English proficiency ($R^2 = 0.310$, $F(4,75) = 8.43$, $p < 0.001$).

In the final model, the wholist-analytic cognitive style dimension emerged as the strongest predictor ($\beta = 0.42$, $t = 4.18$, $p < 0.001$), followed by the verbal-imagery dimension ($\beta = -0.28$, $t = -2.76$, $p < 0.01$). Neither extraversion ($\beta = 0.15$, $t = 1.52$, $p = 0.13$) nor neuroticism ($\beta = -0.14$, $t = -1.41$, $p = 0.16$) retained statistical significance when cognitive styles were included in the model, suggesting that cognitive processing preferences are more central to language learning success than temperamental characteristics, at least as measured by overall proficiency scores.

This study investigated relationships between individual differences in temperament and cognitive style and English language learning outcomes among university students. Results provide empirical support for the importance of considering learner characteristics in language pedagogy, while also revealing the complexity of these relationships. The findings suggest that different individual difference variables relate to distinct aspects of language proficiency, and that cognitive styles may be particularly important for overall language achievement.

The significant positive correlation between extraversion and speaking proficiency aligns with previous research suggesting that extraverted learners benefit from their willingness to engage in oral communication [5, 6]. This finding has practical implications for classroom instruction. Teachers might create additional structured speaking opportunities for introverted learners who may be less inclined to volunteer contributions spontaneously. Conversely, the lack of relationship between extraversion and writing proficiency suggests that introverted students may find written communication a more comfortable medium for language expression, highlighting the value of providing diverse modes of communication in language courses.

The negative correlation between the verbal-imagery dimension and vocabulary acquisition (with verbal preference associated with better performance) is consistent with the notion that linguistic information is most efficiently processed using verbal encoding strategies [7]. Students with a verbal cognitive preference may naturally employ more effective strategies for vocabulary learning, such as verbal rehearsal, semantic elaboration, and verbal mnemonic devices. Conversely, learners with imagery preferences might benefit from explicit instruction in visualizing vocabulary through mental imagery, diagrams, or concept mapping techniques. This finding suggests that vocabulary instruction should incorporate both verbal and visual elements to accommodate different cognitive preferences.

The strong positive relationship between analytic cognitive style and grammar comprehension is particularly noteworthy. The analytic processing style, characterized by attention to details and sequential processing, appears well-suited to the rule-based nature of grammatical structures [8]. Students with analytic preferences may more readily perceive patterns in language, formulate grammatical rules, and apply these rules systematically. This finding suggests that grammar instruction emphasizing pattern recognition, rule formulation, and systematic practice may be especially effective for analytic learners, while wholist learners might benefit more from exposure to grammatical structures in meaningful contexts before explicit rule instruction.

The regression analysis revealed that cognitive style dimensions account for substantial variance in language proficiency beyond temperament factors. This finding challenges the emphasis some researchers have placed on personality variables in language learning and redirects attention to cognitive processing preferences. While temperament influences behavioral tendencies and emotional responses relevant to learning, cognitive styles may more directly affect the processing of linguistic information itself. However, it is important to note that the current study measured overall proficiency; temperament effects might be stronger when examining process variables such as class participation, persistence, or strategy use rather than achievement outcomes alone.

These findings have several implications for personalized language instruction. First, assessment of learner cognitive styles could inform instructional design decisions. Language programs might offer parallel instructional pathways that present the same content through different approaches matched to different cognitive preferences. For instance, grammar could be taught either through inductive discovery learning (more suited to analytic learners) or through exposure and pattern recognition in context (potentially better for wholist learners). Second, awareness of cognitive style differences can help teachers avoid the assumption that all learners will respond equally well to any given instructional approach. Third, explicit metacognitive training might help learners understand their own cognitive preferences and develop compensatory strategies when instructional approaches do not match their natural tendencies.

Several limitations of this study should be acknowledged. First, the cross-sectional design precludes causal conclusions about the relationships observed. Longitudinal research examining how individual differences predict learning trajectories over time would strengthen causal inferences. Second, the sample consisted of university students in a single geographic region, limiting generalizability to other age groups and cultural contexts. Third, while standardized instruments were used for temperament and cognitive style assessment, language proficiency measures combined standardized tests with instructor ratings, introducing potential measurement error. Future research might employ more comprehensive proficiency assessment batteries. Fourth, the study did not examine interactions between individual difference variables or between learner characteristics and instructional methods, both of which would be valuable directions for future investigation.

Future research should explore several extensions of this work. First, experimental studies manipulating instructional approaches based on learner profiles would provide stronger evidence for the value of personalization. Second, investigation of additional individual difference variables such as working memory capacity, metacognitive awareness, and motivational orientations would provide a more complete picture of learner characteristics relevant to language acquisition. Third, studies examining how different individual difference variables relate to learning different target languages would illuminate whether the current findings generalize across linguistic contexts or are specific to English. Fourth, research on effective methods for helping learners with various profiles develop compensatory strategies could have immediate practical value.

Conclusion

This empirical investigation demonstrates that individual differences in temperament and cognitive style relate significantly to English language learning outcomes, with cognitive styles showing particularly strong associations with overall proficiency. The specificity of relationships–extraversion predicting speaking proficiency, verbal preference relating to vocabulary, analytic style associated with grammar–suggests that different learner characteristics support different aspects of language acquisition. These findings underscore the complexity of individual differences in language learning and challenge one-size-fits-all instructional approaches.

The practical implication is clear: effective language instruction must accommodate learner diversity. This accommodation can take multiple forms, including varied instructional methods within courses, explicit metacognitive training to help learners understand their own profiles, and development of differentiated materials that present content through multiple modalities and organizational schemes. As language education moves increasingly toward personalization through technology-enhanced learning environments, understanding which learner characteristics matter most for which outcomes becomes essential for effective system design.

While challenges remain in translating individual difference research into scalable instructional practices, the evidence continues to accumulate that learner characteristics significantly influence language acquisition processes and outcomes. By identifying key individual differences and understanding their relationships to language learning, researchers and educators can work toward more effective, efficient, and equitable language instruction that serves diverse learner populations.

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ТІЛ ҮЙРЕНУДЕГІ ЖЕКЕ АЙЫРМАШЫЛЫҚТАР: ТЕМПЕРАМЕНТ, КОГНИТИВТІ СТИЛЬДЕР ЖӘНЕ ОҚЫТУДЫ ЖЕКЕЛЕНДІРУ

Аңдатпа

Бұл эмпирикалық зерттеу университет студенттері арасында жеке психологиялық айырмашылықтар мен ағылшын тілін үйрену нәтижелері арасындағы байланысты зерттейді. Зерттеуге ірі қалалық университеттің 80 студенті (орташа жасы = 19,8 жыл, SD = 1,2) қатысты. Зерттеуде темпераментті бағалау үшін Айзенк тұлғалық сауалнамасы (EPQ), когнитивті стильдерді (вербалды-бейнелі және холистикалық-аналитикалық

өлшемдер) өлшеу үшін Райдинг когнитивті стиль талдауы және тілдік құзыреттілікті бағалау үшін Кембридж ағылшын тілін анықтау тесті сияқты стандартталған құралдар қолданылды. Нәтижелер экстраверсия мен сөйлеу тиімділігі арасында ($r = 0,42$, $p < 0,01$), бейнелі когнитивті стиль мен лексиканы меңгеру арасында ($r = 0,38$, $p < 0,01$), сондай-ақ аналитикалық стиль мен грамматиканы түсіну арасында ($r = 0,44$, $p < 0,01$) маңызды корреляцияларды көрсетеді. Көпфакторлы регрессиялық талдау когнитивті стиль өлшемдері ағылшын тілін меңгерудің жалпы деңгейіндегі дисперсияның 31%-ын болжағанын анықтады ($R^2 = 0,31$, $p < 0,001$). Алынған деректер негізінде біз студенттердің темпераменті мен когнитивті қалауларын ескеретін жекелендірілген тілдік оқыту тұжырымдамасын ұсынамыз. Зерттеу жеке айырмашылықтардың тіл үйрену процестері мен нәтижелеріне айтарлықтай әсер ететінін көрсетеді, бұл шетел тілі ретіндегі ағылшын тілі контекстінде дифференцияланған педагогикалық тәсілдердің қажеттілігін білдіреді.

Тірек сөздер: жеке айырмашылықтар, темперамент, когнитивті стильдер, ағылшын тілін үйрену, жекелендірілген оқыту, университет студенттері.

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ИНДИВИДУАЛЬНЫЕ РАЗЛИЧИЯ В ИЗУЧЕНИИ ЯЗЫКА: ТЕМПЕРАМЕНТ, КОГНИТИВНЫЕ СТИЛИ И ПЕРСОНАЛИЗАЦИЯ ОБУЧЕНИЯ

Аннотация

Данное эмпирическое исследование изучает взаимосвязь между индивидуальными психологическими различиями и результатами изучения английского языка среди студентов университета. В исследовании приняли участие 80 студентов (средний возраст = 19,8 лет, SD = 1,2) крупного городского университета. В исследовании использовались стандартизированные инструменты, включая опросник личности Айзенка (EPQ) для оценки темперамента, анализ когнитивного стиля Райдинга для измерения когнитивных стилей (параметры вербально-образный и холистически-аналитический) и Кембриджский тест по определению уровня владения английским языком для оценки языковой компетенции. Результаты показывают значимые корреляции между экстраверсией и успеваемостью в говорении ($r = 0,42$, $p < 0,01$), между образным когнитивным стилем и усвоением лексики ($r = 0,38$, $p < 0,01$), а также между аналитическим стилем и пониманием грамматики ($r = 0,44$, $p < 0,01$). Множественный регрессионный анализ выявил, что параметры когнитивного стиля предсказывали 31% дисперсии общего уровня владения английским языком ($R^2 = 0,31$, $p < 0,001$). На основании полученных данных мы предлагаем концепцию персонализированного языкового обучения, учитывающую темперамент учащихся и их когнитивные предпочтения. Исследование демонстрирует, что индивидуальные различия существенно влияют на процессы и результаты изучения языка, что указывает на необходимость дифференцированных педагогических подходов в контексте английского языка как иностранного.

Ключевые слова: индивидуальные различия, темперамент, когнитивные стили, изучение английского языка, персонализированное обучение, студенты университета.

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