Psychological Achievements

The Effect of Cognitive Load on Reaction to the Other's Trust: The Moderating Role of Personality Traits

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Abstract

Aim: The aim of this research was to investigate the effect of cognitive load on reaction to the other's trust, with the moderating role of personality traits.

Methods: Using available sampling method 85 at Persian Gulf University were selected and were asked to complete the HEXACO personality inventory. Then, using random assignment method, they were divided into four groups (four levels of cognitive load from no cognitive load to high cognitive load. Finally, participants were asked to complete a scenario that examined reaction to other's trust, under a variety of degrees of cognitive loads, mentioned above. The data were analyzed using hierarchical regression analysis (utilizing Baron and Keaney's method for assessing moderating effect).

Results: The results indicated that cognitive load causes a decrease in reaction to other's trust (R=0.683) and that each personality trait could moderate the effect of cognitive load on reaction to other's trust.

Conclusion: Considering the ever-increasing cognitive load caused by the explosion of information in the modern age, it is necessary to identify and strengthen the personality traits underlying trusting interpersonal relationships.

1. Introduction

The cognitive load theory was developed in 1991 by Sweller and Chandler., based on the information processing theory and limitations of the working memory. It provides guidelines for presenting information in a way that improves the intellectual performance of the learner (Sweller 2004). Sweller (2004) explained that cognitive load refers to the level of effort involved in thinking and reasoning (including perception, memory, language, and etc.,) when other cognitive procedures potentially cause interference. In other words, cognitive load refers to the load exerted on the working memory, which is kept in the form of information besides other information that is ready to be processed. Jong (2010) defines cognitive load as separate pieces of information or schemata that are processed simultaneously in the working memory; performing a task requires resources for processing the interactions and relationship between the different pieces (Dinesen, Nørgaard & Klemmensen, 2014). Unlike the long-term memory that has an infinite capacity, the working memory has a very limited ability to store and process information, hence, the cognitive load theory proposes that when the working memory limits are exceeded during a cognitive task, leaning becomes impaired. Therefore the learning environment can affect cognitive load and change it in various ways and these changes can impact perception, thinking and learning (Schilke & Huang, 2018).

Cognition is a collection of knowledge, beliefs, and mental activities, focused on obtaining and processing information (Helfat, 2015., Badleh, Tomaj & Ghobadian,2021), that people use to analyze the events in their surrounding environment, and is also used in decision-making, perception and giving meaning to behavior. Many parts of the human brain are involved in processing cognitive information. Different mental procedures such as perception, memory, language, reasoning, and decision-making are involved in different stages of cognition (Solso, 2005). In addition to the general processing of the data received from the environment such as visual and auditory stimuli, higher levels of processing in memory and existence of brain structures dedicated to certain cognitive tasks have always been under investigation by scientists (Eyesenck, 2015). A considerable portion of human cognition is obtained from the information available in social settings and interactions. During these ineractions and information exchanging, working memory is vulnerable to be overloaded, which is named cognitive load. Cognitive load refers to the load exerted by the carrying out of a certain task, on the cognitive system (Mahboobi, Zare, Fardanesh, 2013). It also refers to the load exerted on working memory during information processing and encoding of information into long-term memory.

One of the important concepts related to mental health is trust (Biranvand, Golshani, Akbarnejad, & Rafiee, 2021). Trust, as a social mechanism with numerous social, political, economic and psychological functions, plays an important role in group and interpersonal interactions. In fact, human life, without a sense of self-trust, trust to the future, and trust to the world, is accompanied by unbearable anxiety and conflict that leads to the destruction of the individual's life. Trust helps people to achieve their goal, in situations that are characterized by vulnerability and uncertainty (Daronnat, Azzopardi, Halvey, & Dubiel 2021). There is a lack of consensus over the conceptual definition of trust, which is rooted in the fact that many disciplines such as psychology, political science, or economics have tried to offer a definition of the concept (Carter, 2019). Mayer et al. (1995) define interpersonal trust as one's inclination to be influenced by another's actions, expecting a certain outcome. Interpersonal trust is shaped through direct relationships and face-to-face interaction within the society. The vastness and complexity of modern communication has conquered distance,

allowing many different people and groups to be able to interact, in turn expanding interpersonal trust into an important social factor called social trust (Sillietoe, 2018). Trust facilitates growth and actualization of talents and abilities and makes the relationship with others and the world creative and blossoming so that one could experience calmness, security, freedom and independence (Carter, 2019). Henceforth, trust shapes when people have hope and assurance of their life and survival—world and the future—while what endangers their life, survival or independence, will decrease their trust (Sillitoe, 2018). Trust will increase cooperation, coordination, social discipline and long-term interactions in group relations (Samson & Kostyszyn, 2015). Distrust can scale from a small interpersonal level up to a societal level. If distrust occurs on an interpersonal scale, loyalty decreases between the two parties. Distrust becomes more important as it scales, such as when it causes inter-group conflicts, which has a local or regional aspect, yet it will not get widespread in a short time. Although excessive trust is problematic, a low level of trust in the society is even more destructive, causing delays in projects and increasing their expenses and disrupting relationships, interactions and the overall health and development of the society. Furthermore, low levels of trust lead to anxiety and fear of negative evaluation in social settings (Simone, Yu & Hamza, 2022). It appears that the concept of trust is declining and is at its lowest for the past three decades, which is tied to different factors such as the economic and structural condition of the society and also cognitive load (Twenge, 2014).

Cognitive load seems to affect social events and relationships. The cognitive load brought by a dual-task decreases trust towards an assigned partner, independent from the type of the load. Literature indicates that living under conditions of a rather consistent cognitive load can be a risk factor for a decrease in social trust. As modern life becomes more and more fast-paced, the cognitive resources of people are getting more occupied by technology and multitasking (Samson & Kostyszyn, 2015). The relationship between cognitive load and trust can be moderated by different factors such as personality traits. Personality is a set of mental, social and emotional traits that goes beyond superficial physical features. Personality is also defined as a set of consistent characteristics that predict behavior (Symington, 2018). Personality is considered one of the most important factors that affect a person's attitude towards different aspects of life (Thibaut, 2017). Frietag and Bauer (2016) found that personality traits affect trust towards a stranger more than trust towards a family member or friend. They also found that conscientiousness and openness to experience play a significant role in shaping trust towards both friends and strangers, also agreeableness is related to trust towards strangers. Trust is considerably rooted in one's personality such that those who have higher levels of agreeableness and openness to experience have a higher tendency to trust others. Moreover, the extraversion trait has a significant positive correlation with trust but those who are more neurotic and conscientious experience anxiety in their interaction with others that leads to a decrease in trust (Dinesen et al., 2014).

Based on the relationship between the big five personality traits and mental health, the positive correlation of self-transcendence with mental health, physical wellbeing and life quality and its negative correlation with mental disorders, and also the relationship between trust and mental health, there is a probability that personality traits and transcendence—that is according to Cloninger one of the dimensions of personality—mediate the relationship between trust and cognitive load. Pakizeh, Hekmatiyan Fard, Mansourzadeh, & Heydari (2022) have demonstrated that cognitive load leads to a decrease in trust and personality plays a mediating role in this relationship. Daronnat et al. (2021) have shown that expectable

behavior has a positive impact on functioning and trust, and also decreases cognitive load. Therefore, the purpose of this research was to examine if cognitive load affects the reaction to other's trust, with the mediating role of personality traits.

2. Objectives
The objective of this study was to examine the effect of cognitive load on reaction to the other's trust, with the moderating role of personality traits.

3. Methods
3.1. Sample and Procedure
This experimental research uses the post-test design with a control group and was carried at the Persian Gulf University, Bushehr, Iran. Considering Delavar's (2014) guidelines on sample size, 85 students from different faculties, were selected randomly out of 125 students who had volunteered to participate in psychological research, and were randomly assigned to four groups (four levels of cognitive load from no cognitive load (control group) to high cognitive load (experimental group). The analysis was done inside SPSS software using Pearson's correlation and hierarchical regression analysis (utilizing Baron and Keaney's method for mediation). The inclusion criteria consisted of absence of any major psychiatric disorders, not having participated in similar studies. Exclusion criteria consisted of not showing up for more than two sessions, and the students' relocation

3.2. Research Tools
The tools of this research are:

3.2.1. Hexaco Personality Inventory
This inventory was developed by Ashton, Lee, Vernon and Jang (2000) and its validity and reliability were tested in various researches (Ashton, Lee, Perugini, Szarota, De Vries, Di Blas, & De Raad, 2004). The inventory assesses six factors: Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness and Openness to Experience. They reported the Cronbach's alpha for the factors from 0.76 to 0.80 (Lee & Ashton, 2004; De Vries, 2013). De Vries (2013) reports the reliability coefficient for Humility-Honesty as 0.55, Emotionality as 0.54, Agreeableness as 0.53, Conscientiousness as 0.61, and Openness to Experience as 0.60, all subscales averaging at 0.59. Basharpour, Basharpour, Taherifard & Mohammadi (2019) have used Cronbach's Alpha to measure the reliability of the Persian form of the HEXACO-PI, with the coefficients for Humility-Honesty as 0.79, Emotionality as 0.87, Extraversion as 0.74, Agreeableness as 0.88, Conscientiousness as 0.88, and Openness to Experience as 0.63.

3.2.2. Experimental Design
The experiment was conducted on groups of four participants. After welcoming and thanking the participants, the researcher gave the participants a general description of the procedure. Afterward, all of the participants completed the HEXACO personality inventory and then completed the scenario of reaction to trust through four degrees of cognitive load—no cognitive load (no memorizing) up to high cognitive load (memorizing four three-digit numbers).

3.2.3. Reaction to trust scenario

To assess the reaction to other's trust, a modified version of the trust game was used. The trust game is an economical game in which the participants can obtain points (Hudson & Fraley, 2015). At first, it was explained to the participants that they are given 20 scores to start with, and that by making certain decisions they could increase their scores. By the end of the game, the participant with the highest scores will be given a prize. The participants have to decide whether to keep the initial 20 scores to themselves or to share them with the other three participants in their groups (The donation form is shown in Table 1). Any score that is donated gets multiplied by three before being handed to the recipient. The recipient of the tripled score can either keep it for himself or to bring all or part of it back to the donor (The form of reaction to the donor is shown in Table 2). The amount of scores a person donates to other members of the group indicates his trust in group members, and the amount of score that the recipient returns to the donor reflects his or her reaction to the donor's trust.

Table 1. The donation form

Your initial 20 scores	
Group members	Your donation
A (yourself)	
B	
C	
D	

Table 2. The form of reaction to the donor

The scores donated to you by the other three group members (the Tripled scores)	18	24	33
The scores you want to return to the donor			
The scores you want to take for yourself			

3.3. Ethical Considerations

- A written approval was obtained from the university's officials.
- The researchers introduced themselves to the participants and provided thorough description about the experiment and what was going to happen.
- Informed consent was obtained from all participants.
- Participation in the research was purely voluntary.
- Dropping out of the research was permitted at any point.
- The privacy of the participants' info was completely preserved.

4. Results

Table 3 indicates the descriptive statistics including mean, standard deviation, minimum and maximum scores for each facet and reaction to trust in for each group.

Table 3. Descriptive statistics for each personality facet and reaction to trust

Group	Descriptive	Personality Traits						Reaction to trust
		H	E	X	A	C	O	
Experimental	Mean	29.6	30.13	29.7	29.9	29.4	30.2	13.4
	SD	7.3	6.9	4.9	6.2	4.9	4.6	12.2
	Minimum	27.3	27.8	28.10	27.9	28.10	28.7	9.5
	Maximum	32.03	32.3	31.3	31.9	31.3	31.7	17.3
Control	Mean	30.7	29.03	30.7	30.10	30.7	30.6	18.7
	SD	6.5	7.9	4.5	6.4	4.5	7.2	11.5
	Minimum	28.5	26.4	29.3	28.03	29.3	28.3	15.08
	Maximum	32.8	31.5	32.2	32.17	32.2	32.9	22.4

According to Table 3, there's no considerable difference between the personality scores of the control and experimental group, however, the experimental group has scored lower in reaction to trust in comparison to the control group.

Table 4 indicates the correlation between cognitive load, personality traits, and reaction to trust.

Table 4. Correlation matrix for cognitive load, reaction to trust and personality traits

	Cognitive Load	Reaction to trust	Openness to experience	Conscientiousness	Agreeability	Extraversion	Emotionality	Honesty-Humility
Cognitive Load	1							
Reaction to trust	-0.683**	1						
Openness to experience	-0.055	0.118	1					
Conscientiousness	-0.416**	0.515**	0.179	1				
Agreeability	-0.502**	0.654**	0.164	0.308**	1			
Extraversion	-0.159	0.391**	0.297**	0.389**	0.274*	1		
Emotionality	-0.411**	-0.458**	0.180	-0.110	-0.158	-0.127	1	
Honesty-Humility	-0.397**	0.547**	0.258*	0.385**	0.521**	0.527**	-0.093	1

Table 4 indicates a significant negative correlation between cognitive load and reaction to trust ($p < 0.01$, r= -0.683). Findings also point to a significant positive correlation between reaction to trust and the following personality traits: conscientiousness ($p < 0.01$, r=0.515), agreeability ($p < 0.01$, r=0.645), extraversion ($p < 0.01$, r=0.391), and honesty-humility ($p < 0.01$, r=0.547).

Table 5 indicates the findings regarding the effect of cognitive load on reaction to other's trust.

Table 5. Hierarchical regression analysis of the effect of cognitive load on reaction to other's trust

	R	R^2 Change	F Change	P	Beta	T	p
Cognitive Load	0.683	0.467	72.605	0.000	-0.683	-8.521	0.000

As seen in table 5, cognitive load determines 46.7% of the variance for the dependent variable (reaction to trust) ($p < 0.001$, r=0.683). Table 6 indicates findings regarding the mediating role of personality traits.

In this model, firstly, the effect of each of the six personality traits on reaction to other's trust was calculated, and then, the mediating role of these personality traits on the effect of cognitive load on reaction to trust was examined. As witnessed in table 6, emotionality ($P < 0.015$, F=6.231) has a significant negative effect on reaction to trust, while conscientiousness ($P < 0.001$, F=11.293), extraversion ($P < 0.000$, F=14.874), agreeability ($P < 0.000$, F=26.225) and honesty-humility ($P < 0.000$, F=16.733) have a significant positive effect on reaction to trust, also, openness to experience (P=0.316, F=1.019) has no effect on reaction to trust.

Secondly, the interaction of cognitive load with each personality trait was added to the equation, and as seen in table 5, the personality traits conscientiousness (P=0.032, F=4.741) and agreeability (P=0.023, F=5.409) play a mediating role in the effect of cognitive load on reaction to trust, while the other four personality traits, emotionality

(P=0.434, F=0.618), openness to experience (P=0.814, F=0.056), extraversion (P=0.662, F=0.193), and honesty-humility (P=0.882, F=0.022) do not.

Table 6. Hierarchical regression analysis of the mediating role of personality traits

	R	R² Change	F Change	P	Beta	T	p
Step 1 (The effect of emotionality on reaction to other's trust)							
Cognitive Load					-0.595	-6.981	0.000
Emotionality	0.710	0.038	6.231	0.015	-0.213	-2.496	0.015
Step 2 (The mediating role of emotionality in the effect of cognitive load on reaction to trust)							
Cognitive Load					-0.589	-6.854	0.000
Emotionality					-0.221	-2.566	0.012
Cognitive Load × Emotionality	0.713	0.004	0.618	0.434	-0.062	-0.786	0.434
Step 1 (The effect of conscientiousness on reaction to other's trust)							
Cognitive Load					-0.567	-6.820	0.000
Conscientiousness	0.729	0.065	11.293	0.001	0.279	3.360	0.001
Step 2 (The mediating role of conscientiousness in the effect of cognitive load on reaction to trust)							
Cognitive Load					-0.496	-5.660	0.000
Conscientiousness					0.333	3.920	0.000
Cognitive Load × Conscientiousness	0.746	0.026	4.741	0.032	-0.175	-2.177	0.032
Step 1 (The effect of openness to experience on reaction to other's trust)							
Cognitive Load					-0.679	-8.454	0.000
Openness to experience	0.688	0.007	1.019	0.316	0.081	1.009	0.316
Step 2 (The mediating role of openness to experience in the effect of cognitive load on reaction to trust)							
Cognitive Load					-0.677	-8.359	0.000
Openness to experience					0.073	0.844	0.401
Cognitive Load × Openness to experience	0.688	0.000	0.056	0.814	-0.021	-0.237	0.814
Step 1 (The effect of extraversion on reaction to other's trust)							
Cognitive Load					-0.637	-8.475	0.000
Extraversion	0.741	0.082	14.874	0.000	0.290	3.857	0.000
Step 2 (The mediating role of extraversion in the effect of cognitive load on reaction to trust)							
Cognitive Load					0.632	-8.290	0.000
Extraversion					0.291	3.847	0.000
Cognitive Load × Extraversion	0.741	0.001	0.193	0.662	-0.033	-0.439	0.662
Step 1 (The effect of agreeability on reaction to other's trust)							
Cognitive Load					-0.475	-5.849	0.000
Agreeability	0.772	0.129	26.225	0.000	0.416	5.121	0.000
Step 2 (The mediating role of agreeability in the effect of cognitive load on reaction to trust)							
Cognitive Load					-0.414	-4.978	0.000
Agreeability					0.477	5.577	0.000
Cognitive Load × Agreeability	0.788	0.025	5.409	0.023	-0.167	-2.326	0.023
Step 1 (The effect of honesty-humility on reaction to other's trust)							
Cognitive Load					-0.553	-6.904	0.000
Honesty-humility	0.746	0.090	16.733	0.000	0.328	4.091	0.000
Step 2 (The mediating role of honesty-humility in the effect of cognitive load on reaction to trust)							
Cognitive Load					-0.554	-6.843	0.000
Honesty-humility					0.331	3.934	0.000
Cognitive Load × Honesty-humility	0.746	0.000	0.022	0.882	0.012	0.149	0.882

5. Discussion

The goal of this research was to examine the effect of cognitive load on reaction to other's trust and the mediating role of personality traits. As stated in the results section, cognitive load has a significant negative effect on reaction to other's trust. To explain this finding, it can be pointed out to the fact that the cognitive load of interpersonal interactions affects the normal procedures of the cognitive information processing system and henceforth decreases the efficiency of information processing. This situation leads to a decreased accuracy in the analysis of the information received by the cognitive system and impairs decision-making (Clark, Nguyen, & Sweller, 2011). In such a situation the person will be cautious and pessimist while making decisions regarding the trust received by others, therefore taking fewer risks (Fraser, Ma, Teteris, Baxter, Wright, & McLaughlin, 2012).

Another goal of this research was to examine the moderating role of personality traits in the effect of cognitive load on reaction to other's trust. As previously stated, findings showed that emotionality has a significant negative effect on reaction to the other's trust. The characteristics of an emotional person such as fear, anxiety, dependence and sensitivity can explain this finding, as these characteristics can increase distrust during high cognitive load. Such people might overestimate the risks of mutual trust (Hoy & Miskel, 1987). To explain the other findings regarding the significant positive effect of conscientiousness, extraversion, agreeability, and honesty-humility on reaction to other's trust, it can be pointed to the typical characteristics of people with such traits that cause responsibility and facilitate interpersonal interactions. For example, conscientiousness is associated with characteristics such as organization, self-discipline, diligence, accuracy, and efficiency (Ashton et al., 2004). The people with the aforementioned personality traits apply certain strategies during high cognitive load and feel compelled to make a fair trade. Consistent to the findings of Vollrath and Torgersen (2000) regarding coping styles of extraverts, the effective social interactions and mental wellbeing observed among extraverts, might explain the moderating role of extraversion (Tov, Nai, & Lee, 2016). It appears that extraverts have the skills needed to confront cognitive load, and due to the self-confidence caused by the effective social interactions they show more positive reactions to the trust received from others.

To explain the moderating role of agreeability, one could point to the characteristics such as warmness and friendliness and cooperation seen in such people and their ability to trust (Ashton et al., 2004). These characteristics could play an effective role in decreasing stress during high cognitive load and lead to constructive interaction. The findings regarding the moderating role of honesty-humility are consistant to the findings of Hoy and Miskel (1987), showing that honesty as the most important factor of trust. The findings could also be explained by characteristics such as unbiasedness, sincerity, and generosity (Ashton et al., 2004).

6. Limitation and Recommendation

Despite the limitations of this research such as being focused on a student population, it is of high scientific value and freshness due to using an experimental method and a new method for evaluating reaction to trust, and it provides a new outlook regarding the role of personality traits in reaction to the trust received by others.

7. Conclusion

This study investigated the effect of cognitive load with respect to the moderating role of

personality traits. The findings clarified the structure of trust by experimental investigation and theoretical explaination of effect of cognitive load situation on the reaction to another's trust. The current study was the first study to investigate the moderative role personality traits in the effects of cognitive load on the reaction to the other's trust. Using a modified version of the trust game, we found out that emotionality has a significant negative effect on reaction to the other's trust. It could be concluded that considering the cognitive load of the ever-increasing amount of information of the modern age, it's crucial to identify and amplify the personality traits which establish trust.

8. Author Contributions

In the present study; the research design, the process of data collection, analysis and interpretation of the findings, was done by researchers and discussed with colleagues and professors of technology.

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10. Conflicts of Interest

There are no conflicts of interest.

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