

A study on personality trait extraction considering user's ego state, and service development adapted to personality traits using ACL

Professor, Faculty of International Business Management, Kyoei University

Nobutaka Hirabayashi

<Abstract>

In transcultural management, in order to understand people, one of the three elements of management, it is important to understand individual personality in addition to understanding the national culture.

In this study, the five factors of the innate Big Five personality traits, which were studied to be universal in cultural and ethnic differences, and the egogram representing the state of the ego, were used. Then, it was analyzed and discussed how the state of mind of the survey subject at the time of the survey affected the collected personality trait data. Furthermore, we used the words in the Adjective Check List (ACL) that compose the Big Five (five-factor theory) trait theory of personality to assume multiple English learning service options. We asked the surveyees in the English learning state to select their English learning service and verified the effectiveness of ACLs that match the learner's personality traits for learning motivation. We created two different mental states in the classroom, conducted a questionnaire survey of 418 college students, and quantitatively verified the qualitative hypothesis extracted from the literature review and previous studies.

<Keywords>

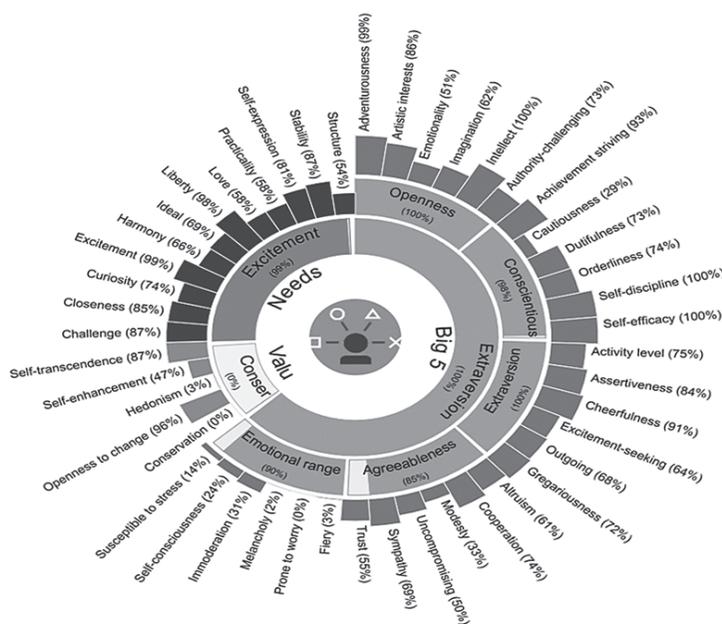
Big-five personality traits, egogram, motivation, service development, ACL

I . Introduction

In transcultural management, it is important to understand personality at the individual level in addition to understanding national culture at the national level. Hofstede (2005), who established five dimensions of national cultures, placed culture between human nature and personality in the concept of mental programming. Personality is specific to individuals and is inherited and learned, while culture is specific to group or category and is learned. Utilization of personality traits in transcultural management has a complementary relationship with the dimensions of national cultures, and also plays a role of correcting stereotypes. Personalities include type theory, which classifies people by type, and trait theory, which quantifies the strength of traits.

The mainstream of personality trait theory is the Big Five trait theory, whose score is relatively stable throughout life (Nettle, 2009; Soldz & Vaillant, 1999). Advances in big data processing and AI have entered the era of computer analysis of human personality traits using psychological theory. As a concrete example shown in Figure 1, Personality Insights, an application of IBM Watson, employs machine learning to automatically analyze text data posted on social media and score big five trait factors (IBM Watson - Personality Insights Home Page, 2020).

Figure 1 Graphic chart of IBM’s Watson™ application Personality Insights.



The Adjective Check List (ACL), a vocabulary of adjectives, is used to identify the Big Five personality traits (Gough & Heiblum, 1983).

Not all personality indicators use the Big Five. For example, in the medical and educational fields, some use the Egogram Test, developed by Berne (1961, 1964) and Dusay (1972) based on the theory of transactional analysis, which expresses the state of human ego with five indicators such as CP (Critical Parent), NP (Nurturing Parent), A (Adult), FC (Free Child), and AC (Adapted Child). With the Egogram, it is possible to exchange 'human interaction' (transactional analysis) and to facilitate problem solving and communication. The state of the ego changes depending on the state of the target person such as time and environment. Accurate collection of personality characteristic information and its utilization in business are indispensable for international management, where digital transformation will progress in the future.

From these backgrounds, the research questions are:

- Is it possible to stably collect personality trait information without being affected by changes in the state of the ego?
- Is it possible to contribute to product & service planning, design, marketing, and organizational management that match the personality traits by using the words in the ACL that match the personality traits of the target person?

To answer the above research questions, this study focuses on the English education business and its utilization of learner's characteristics, and investigates the following three points related to development, operation and promotion of learning services.

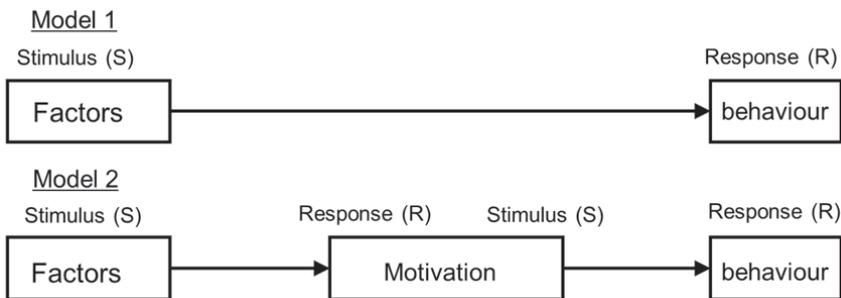
1. Which timing is the best for collecting the characteristics of learners accurately?
2. Is the use of learners' characteristics effective in improving learning motivation?
3. Is there an effective method that leverages the characteristics of learners in the development, operation, and promotion of learning services?

This research is not limited to the development, operation and promotion of learning services, but has a wide range of applications such as international human resource development, cross-cultural communication, international leadership management, and international organization management.

II. Literature Review

In preparation for establishing a hypothetical model for this research, we examined two personality models in Figure 2. Model 1 included such behavioral theories as Pavlov's (1927) classical conditioning, Watson's (1913) classical stimulus-response (S-R) behaviorism, and Thorndike's (1927) law of effect. Model 2 was a behavioral analysis incorporating concepts of new behaviorism such as Hull's (1943) stimulus-organism-response (S-O-R) theory and Skinner's (1961, 1977) operant conditioning.

Figure 2 Stimulus-response behaviorism and stimulus-organism-response theory



The Big Five (five-factor theory) trait theory of personality was originally proposed by Goldberg (1992), who said that human nature is composed of a combination of five factors previously described: extroversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Komarraju & Karau (2005) examined the relationship between the Big Five personality traits and individual differences in individual college students' academic motivations (172 undergraduates) by using the Academic Motivations Inventory (AMI) (Doyle & Moen, 1977) and found a significant relationship. 'Engagement' in the AMI was highly related with openness and extraversion. 'Achievement' in the AMI was explained by conscientiousness, neuroticism, and openness. 'Avoidance' in the AMI was related positively with neuroticism and extraversion, and it was related negatively with conscientiousness and openness.

Figure 3 Examples of Adjectives to Define the Five Factors

Name	Adjectives	Q-sort items	Scales
Extraversion (E)	Active Assertive Energetic Enthusiastic Outgoing Talkative	Talkative Skilled in play, humour Rapid personal tempo Facially, gesturally expressive Behaves assertively Gregarious	Warmth Gregariousness Assertiveness Activity Excitement Seeking Positive Emotions
Agreeableness (A)	Appreciative Forgiving Generous Kind Sympathetic Trusting	Not critical Behaves in giving way Sympathetic, considerate Arouses liking Warm, compassionate Basically trustful	Trust Straightforwardness Altruism Compliance Modesty Tender-Mindedness
Conscientiousness (C)	Efficient Organized Planful Reliable Responsible Through	Dependable, responsible Productive Able to delay gratification Not self-indulgent Behaves ethically Has high aspiration level	Competence Order Dutifulness Achievement Striving Self-Discipline Deliberation
Neuroticism (N)	Anxious Self-pitying Tense Touchy Unstable Worrying	Thin-skinned Brittle ego defences Self-defeating Basically anxious Concerned with adequacy Fluctuating moods	Anxiety Hostility Depression Self-Consciousness Impulsiveness Vulnerability
Openness (O)	Artistic Curious Imaginative Insightful Original Wide interests	Wide range of interests Introspective Unusual thought processes Values intellectual matters Judges in unconventional terms Aesthetically reactive	Fantasy Aesthetics Feelings Actions Ideas Values

Dewaele & Oudenhoven (2009) reviewed and found the relationship between the Big Five personality traits (especially conscientiousness and openness) and second foreign language learning in some extent.

McCrae & John (1992) conducted research using several types of language adjectives for questionnaires to define the Five-Factor Model (FFM). Examples of the language adjectives are shown in Figure 3.

Gough & Heiblum (1983) developed an Adjective Check List (ACL), a list of adjectives to identify common personality traits. The ACL was used to create the scale and question of Big Five personality test. Using the ACL increases the consistency and reliability of the contents and easily secures a stable factor structure. Kashiwagi, Wada, & Aoki (1993) made a Japanese version of the ACL, compared Big Five with an oblique primary pattern for the Japanese ACL, and confirmed that it matched the English ACL. Piedmont, McCrae, & Costa

(1992) also studied factor analysis with Big Five. Thus, there are several methods for the scale configuration and questionnaires of character examination using Big Five. Oshio, Abe, & Cutrone (2012) created a Japanese version of the Ten Item Personality Inventory (TIPI-J) and examined its reliability and validity. The results generally supported the reliability and validity in extraversion and conscientiousness. Nettle (2009) recommends using a questionnaire based on the International Personality Item Pool (IPIP) scale from the viewpoint of effectiveness. The IPIP comprises 50 items. The five traits of the Big Five differ for each age group, but it is said that the proportion of each combination of each person is considerably stable at any age.

Soldz & Vaillant (1999) found during 45 years of research that the characteristic trends of the Big Five among university graduates had much in common with the trends of people aged 67 to 68 years. They suggested that the personality formed by around the age of 20 does not change very much throughout life.

There have been numerous examples of previous research using the Big Five in the learning field of the second language. For example, Verhoeven & Vermeer (2002) investigated the relationship between the communication skills of children aged 11 to 13 with parents who had emigrated to the Netherlands and personality traits using the Big Five. From the time of kindergarten, the children used Dutch as the living language. It was openness that showed the highest correlation in this study. Openness, or openness to experience, is a characteristic that shows the desire to experience various things and the degree of consciousness to learn from the experience. Whereas openness shows a high interest in new, diverse, and complicated things, the opposite, closedness, describes a tendency to like what you already know well, simple things, and real things. According to a study by Bakalis & Joiner (2004), there is a tendency for people with higher openness to gain higher English proficiency—for example, students actively absorbing different lifestyles and cultures curiously in their overseas study abroad. According to Nitta & Baba (2016), openness seems to be similar to extraversion, but while extraversion seeks social success, openness relates more to curiosity and quest. It is a characteristic of pursuit. Openness reflects the efficiency of the frontal lobe of the brain and is believed to be associated with intelligence and creativity. Dewaele & Oudenhoven (2009) investigated the character of teenagers living in London as immigrants. They found that immigrant children tended to have higher cultural empathy, with higher openness and neuroticism, than British children

who used only English. It is thought that the cross-cultural experiences of their childhoods produced great stress for the immigrant children and increased their neuroticism, but endeavoring to overcome those experiences helped develop their openness and made them aware of different values. Personality is influenced by genetic factors and experiences early in life, and experiences of living in different cultural environments and using multiple languages during childhood have a great influence on personality formation.

Nitta & Baba (2016) referred to two approaches to investigate personality traits. One approach is to use questionnaires to quantify and objectively understand personality traits, and the other approach views the formation of individual identity as building a subjective story of a person's life. This latter method tries to capture individual identity qualitatively by having a variety of experiences told as a series of stories.

According to a biography by Stewart (1992), Eric Berne launched transactional analysis in 1954. Berne and Dusay's Egogram is a quantification method expressing the ego states of parent, adult, and child on a graph. The Egogram hypothesizes that each individual has 100% (constant) spiritual energy and that energy is divided into five factors— CP (Critical Parent), NP (Nurturing Parent), A (Adult), FC (Free Child), and AC (Adapted Child)—in personality profiling. Iwai, Ishikawa, Morita, & Kikuchi (1978) analyzed changes in ego states using a clinical application of the Egogram with patients. They found that their therapy patients tended to have higher AC and higher FC scores than those found in healthy individuals. The Egogram can be used not only for transactional analysis therapy but also as a monitor for judging treatment effect (behavior changes) by psychosomatic medicine treatment. TEG, a Japanese version of the Egogram developed by the Department of Psychosomatic Medicine, University of Tokyo (2006), is widely used in Japan as a questionnaire method. Kashiwagi (1999) analyzed the five factors of Egogram using the TEG and the five factors of the Big Five using the Japanese ACL. The results showed that in an incomplete orthogonal Procrustes solution by scale unit, a five-trait personality scale based on the Big Five scale and the Japanese ACL is mutually independent, but the TEG concept scale lacks dimensions of personality traits described as E or extraversion and thus has not five factors but only four, making it the Big Four instead of the Big Five. Hirabayashi (2019) incorporated behavioral models (e.g. S-R model, S-O-R model, etc.) in previous studies to develop questionnaire using personality traits and studied the ways to raise students' motivation to learn English qualitatively.

People in healthcare, business, education, and other areas have used the Egogram, as well as the Big Five personality traits theory. However, both theories have been field tested independently. Thus, there is a limitation on research on models that combine the advantages of both. The ego state described by the Egogram varies depending on the target person’s conditions (e.g. time and environment), but the personality traits of the Big Five do not change depending on the target person’s condition. Thus, a study based on both simultaneously has an inherent limitation since it treats them the same with respect to whether conditions affect outcome. That is, in this study, the data was viewed as though conditions affected both the Egogram and the Big Five results. To use both theories to improve the motivation of customers to use learning services, this limitation also affects what characteristic factor information should be collected to fulfil the objective given a customer’s state or conditions.

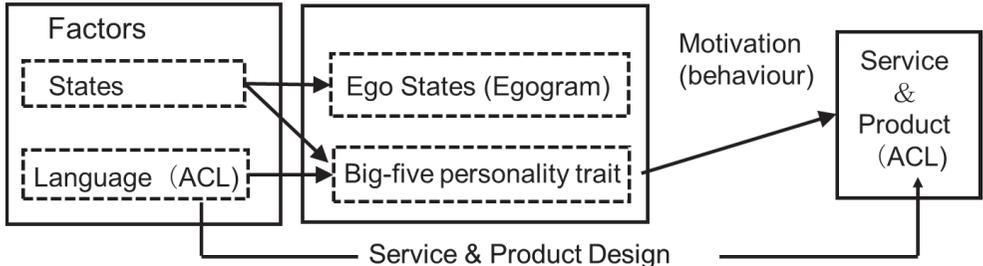
III. Methodology:

1. Hypothetical model and hypothesis:

Through the literature review and the preliminary study, I created a hypothetical Model 3 (Figure 4). This model expresses that ‘a person feels motivated and takes action, but the language and dialogue pattern affecting motivation is specified by the personality trait and the ego states.

Figure 4 Basic model for product design of this research (created by the author).

Model 3



Since the authenticity of the hypothesis was qualitatively confirmed to a certain extent by the previous study (Hirabayashi, 2019), the following four hypotheses made up this Model 3.

To verify each hypothesis, the following statistical methods were applied, respectively.

(1) Hypothesis 1:

When entering the environment of English learning from the normal environment, the learner's dominant personality trait changes.

Statistical method: F-test and t-test

(2) Hypothesis 2:

Ego states change when learners enter the environment of English learning from the normal environment.

Statistical method: F-test and t-test

(3) Hypothesis 3:

The Big Five and the Egogram show high similarity from the viewpoint of a learner's personality.

Statistical method: correlation analysis

(4) Hypothesis 4:

It is possible to motivate learners' English study by proposing learning products that use the words of ACLs in accordance with the personality traits of learner's Big Five.

Statistical method 1: correlation analysis between ACL and Big Five personality traits

Statistical method 2: correlation analysis between English learning service and Big Five personality traits

Statistical method 3: factor analysis of English learning service

Statistical method 4: multiple regression analysis

(a) The dependent variable: learning product score (16 items)

(b) The independent variables: E, A, C, N, and O

To quantitatively verify the hypotheses extracted through the previous research and the preliminary survey using Model 3 (Figure 4), we followed the procedure described below.

2. Measurement Target:

Four hundred eighteen university students taking the classes that were chosen randomly from all classes of a university. After removing 9 invalid answers and 16 international student

answers, valid answers are 393. Demographic information of 393 valid answers is as follows:

Gender (male: 303, female: 90), Grade (1st grade:171, 2nd grade:138, 3rd grade:53, 4th grade or more:31)

3. Survey Method (conducted from Tuesday, July 24 to Friday, July 27, 2018):

This section describes the method of delivery of the questionnaire.

(1)The students filled out the questionnaire in a normal state. The questionnaire included the following:

(1a) 50 items from the TEG II on Egogram pattern analysis

(1b) 50 items from the Big Five factor analysis of the International Personality Item Pool (IPIP)

(1c) 50 items from the Japanese version of Adjective Check List (ACL)

(2)After a break, we made students imagine situations where they were studying English in a relaxed atmosphere, and gradually students were led to situations where they learn English.

(3)Students again filled in the questionnaire, imagining the situation of studying English.

The questionnaire included the following:

(3a) 50 items from the Big Five factor analysis of the IPIP

(3b) 50 items from the TEG II on Egogram pattern analysis

(3c) 50 items from the Japanese version ACL

One week later, the students filled in another questionnaire to measure learning motivations for 16 types of English learning services expressed using words from the ACL (Figure 5).

Figure 5 English Learning Services Expressed Using Words from the ACL Characteristic of the Big Five

svc	Content of English Learning Service	Big 5 ego state	Score	Rank
v1	English lessons that you can relax with even you are anxious and worried about English	N		
v2	English counselling to resolve irritation while facing English troubles with learner	N		
v3	English lessons that give kind support to nervous and vulnerable people	N		
v4	Active English learning mainly based on outgoing activities	E		
v5	Talkative English lesson with a cheerful teacher and colleagues in a bright atmosphere	E		
v6	English lesson that will follow well for even modest and inward person	E-		
v7	Lessons to learn various things such as colour coordination using English	O		
v8	Key points learning that emphasizes on efficiency and enables you to acquire English skill in a short period of time	O		
v9	Innovative English program using unique and ingenious method	O		
v10	English conversation lesson that you can brightly respond to any scene such as unexpected incident	O		
v11	English lessons by gentle, generous, and mild teacher	A		
v12	English lessons with kind, close, and honest friends	A		
v13	Survival English lesson where you beat your opponent with emotion and survive only yourself	A-		
v14	English learning program to keep on seriously and steadily every day	C		
v15	Lessons that the teacher taught hard with responsibility	C		
v16	English lesson for loose lazy people who can participate when they want to go	C-		

Please evaluate the following English learning services using these 5 grades: 1 = do not want to do at all, 2 = I do not want to do, 3 = cannot say either, 4 = want to do, 5 = I strongly want to do.. Please rank your English learning service in the order you want to do.

All students were advised that their privacy was secured, the survey was not related to their grades, and how the study result would be used. All questionnaires were filled with name and student ID number and collected immediately after completion.

IV. Analysis and Discussion

1. Hypothesis 1 (Big Five)

First, we statistically verified Hypothesis 1, 'When entering the environment of English learning from the normal environment, the learner's dominant personality trait changes,' using the F-test and t-test as the verification methods. The verification results are shown in the Figure 6. Regarding E, N, and O among the five personality traits of the Big Five, we

found the hypothesis to be statistically significant. On the other hand, it was also verified that the same hypothesis was not statistically significant for A or C.

Figure 6 F-test and T-test of the Big Five Personality Traits

acronym	states	observed number	average	variance	F-test [p value: both sides]	t-test [t value]	t-test [p value: both sides]
E	normal	393	18.4	40.2	[0.6976]	[-3.04]	[0.00121**]
	study		19.8	38.7			
A	normal	393	24.5	32.2	[0.5269]	[0.51]	[0.60977]
	study		24.3	30.2			
C	normal	393	23.0	31.6	[0.8164]	[0.50]	[0.61858]
	study		22.8	30.8			
N	normal	393	20.1	48.4	[0.7281]	[-2.87]	[0.00422**]
	study		21.5	46.8			
O	normal	393	18.0	32.1	[0.7478]	[-2.42]	[0.01594**]
	study		19.0	33.2			

**p<0.01, *p<0.05

2. Hypothesis 2 (Egogram)

Next, we statistically verified Hypothesis 2, 'Ego states change when learners enter the environment of English learning from the normal environment,' using the F-test and t-test as the verification methods. The verification results are shown in the Figure 7. Regarding NP (Nurturing Parent), FC (Free Child), and AC (Adapted Child) among the five ego states of Egogram, the hypothesis was statistically significant.

Figure 7 F-test and T-test of Egogram Ego States

acronym	states	observed number	average	variance	F-test (p value: both sides)	t-test (t value)	t-test (p value: both sides)
CP (Critical Parent)	normal	393	12.4	14.4	[0.0005**]	[-1.64]	[0.10247]
	study		12.9	20.4			
NP (Nurturing Parent)	normal	393	15.3	13.7	[0.0049**]	[-2.63]	[0.00877**]
	study		16.0	18.2			
AA (Adult)	normal	393	11.0	21.1	[0.0320*]	[-0.90]	[0.37037]
	study		11.3	26.2			
FC (Free Child)	normal	393	12.8	23.9	[0.3498]	[-2.93]	[0.00347**]
	study		13.9	26.3			
AC (Adapted Child)	normal	393	12.6	28.1	[0.0018**]	[1.99]	[0.04666*]
	study		11.7	38.5			

**p<0.01, *p<0.05

On the other hand, we also found that this same hypothesis was not statistically significant for the CP (critical parent) and AA (adult) ego states.

3. Hypothesis 3 (Egogram)

According to the correlation analysis in Figure 8, the Big Five and Egogram showed some similarity from the viewpoint of traits of learners' personalities.

Figure 8 Correlation Analysis between the Big Five and Egogram (Sample size 393)

		Egogram (TEGII)				
		CP	NP	AA	FC	AC
Big-Five (PIPP)	E	0.44	0.30	0.13	0.57	-0.30
	A	0.25	0.48	0.17	0.32	0.04
	C	0.28	0.28	0.13	0.18	-0.20
	N	0.11	0.10	-0.10	0.25	-0.40
	O	0.39	0.24	0.41	0.39	-0.30

We observed a positive correlation (correlation coefficient > 0.4) between E (extroversion) and FC (free child); E (extroversion) and CP (critical parent); A (agreeableness) and NP (nurturing parent); and O (openness to experience) and AA (adult).

We also observed a negative correlation (correlation coefficient < -0.4) between N and AC. There was a weak positive correlation ($0.2 < \text{correlation coefficient} < 0.4$) between E and NP; A and FC; A and CP; C and CP; C and NP; N and FC; O and CP; O and NP; and O and FC.

We found a weak negative correlation ($-0.2 < \text{correlation coefficient} < -0.4$) between E and AC; C and AC; N and AC; and O and AC.

4. Hypothesis 4 (Egogram)

To examine Hypothesis 4, it is possible to motivate learners' English study by proposing learning products that use the words of ACLs in accordance with the personality traits of learner's Big Five, we used the following four statistical methods for verification:

(1) Statistical Method 1 (correlation analysis between ACL and Big Five personality traits).

Figure 9 indicates the correlation between the Big Five personality traits and ACL, the list of adjectives to identify common personality traits. It is a correlation analysis between the score of five stages and the Big Five personality traits and reflects how often the students matched the 50 words of the ACL. In Figure 9, the shaded figures are the Big Five

personality traits with the highest correlation coefficient for each word. Except for a few words for which correlation with N was high despite expected correlation with C, it was verified that most ACL words have high correlations with the expected Big Five personality traits.

Figure 9 Correlation Analysis between ACL Words and the Big Five Personality Traits

		393 samples				
	Adjective Check List of Big-Five	correlation with ACL				
		E	A	C	N	O
1	N uneasy	-0.32	0.08	-0.01	-0.51	-0.22
2	N anxious	-0.33	0.13	0.02	-0.46	-0.22
3	N troubled	-0.32	0.10	-0.06	-0.57	-0.12
4	N upset	-0.36	0.05	-0.04	-0.50	-0.16
5	N afraid	-0.35	-0.03	-0.15	-0.44	-0.22
6	N irritated	-0.27	-0.20	-0.15	-0.60	-0.08
7	N nervous	-0.22	0.02	0.10	-0.44	0.01
8	N sensitive	-0.21	0.03	-0.07	-0.58	-0.03
9	N stable	0.07	0.19	0.20	0.14	0.09
10	N easy	0.10	0.13	0.09	0.08	0.14
11	E active	0.47	0.33	0.22	0.24	0.29
12	E positive	0.57	0.32	0.23	0.26	0.32
13	E cheerful	0.48	0.34	0.24	0.22	0.26
14	E outgoing	0.57	0.31	0.22	0.18	0.32
15	E talkative	0.53	0.39	0.21	0.14	0.31
16	E modest	-0.51	-0.09	-0.01	-0.24	-0.18
17	E inward	-0.52	-0.13	-0.19	-0.34	-0.20
18	E timid	-0.53	-0.16	-0.15	-0.32	-0.15
19	E humble	-0.49	-0.16	-0.16	-0.36	-0.16
20	E lonely	-0.42	-0.24	-0.18	-0.39	-0.09
21	O aesthetic	0.18	0.09	0.01	-0.04	0.39
22	O all-arounded	0.30	0.08	0.10	0.11	0.47
23	O nimble	0.23	0.23	0.20	0.12	0.42
24	O efficient	0.25	0.22	0.22	0.08	0.43
25	O provident	0.31	0.20	0.19	0.08	0.48

		393 samples				
	Adjective Check List of Big-Five	correlation with ACL				
		E	A	C	N	O
26	O original	0.22	0.12	0.13	-0.02	0.55
27	O independent	0.11	0.10	0.15	-0.11	0.39
28	O bright	0.21	0.18	0.17	0.07	0.54
29	O quick-witted	0.18	0.23	0.22	0.04	0.44
30	O adhoc	0.26	0.26	0.32	0.09	0.49
31	A gentle	0.20	0.42	0.37	0.15	0.21
32	A generous	0.23	0.32	0.24	0.06	0.26
33	A mild	0.18	0.41	0.30	0.10	0.21
34	A kind	0.23	0.39	0.35	0.06	0.23
35	A friendly	0.38	0.42	0.31	0.12	0.20
36	A kindhearted	0.28	0.40	0.34	0.11	0.21
37	A honest	0.32	0.32	0.26	0.12	0.21
38	A selfish	0.02	-0.20	-0.20	-0.28	0.05
39	A short-tempered	-0.12	-0.26	-0.21	-0.51	0.00
40	A hostile	-0.16	-0.27	-0.21	-0.44	0.02
41	C diligent	0.00	0.11	0.21	-0.17	0.24
42	C hasty	-0.12	-0.20	-0.26	-0.27	0.07
43	C fickle	-0.13	-0.01	-0.12	-0.31	0.01
44	C mercurial	0.10	-0.02	-0.21	-0.40	0.10
45	C capricious	-0.19	0.01	-0.11	-0.30	-0.03
46	C irresponsible	-0.10	-0.24	-0.34	-0.29	-0.09
47	C perfunctory	-0.15	-0.18	-0.33	-0.27	-0.05
48	C idle	-0.28	-0.24	-0.31	-0.36	-0.06
49	C lazy	-0.19	-0.25	-0.32	-0.31	-0.04
50	C promiscuous	-0.10	0.01	-0.26	-0.13	0.04

(2)Statistical Method 2: correlation analysis between English learning service and the Big Five personality traits.

Figure 10 shows the contents of English learning services. We developed the list of English learning services using the 50 ACL words that affect specific Big Five personality traits. The ACL column in the Figure 10 represents the expected Big Five personality traits that are the personality traits of the students who are the target of the services. The shaded numbers are the first- and second-highest correlation coefficients for each English learning service, indicating that students with the target personality traits showed high motivation for each service. In the Figure 10, there are two exceptional English learning services (v1, v2) which did not motivate the student with target personality traits.

Figure 10 Correlation between English Learning Services and the Big Five Personality Traits

svc #	Content of English Learning Service	ACL	Correlation with Big-Five				
			E	A	C	N	O
v1	English lessons that you can relax with even you are anxious and worried about English	N	0.02	0.21	0.12	-0.06	0.05
v2	English counseling to resolve irritation while facing English troubles with learner	N	0.07	0.13	0.00	-0.14	0.12
v3	English lessons that give kind support to nervous and vulnerable people	N	-0.02	0.10	0.04	-0.14	0.08
v4	Active English learning mainly based on outgoing activities	E	0.28	0.28	0.14	0.18	0.15
v5	Talkative English lesson with a cheerful teacher and colleagues in a bright atmosphere	E	0.28	0.37	0.14	0.13	0.09
v6	English lesson that will follow well for even modest and inward person	E-	-0.10	0.13	0.01	-0.07	0.03
v7	Lessons to learn various things such as color coordination using English	O	0.10	0.12	-0.01	0.01	0.14
v8	Key points learning that emphasizes on efficiency and enables you to acquire English skill in a short period of time	O	0.10	0.18	0.11	0.05	0.16
v9	Innovative English program using unique and ingenious method	O	0.12	0.20	0.08	0.01	0.26
v10	English conversation lesson that you can brightly respond to any scene such as unexpected incident	O	0.08	0.24	0.17	0.02	0.22
v11	English lessons by gentle, generous, and mild teacher	A	0.05	0.23	0.12	0.02	0.05
v12	English lessons with kind, close, and honest friends	A	0.17	0.29	0.16	0.05	0.06
v13	Survival English lesson where you beat your opponent with emotion and survive only yourself	A-	0.15	-0.03	-0.08	0.07	0.10
v14	English learning program to keep on seriously and steadily every day	C	0.02	0.13	0.18	-0.02	0.12
v15	Lessons that the teacher taught hard with responsibility	C	0.09	0.27	0.23	0.03	0.10
v16	English lesson for loose lazy people who can participate when they want to go	C-	0.03	-0.05	-0.15	0.04	0.01

(3) Statistical Method 3: factor analysis of English learning service.

We conducted an exploratory factor analysis (method of maximum likelihood, promax rotation, Kaiser criterion) for 16 items on the English learning services' attractiveness scale based on the score given by the students from v1 to v16 of service # in Figure 11. The factor number was determined to be four factors by taking into consideration of the attenuation pattern of eigenvalues (5.009, 1.526, 1.350, 1.114, 1.058) and the possibility of interpretation of factors. However, since factor loading amounts for the two items (v7, v16) were less than 0.30, these items were excluded, and factor analysis was performed again. As a result, since the factor loading amount for one item (v9) was less than 0.30; this item was excluded, and the factor analysis was performed again. The final factor pattern after rotation is shown in Figure 11. The reliability of the factor analysis is shown below the Figure 11.

Factor 1 was named the 'good faith and reliability factor' because factor loading was high in items related to good, faithful, and reliable teachers, colleagues, and contents. Factor 2 was related to mental support such as anxiety and threat, and the factor load was high, so it was named the 'anxiety and threat factor'. Factor 3 was related to extroverted and active lessons, and the factor load was high, so it was named the 'socialization and activity factor'. Factor 4 was related to self-management and self-centered programs, and the factor load was high, so it was named the 'self-management/self-centered factor'.

The four factors can be easily interpreted from the viewpoint of the Big Five personality traits. The ‘faithfulness and reliability factor’ is interpreted to be a hybrid of C and A. The ‘anxiety and threat factor’ is translated to N. The ‘socialization and activity factor’ is matched to E. The ‘self-management and self-centered factor’ corresponds to a hybrid of C and A.

Figure 11 Factor Analysis of English Learning Service

Item	Content of English Learning Service	Big5	Factor1	Factor2	Factor3	Factor4	Commonality
v12	English lessons with kind, close, and honest friends	A, C	0.72	-0.05	0.16	-0.15	0.53
v15	Lessons that the teacher taught hard with responsibility	A, C	0.68	-0.03	-0.10	0.35	0.70
v11	English lessons by gentle, generous, and mild teacher	A, C	0.62	0.15	0.00	-0.11	0.45
v8	Key points learning that emphasizes on efficiency and enables you to acquire English skill in a short period of time	A, O	0.51	-0.14	0.08	0.07	0.26
v1	English lessons that you can relax with even you are anxious and worried about English	A, C	0.44	0.29	0.09	-0.18	0.40
v10	English conversation lesson that you can brightly respond to any scene such as unexpected incident	A, O	0.38	0.06	0.26	-0.03	0.31
v2	English counseling to eliminate irritation while consulting English troubles	N-, A	-0.12	0.90	0.08	0.04	0.77
v3	English lessons that give kind support to nervous and vulnerable people	N-, A	0.03	0.71	-0.12	0.12	0.57
v6	English lesson that will follow well for even modest and inward person	A, E	0.33	0.34	-0.10	0.02	0.33
v5	Talkative English lesson with a cheerful teacher and colleagues in a bright atmosphere	A, E	0.16	-0.05	0.72	0.03	0.60
v4	Active English learning mainly based on outgoing activities	E, A	0.06	-0.02	0.69	0.21	0.57
v14	English learning program to keep on seriously and steadily every day	C, A	0.22	0.06	-0.01	0.61	0.57
v13	Survival English lesson where you beat your opponent with emotion and survive only yourself	A-, O	-0.27	0.09	0.29	0.46	0.25

Reliability coefficient

* Calculate the a coefficient and ω coefficient from the items in bold (reverse to those with negative load)

	Factor 1	Factor 2	Factor 3	Factor 4
a coefficient	0.78	0.74	0.74	0.46
ω coefficient	0.81	0.77	0.74	0.53
Factor score	0.83	0.84	0.71	0.61

(4) Statistical Method 4: multiple regression analysis.

For Factor 1 (v12, v15, v11), Factor 2 (v2, v3), Factor 3 (v5, v4) and Factor 4 (v14), which had a factor loading amount of 0.60 or more by factor analysis, personality traits of Big-Five are used to perform multiple regression analysis as follows:

- Objective variable: product score for learning services extracted through factor analysis.
- Explanatory variables: E, A, C, N, O

Figure 12 shows the results of the multiple regression analysis, which verified that the

explanatory variable personality traits (E, A, C, N, and O) significantly predicted all eight English learning services, which are objective variables. In addition, the English learning services developed using words that are supposed to influence specific personality traits (E, A, C, N, and O) in the ACL verified that its explanatory variable is statistically matched with the personality traits (E, A, C, N, and O) originally expected in the ACL. (See shaded figures in Figure 10)

Figure 12 Multiple Regression Analysis for Services Extracted from Factor Analysis

Factor analysis	Objective variable	ACL	Factor loadings	Explanatory variables (Big-Five)					R ²
				E	A	C	N	O	
Factor1	v12	A	0.720	0.134*	0.256**	0.058	0.023	0.073	0.102**
	v15	C	0.682	0.019	0.207**	0.146**	-0.007	0.003	0.092**
	v11	A	0.620	-0.009	0.224**	0.040	-0.003	-0.015	0.056**
Factor2	v2	N	0.899	0.082	0.133**	-0.059	-0.175**	0.069	0.056**
	v3	N	0.707	-0.013	0.102	0.001	-0.147**	0.056	0.036*
Factor3	v5	E	0.715	0.209**	0.328**	0.000	0.024	-0.074	0.175**
	v4	E	0.690	0.179**	0.215**	0.014	0.091	0.028	0.133**
Factor4	v14	C	0.609	-0.039	0.066	0.137	-0.026	0.075	0.041**

(sample size = 392) **p<0.01, *p<0.05

V. Conclusion

Four main conclusions were drawn from this study. These are described below.

One, the Big Five personality traits of English learners were statistically verified to change if learners changed from the normal environment to an English learning environment. The personality traits of English learners whose transformation was confirmed were E, N, and O. Therefore, when collecting customers' Big Five personality traits for developing and marketing English learning products, the best results will occur when the data is collected when the customers are in the English learning state. Additionally, when companies use the Big Five in the development and marketing of English learning products to enable psychological segmentation of the market, it is especially necessary to carefully investigate the personality traits E, N, and O.

Two, the Egogram's ego states of English learners were statistically verified to change when the English learners changed from the normal environment to the English learning environment. The ego states of English learners whose transformation was confirmed

were NP (Nurturing Parent), FC (Free Child), and AC (Adapted Child). Therefore, when a company collects information on the Egogram ego states of English learners for the purpose of developing and marketing English learning products, the best results will occur when the data is collected when the customer is in the English learning state. Because the Egogram is used for communication-based therapies such as transactional analysis, when an English teacher communicates to English learners or when sellers of English learning products use it in conversation with customers, it is important to pay attention to the transformations of NP (Nurturing Parent), FC (Free Child), and AC (Adapted Child).

Three, the Big Five and Egogram showed some similarity from the viewpoint of learners' personalities. A positive correlation was observed between E and FC (Free Child); between E and CP (Critical Parent); between A and NP (Nurturing Parent); and between O and AA (Adult). A negative correlation was observed between N and AC (Adapted Child).

In the fourth and final conclusion, it was confirmed that the ACL words that affect the Big Five's specific personality traits positively affect English learners who have similar personality traits entering the state of English learning. There is a possibility of stimulating the personality traits of customers and students and improving the motivation for specific behavior by using words affecting the personality traits of customers and students in English learning. When English learning products were developed using the words of the ACL matched to specific personality traits of the Big Five, it was statistically confirmed that learners who had similar personality traits shared with the words of that ACL wanted to use the product. As a result, it is statistically verified that it is effective to employ the word from the ACL that conforms to the Big Five personality traits in marketing segmentation of English learning customers, developing English learning products, and communicating with customers.

Since ACL of Big Five and dialogue patterns of Egogram positively affect learners' motivation, I found that they are effective for marketing, development and sales of English learning services.

In this research, the sample data was limited to college students, and the application target was limited to English learning service. However, in the future research, I would like to expand the sample data and applications to apply this mechanism to increase motivation by utilizing personality traits, ACL, and states management in various fields.

VI . Implication

The following five points are raised as implications of this research:

1. By combining the Big Five and the egogram, we properly grasped the different personality traits of the target person in situations of different contexts such as work and learning.
2. There is a word list (ACL) that influences motivation of the target person with each personality trait, and it was verified that a service consisting of a combination of words that matches the personality trait is accepted by that target person.
3. Understanding personality traits by utilizing ACL will be automated by text mining and machine learning by AI. However, it is an issue how to grasp the state of the target persons and how to grasp their personality traits suitable for their state (context) of the ego.
4. The use of ACL will be used not only for the development of products and services that match personality traits, but also for sales, marketing, organizational management, etc.
5. Utilization of personality traits will become more and more important while complementing the national cultural scale in transcultural management.

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ユーザーの自我の状態を考慮した性格特性の抽出と ACL を用いた性格特性に 適応したサービス開発に関する研究

共栄大学国際経営学部教授

平林信隆

<要旨>

異文化経営において、経営の重要な3要素のひとつである人を理解するためには国民文化の理解に加え、個人のパーソナリティを理解することが重要である。

本研究では文化や民族の違いを超えて普遍的であると報告されたビッグファイブ・パーソナリティ特性5因子や心の状態を表すエゴグラムを用い、パーソナリティ特性を調査する際の対象者の精神的状態が、収集されたパーソナリティ特性データにどのような影響を及ぼすかの分析を行った。さらにビッグファイブの5因子尺度の International Personality Item Pool の構成項目に使われている形容詞チェックリスト ACL にある単語を使い、複数の学習サービスを想定し、ビッグファイブに帰属する各人に選択させることにより、学習者の性格特性に一致する ACL の学習者のモチベーションに対する有効性の検証を行った。教室において2つの異なる精神状態を作成し、418人の大学生にアンケート調査を実施し、文献レビューと以前の研究から抽出した質的な仮説を量的に検証した。

<キーワード>

ビッグファイブ性格特性、エゴグラム、モチベーション、サービス開発、ACL