How Students Interact with AI-Teaching Assistant: Roles of Novelty and Innovativeness

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Strategic Adaptation in the World of Uncertainties

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Abstract

Research purpose:
This study suggests an investigation into how introducing novelty and innovativeness in AI teaching assistants can positively impact student interaction and engagement. This research topic explores the potential benefits of incorporating novel and innovative features into AI-driven educational tools to enhance the learning experience

Research motivation:
Artificial intelligence (AI) can transform student learning behaviour. When students adapt to multiple digital platforms and environments, it is necessary to understand student's using AI assistants in higher education

Research design, approach, and method:
A conceptual model was developed to investigate the impact of spatial novelty value and innovativeness on interaction and behavioural loyalty to using AI teaching assistants. Smart PLS version 3.3.3 were employed to analyse data acquired from a sample of 165 students utilising the AI-enabled solutions as teaching assistant.

Main findings:
According to the data, innovativeness and novelty value have a significant positive impact on interaction with AI, generating loyalty to AI teaching assistants and attitude to AI teaching assistant-based education sequentially.

Practical/managerial implications:
The effect of innovativeness on the novelty value of utilising AI solutions in higher education was discovered to generate a higher level of interaction, which influence the loyalty to using innovative AI teaching assistant.

Keywords: innovativeness, novelty value, interaction, loyalty, attitude.

1. INTRODUCTION

In 2020, global investment in learning technology businesses had reached $36.38 billion (AIthority, 2021). The learning technology businesses are predicted to evolve as increasing demand for collaborative learning solutions and the growing learning experience. AI can support students by providing learning methods, coaching, and assessing students' knowledge and learning progress. Diffusion of Innovations is a social occurrence that appears when individuals learn a new technology or practice to expand or enhance social well-being (E. M. Rogers, 1995). In its most basic form, diffusion refers to an innovation transmitted to members of a social structure through specific methods. Separately, the primary notion of AI is conceptualized as the increasing capability of devices that function intelligently via their mechanical, analytical, intuitive, and empathetic service tasks (Huang & Rust, 2018). AI helps users examine and learn from large volumes of data and use that information to assist them in living in diverse situations (Sreedharan, Srivastava, & Kambhampati, 2021). Many technology-mediated platforms allow marketing people to examine individual records, anticipate individual behavior, and reduce mental inconvenience on end-users (Perez-Vega, Kaartemo, Lages, Borghei Razavi, & Männistö, 2021). For example, Cortana practice data analysis using AI. The software in this intelligent assistant can understand voice commands, recognize keywords used by speakers, and then carry out a series of pre-programmed requests and answers (Hoy, 2018). The program, which is no longer in its infancy, via an Internet connection, can access personal information saved on the smartphone and forecast and reply to users' queries and inquiries, giving them the news they want. The machine eventually understands a user's speech as a command when activated. The technology advances

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and expands software's database. AI machine is more capable of understanding and analyzing a user's orders more intelligently, increasing its potential to perform a broader range of services (Hoy, 2018).

An obvious tendency in the evolution of the idea of a smart classroom is the introduction of Artificial Intelligence (AI) in conjunction with developing technologies in the form of interactive, remote, and mobile computing in physical and/or virtual surroundings. Artificial intelligence (AI) is a key technology used in a smart class since it enables interactive, adaptable, and intelligent employment of those technologies during the learning process. A smart classroom is a physical or virtual setting that incorporates cutting-edge technologies and artificial intelligence to improve the learning experience (Lakshmi et al., 2023).

AI describe the capacity of computer systems to carry out human functions (such as learning and reasoning), which are frequently only possible through human intellect. The specialized field of AI in education (AIED) has started to have an impact on the way that technology is used for instruction and learning, improve the learning experience, and support student accomplishment (Winkler, Söllner, & Leimeister, 2021). The goal of AIED is to create AI-powered systems, such as virtual pedagogical agents, AI robots, and intelligent systems, that enable flexible, engaging, and personalized learning in addition to automating routine teaching duties (such as feedback and evaluation) (J. Kim, Merrill, Xu, & Sellnow, 2020).

Novelty value and interaction were uncovered its effects in the case of Siri, an AI-based voice assistant, to add to the studies of new technology acceptance and examine its complexities (Hasan, Shams, & Rahman, 2021). The popularity of technical and digital use and e-commerce consumption is increasing; it is critical to build positive interaction and ensure novelty value is not compromised (Skavronskaya, Moyle, & Scott, 2020). Some experts argue that efficient relationship management requires positive experience (Sovacool, Axsen, & Sorrell, 2018). As a result of this problem, this research aims to figure out how to boost technology acceptance and, as a result, loyalty to AI-enhanced products.

Innovative experiences play and critical role in academic and professional settings. Individuals' memorable experiences, which are known to improve loyalty (Hasan et al., 2021; Zhang, Wu, & Buhalis, 2018). However, creating memorable encounters necessitates an awareness of the mental processes that occur at various phases of an individual's experience and the antecedent and subsequent conditions (Skavronskaya et al., 2020). Novelty, hedonism, participation, knowledge, refreshment, and meaningfulness are psychological antecedents of experience (Chandralal & Valenzuela, 2015; H.-J. Kim, Lee, & Rha, 2017). According to recent research, novelty is essential in eliciting emotions and links to memorability (Skavronskaya et al., 2020). Novelty's relevance has been proven, research on the connection between novelty and experience is lacking (Hasan et al., 2021). When considering the potential for societal utility, we must acknowledge that the advantages of AI are intangible in the context of this study. It can minimize adoption and usage obstacles, resulting in enormous societal benefits. Because a considerable portion of the world's population is still illiterate or unable to type physically, AI may help them overcome the knowledge gap. Furthermore, for customers with specific health issues, such as dementia, who may ask repetitive inquiries and require continual assistance, AI might provide enormous chances to improve their situations by living an independent lifestyle (Hoy, 2018).

The study contributes to the existing behavioral studies on the learning experience; this study employs cognitive appraisal theory (CAT) to investigate the intricate relationship between novelty, innovativeness, interaction, and loyalty to AI teaching assistant in higher education.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Paper size and format

Many theories clarify why people accept innovative solutions, which depend on cognitive assessments. According to the Technology Acceptance Model (TAM) and Diffusion of Innovations (DOI), the perceived properties of the technology and innovation and the attributes of the adopter are regarded as significant antecedents of consumer adoption in the research (Davis, 1989; E.M. Rogers, 2003). Personal attributes, characteristics become the predictors of innovation adoption. E.M. Rogers (2003) has found a variety of socio-demographic factors, with some of them focusing explicitly on customers' educational levels, ages, and incomes. Gender, income, and social norm are all factors that are frequently examined.

Psychographic features are also good predictors of innovation uptake (Arts, Frambach, & Bijmolt, 2011). Innovativeness, social media, influencer, and participation are common psychographic qualities (Hasan et al., 2021). In addition, one of the most important antecedents of consumer adoption is a customer's assessment of the benefit, complexity, compatibility, trialability, observability (E.M. Rogers, 2003) of the invention. It focuses on end-user adoption, contextualized in various contexts rather than inter-organizational adoption. This extension extends the Technology Acceptance Model to a more extensive range of consumer products. It integrates hedonic motivation and the price/value connection to understand end-user acceptance and usage (Venkatesh, 1999). It was criticized for not taking essential elements like cognitive process, innovativeness, novelty, interaction. This study aims to fill a critical research gap on AI's commitment and use because of

the cognitive learning progress (Hoy, 2018).

Novelty can promote co-creation and conscious experiences in the learning progress (Schomaker, 2019). As a result, the cognition of emotions elicitation is a significant theory that can add value to existing experience research.

Cognitive appraisal theory (CAT) An individual may assess their expbasednce based on a limited amount of appraisal perspectives relevant to their elicited emotions and their target at the moment of their experience (Bagozzi & Dholakia, 2002). An appraisal is defined as the scenario's implications for the individual's interests and ambitions and hence decide the shape of that emotional response in a specific setting. The definition of an assessment process is the emotional evaluation and formation of an occurrence in the environment (Thompson, 2014). CAT is frequently used to treat negative emotions like panic or anxiety in cognitive psychology, but positive feelings.

CAT stresses the relevance of an individual's perception of an experience in the cognitive evaluation in assessing emotional reaction. CAT provides a sequential mechanism, including the perception of a specific circumstance (knowledge), assessment (appraisal) based on appraisal dimensions, and elicitation of a particular emotion (Skavronskaya et al., 2020). Notably, an emotional evaluation of a circumstance may lead to a behavioral response (Parasuraman, Ball, Aksoy, Keiningham, & Zaki, 2021; Prebensen & Xie, 2017). Using virtual reality and AI instruments, spatial novelty can bridge the gap between the types of stimuli to create a spatially novel environment (Schomaker, 2019), influencing the elicitation of pleasure, love, and positive surprise and behavior (Choi & Choi, 2018). In CAT, novelty is a crucial assessment dimension, and a higher level of novelty is associated with a higher level of emotional arousal (Parasuraman et al., 2021). The current study uses CAT to investigate how the novelty may affect emotional reactions, which improves the positive interaction of that experience.

Conceptualizing novelty, innovativeness Spatial novelty is the exploratory experience or practice that individuals get used to or are familiar with (Schomaker & Wittmann, 2021). The precise definition of novelty and innovativeness is a complex and psychological cognition (Skavronskaya et al., 2020). The degree to which a stimulus is unfamiliar for a person compared to the common knowledge that an individual holds, or between what is known and what is discovered, has been defined as a novelty (Schomaker & Wittmann, 2021). Novelty is connected with activity in response to stimulation in neuroscience (Schomaker, 2019). It has been discovered that novelty increases formation and persistence to a targeted stimulus, promotes and encodes memory, and enhances goal-directed behavior, word-learning performance (Ramirez Butavand et al., 2020; Schomaker & Wittmann, 2021). Novel stimuli may be present in a wide range of settings, and detecting novelty is vital for learning because it directs attention to new and possibly significant occurrences (Ramirez Butavand et al., 2020). It is also necessary for students' cognitive growth, learning performance, and behavior.

An experience or practice may differ from expectations. Unexpectedness, delight, surprise, excitement, and enjoyment are related to novel experiences (Parasuraman et al., 2021). Some studies view novelty as a motivating forerunner of behavior since it is isolated to a wide range of complicated and powerful sentiments and possible peak experiences (Cloninger et al., 1994). The consumer's self-perception is influenced by elements such as the supplier's reputation, user preferences, and continuous usage. In the case of google voice, Cortana, Alexa, users must feel novelty when interacting with the machine. User are more inclined to trust a new AI assistant like Alexa because brand name Amazon is popular. Furthermore, user happiness with the initial usage of a product or technology leads to continuing product/technology. Users who utilize a new technology are more likely to continue to use and trust the product/technology. Furthermore, a good reputation for technology can generate an individual commitment to a business. As a result, novelty value can make users engage and interact with the technology. In reality, according to several surveys, intelligent voice assistants are mainly utilized for straightforward tasks, surfing, and listening to music. As a result, the keys to creating brand loyalty include enticing customers with novelty value and then maintaining them with enhanced and consistent interactions. As a result, both were included as beneficial antecedents in the research.

After carefully weighing a variety of factors, including how the curriculum will be incorporated into a collaborative learning environment, teachers may decide to use AI technology. Primary school teachers' viewpoints were used in this study to learn more about the benefits and drawbacks of smart technology from individuals who use it on a daily basis in the classroom (Lakshmi et al., 2023).

Table 1. Hypotheses

Hypotheses Tested.
H1 Novelty value has a positive impact on interaction.
H2 Innovativeness has a positive impact on interaction.
H3 Interactions have a positive impact on behavioral loyalty.
H4 Behavioral loyalty has a positive influence on attitude to AI teaching assistant

A framework (Fig. 1) was built based on our conversation for our study. The four aspects explored are novelty value, innovativeness, interaction, loyalty.

3. METHODOLOGY

3.1 Equations

Equations ***Participants and procedures*** 200 undergraduate students from an international university made up the original sample size. A total sample size of 165 was obtained after the removal of 12 respondents who failed the participation check and 23 incomplete responses. Since it exceeds the required sample size of 100, additional analysis is appropriate (Hair, Anderson, Tatham, & Black, 1998). Table 2 displays the respondents' descriptive data. A convenience non-probability sampling process was chosen because it appeared to be the most practical choice and is the one used by academics the most frequently (Churchill & Iacobucci, 2002). Screening questions were used to ascertain whether the respondents used Grammarly to write their report on their computer. A series of inquiries about the respondents' demographics were made of them. The questions that came next included those regarding novelty value, inventiveness, interaction, and loyalty. Each responder needed eight to ten minutes to finish the survey on average. The MS Team platform was used to operate undergraduate students and collect statistics. They span the first through fourth years of study. Students have been encouraged by the lecturers to use the AI tool throughout their 10-week study process. According to reports, Grammarly, Google Translator, Cortona, and Google voice are the AI teaching assistants. The classroom environment was reliable, producing reliable psychological data.

Table 2. Descriptive Statistics

Variable	Definition	Frequency	Percentage
Gender	Female	97	58.79
	Male	68	41.21
Attend AI-related training or courses	Attend before	126	76.36
	Do not Attend AI-related training or courses	39	23.64

Measures In this study, the bulk of evaluations were made using a 7-point Likert scale. The 7-point Likert scale captures greater variability than the 5-point scale (Finstad, 2010). The majority of the items were taken from well-known sources, confirming the validity and reliability of the measurements. The elements in each construct are listed in Appendix 1 along with their corresponding sources.

Notably, the measurement scale for the entire measurement would strictly adhere to the 7-Likert scale, which is an effective tool for comprehending the perception of the research topic. Joshi, A., et al. (2015). As for the first aspect, **attitudes toward new technologies (ATT)** were measured through two items. For instance, "How comfortable would you be with new technologies (e.g., robots, AI) taking routine roles?" and " How comfortable would you be with new technologies (e.g., robots, AI) taking interpretive roles?" Responses for this aspect would be obtained from the 7 Likert Scale(e.g., 1 = strongly disagree; 7 = strongly agree).

Novelty were measured by questions such as “Being the first to use new high-tech services is very important to me.” , “Using AI-based technology (e.g. virtual agent, voice-based agent, robot) is a unique experience.” “Using AI-based technology (e.g. virtual agent, voice-based agent, robot) is a once-in-a-lifetime experience.”, “Using AI-based technology (e.g. virtual agent, voice-based agent, robot) is an educational experience.”, “The experience of using AI-based technology (e.g. virtual agent, voice-based agent, robot) satisfies my curiosity.

To evaluate the aspect of **student innovativeness (INV),** it is required to use the in-depth scale to review the perception of innovativeness that people need (Vandecasteele & Geuens, 2010). It lists six items to clarify users' sentiment toward innovativeness provided in the questionnaire. Furthermore, the novelty value provided beneath the five items begins with "Using AI-based technology (e.g., virtual agent, voice-based agent, robot) is ". It served as a tool to evaluate the newness

of the teaching assistant.

Also, the innovativeness was supported by the proposal of **Interaction (ITR**). It included statements like " I can easily.." It also assessed how users accessed the features and facilitated how users generate their own experience. Generally, the measurement scale also examines the loyalty of users in the four items, including "I will use AI-based technology the next time I seek solutions,"; "I intend to keep using AI-based technology,"; "I am committed to AI-based technology"; and "I would be willing to use AI-based technology over other solutions." (Nambisan & Baron, 2007). Subsequently, the function of the **loyalty** examination is to generate a survey about the trust and loyalty of users for following usage (Teng, 2018).

Statistical analysis PLS-based structural equation modeling (SEM) was used to assess the measurement model and ensure the validity and reliability of the components and items. Because PLS-SEM enables early investigation of phenomena, it was chosen for this work (Fornell & Larker, 1981). In addition, a multivariate-normal distribution is not necessary for PLS-SEM (Albert & Merunka, 2013; Hasan et al., 2021).

4. RESULTS AND DISCUSSION

Measurement model A bootstrapping sample of 5000 was utilized to assess the measurement model, and SmartPLS 3.3.3 was used to observe the reliability and validity of each construct. As a result, the convergent validity, reliability, and discriminant validity of each construct were assessed. The concurrent validity of each construct was evaluated using confirmatory component analysis (CFA). All elements are properly loaded into their associated theoretical constructs, and the results are shown in (Factor Loading [> 0.7]), where they are all displayed. The composite reliability and each reflective Cronbach's alpha were both assessed, and the results are shown in Appendix 1 above the necessary level of 0.70. (Chin, 1998). The findings of the discriminant validity analysis are shown in Table 4 with the square roots of the average variance extracted (AVE) shown by the diagonal numbers. The inner construct correlations are displayed in the off-diagonal integers. The statistics suggest that the AVE's square root is greater than the internal construct correlations, which is sufficient support for its good discriminant validity (Gaskin & Lowry, 2014).

Fig. 2 shows that novelty and innovation have a significant beneficial impact on interaction (ß = 0.305, p 0.001) and (ß = 0.569, p 0.001), supporting hypotheses H1, H2. Loyalty strongly influenced AI interactions in a positive way (ß = 0.747, p 0.001), supporting hypothesis H3. The results show that attitude is significantly negatively impacted by loyalty to AI (ß = 0.733, p 0.001), supporting hypothesis H4.

Table 4. Discriminant Validity of the Measurement Model.

	Innovativeness	Novelty	attitude	interaction	loyalty
Innovativeness	0.828				
Novelty	0.613	0.883			
attitude	0.573	0.686	0.933		
interaction	0.653	0.756	0.674	0.913	
loyalty	0.723	0.767	0.733	0.747	0.828

Regarding the use of the AI solution, we also see that the interaction's R-square value is 62.4%, which shows that novelty value and innovativeness are responsible for 62.4% of the variance in interaction. 55.50 percent of the loyalty variance can be attributed to interaction. 53.50 percent of the attitude variance is explained by loyalty.

Table 5. PLS path coefficient.

Relationship	Coefficient	Standard Deviation	T Statistics	P Values	CI 2.5%	CI 97.5%	VIF
Innovativeness -> interaction	0.305	0.085	3.582	0.000	0.135	0.462	1.601
Novelty -> interaction	0.569	0.070	8.180	0.000	0.444	0.702	1.601
interaction -> loyalty	0.747	0.046	16.271	0.000	0.647	0.824	1.000
loyalty -> attitude	0.733	0.047	15.569	0.000	0.630	0.812	1.000

5. DISCUSSION AND CONCLUSION

AI solution in higher education is contested; this research has broader implications for students and stakeholders. In this topic, novelty and innovativeness can enhance student interaction; nevertheless, AI solutions lower barriers to utilizing technology might increase the commitment to these technologies by various categories of students (Hoy, 2018). Millennials become the critical determinant behind the widespread adoption of intelligent virtual assistants (Bose, 2019). The novelty and innovativeness attract millennials to interaction with AI. It also raises some intriguing issues regarding loyalty to an AI teaching assistant and attitude towards AI teaching assistant-based solution. This primary research determined an individual's employability status, adding to this understanding.

Our study has found that encouraging more significant interaction and loyalty is the best way to enhance attitude toward AI teaching assistants. This study also highlights the higher level of innovativeness of capturing AI solutions may lead to higher level of interaction with new technology, which is related to continue using of this technology . Even though some studies have issued students resistance to mobile learning usage, the students may reconsider utilizing such software and technology (H.-J. Kim et al., 2017). The immediate repercussions of novelty in tourism encounters include acute emotions and sentiments and relay memories associated with unique events with a higher possibility for long-term memory transfer. According to neuropsychological research, information about new events is encoded, stored in long-term memory and enhance learning performance (Schomaker & Wittmann, 2021). Novelty has also been linked to increased attention, as previously stated. Novelty and innovativeness and is encoded and preserved in memory when people interact with AI to gain new experiences (Parasuraman et al., 2021). Short-term memory has a limited capacity and can only keep information for a short time, but long-term memory has a higher power, endurance, formation and persistence (Ramirez Butavand et al., 2020). Novelty has become a crucial condition for storing information in long-term memory and that it improves the capacity for interactions between memory systems (Ramirez Butavand et al., 2020; Schomaker & Wittmann, 2021).

Our study is in congruence with previous study regarding novelty has long-term implications, such as improved interaction, loyalty, attitude, respectively. Reminiscence, recollection, and reprocessing of previous experiences lead to re-evaluation and a shift in the meaning attached to the event. As a result, re-evaluation entailed a review based on the coherence of the individual's goals with the specific learning experiences. This finding supports earlier novelty research on the significance of emotions and objectives in the cognitive and behavioral assessment. Interaction can also drive behavior by focusing attention on essential items (Ben Mimoun, Poncin, & Garnier, 2017).

This study discovered that high emotions is a result of novelty in remembered experiences. Previous research has found that emotions are linked to the memorability of individuals' encounters. The current study's findings suggest that novelty can elicit both interaction, loyalty, and positive attitude sequentially. Schomaker (2019) found that novelty result higher learning performance. Instead, active exploration and novelty linked with memory enhancement, which in turn determine positive behaviors (Ramirez Butavand et al., 2020). The interaction between novelty and innovativeness is a promising subject for future research. Participants also reported pleasant memories of novelty experience encounters as a result of anticipated positive interaction during survey times of high emotional positivity. The qualitative method should be used for further in-depth study.

The quality and effectiveness of technical education could be considerably increased by using AI-based studying programs to provide students with personalised, adaptive, and hands-on learning experiences. The development and adoption of advanced mechanisms and technologies that can personalize learning, deliver targeted support and feedback, and better prepare students for in-demand technical jobs have the potential to enhance the quality and effectiveness of studying programs. Artificial intelligence (AI) can be a helpful tool for any teacher trying to increase their students' knowledge retention and application by examining a student's learning style, approach, and development as a whole (Lakshmi et al., 2023).

We must develop reliable measurements that take into account ephemeral characteristics like inquisitiveness and creativity in order to enhance the utility of AI in the classroom. The findings from the studies and literature to incorporate mixed reality technologies in collaborative educational environments, particularly by using emergent new technologies, are used in this paper to fill in the gaps using the virtuality continuum as a guide. Despite its shortcomings, mixed reality technology can be used in group learning settings, as this mapping research has demonstrated. The production of true mixed reality experiences is becoming possible because to new technologies, which are also removing the obstacles previously mentioned in the literature. Additionally, these technologies frequently feature cutting-edge interaction strategies like gesture and emotion recognition, which emphasizes the necessity for exploratory research into the effects of integrating such innovations into learning environments.

Future study should include technological dependency, privacy concerns, equity issues, reduced human interaction, biases in AI algorithms, complexity, high costs, and ethical dilemmas (Chan, 2023)

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References should be prepared according to the Publication Manual of the American Psychological Association (6th edition). This means in text citations should follow the author date method whereby the author's last name and the year of publication for the source should appear in the text, for example, (Jones, 1998). They should also be listed at the end of the manuscript (in this section) in Times New Roman 10pt. References should be complete in style as shown in the examples below:

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7. APPENDIXES

Appendix 1. Results of the Measurement Model.

Construct/ Items	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)	Factor Loadings	T Statistics	P Values	Mean	Standard Deviation	VIF
Innovativeness	0.885	0.916	0.685						
INV01				0.786	19.786	0.000	5.709	1.150	2.198
INV02				0.882	45.353	0.000	4.600	1.595	2.888

INV03				0.843	30.914	0.000	5.533	1.301	2.464
INV04				0.849	34.325	0.000	5.109	1.444	2.451
INV06				0.775	21.261	0.000	4.794	1.639	2.288
Interaction	0.901	0.938	0.834						
ITR01				0.925	72.362	0.000	5.733	1.166	3.024
ITR02				0.907	38.257	0.000	5.527	1.253	2.860
ITR03				0.908	48.914	0.000	5.545	1.173	2.629
Loyalty	0.846	0.897	0.686						
LOY01				0.867	36.811	0.000	5.812	1.048	2.309
LOY02				0.839	28.502	0.000	6.042	1.058	2.189
LOY03				0.842	22.337	0.000	5.491	1.194	2.065
LOY04				0.761	18.541	0.000	5.061	1.417	1.657
Novelty	0.858	0.914	0.779						
NV01				0.892	41.762	0.000	5.848	1.099	2.332
NV03				0.868	42.310	0.000	5.733	1.123	1.982
NV04				0.887	40.034	0.000	5.776	1.097	2.231
Attitude	0.926	0.953	0.871						
ATT01				0.925	60.299	0.000	5.673	1.063	3.645
ATT02				0.953	119.301	0.000	5.733	0.967	4.968
ATT03				0.922	56.654	0.000	5.697	1.018	3.198

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