Journal of Cultural Analysis and Social Change,
2026, 11(1), 254-260
ISSN: 2589-1316

Design and Evaluation of an Illusion of Explanatory Depth Scale and Its Relationship to Certain Variables

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Citation: Hawil, R. A. A., Hatami, J. & Al-Daghestani, S. I. (2025). Design and Evaluation of an Illusion of Explanatory Depth Scale and Its Relationship to Certain Variables, *Journal of Cultural Analysis and Social Change*, 11(1), 254-260. https://doi.org/10.64753/jcasc.v11i1.3590

Published: December 23, 2025

ABSTRACT

The Illusion of Explanatory Depth (IOED) is a cognitive bias that causes individuals to overestimate their knowledge about various topics based on incomplete or misleading information. It represents a behavioral phenomenon prevalent in societies, occurring when individuals believe they understand a concept more deeply than others actually do. The IOED is significant because it exposes the ignorance underlying many societal behaviors and false claims, often resulting in social divisions when individuals perceive themselves as experts in specific fields. This study aimed to measure the level of IOED among a sample of government employees and examine differences based on gender (male–female), educational attainment (PhD, Master's, Institute, Bachelor's, Secondary), and age (20–59 years). The sample consisted of 400 employees, selected using a stratified random sampling method with equal distribution. Statistical analysis revealed that government employees exhibited a high level of IOED, with a mean score of 6.50, indicating that they tend to exaggerate their knowledge in front of others. No statistically significant differences in IOED were found across gender, educational attainment, or age.

Keywords: Illusion of Explanatory Depth, Selective Exposure, Personality Traits, Overconfidence

INTRODUCTION

The Illusion of Explanatory Depth (IOED) refers to individuals' belief that they understand the world around them more thoroughly than they actually do. People often overestimate their knowledge of topics, believing they know much more than the reality. When this illusion is avoided, individuals' assessments of their knowledge become more accurate after distinguishing between what they know and what they do not (Rozenblit & Keil, 2002, p.521).

IOED also manifests in general human behavior, particularly when individuals experience anxiety or uncertainty regarding the evaluation of daily familiar matters, people, or higher-value concepts. Known as the illusion of understanding, it involves exaggerating the extent of knowledge while neglecting the complexity of actual facts, believing one's actions are justified and based on knowledge, even when they are not (Sloman&Fernbach, 2022, p.163).

This illusion can lead to risky behaviors due to hasty judgments, poor decision-making, or misinterpretation of texts based on insufficient information, posing a societal threat (Sheldon et al., 2014, p.125). Moreover, IOED can undermine collective values, promoting moral relativism and converting public norms into individual choices (Hawkins, 2021, p.205).

IOED shares similarities with other biases, including illusion of knowledge, superiority bias, overconfidence, egocentric bias, and hindsight bias.

Research Questions:

1. How can the Illusion of Explanatory Depth Scale be evaluated?
2. Are there differences in IOED based on gender, educational level, or age?

Objectives:

1. Measure the level of IOED among government employees.
2. Identify the significance of differences in IOED based on:
    - Gender (male–female)
    - Educational attainment (PhD, Master's, Institute, Bachelor's, Secondary)
    - Age groups (20–29, 30–39, 40–49, 50–59, 60–65)

Hypotheses:

1. No statistically significant difference exists between the observed mean and the hypothetical mean on the IOED scale among government employees at a significance level of 0.05.
2. No statistically significant differences in IOED exist based on gender.
3. No statistically significant differences in IOED exist based on educational attainment.
4. No statistically significant differences in IOED exist based on age.

RESEARCH METHODOLOGY

The methodology of the current study can be briefly described as follows:

The study applied a correlational design, which focuses on identifying relationships between two or more variables and expressing these relationships quantitatively through correlation coefficients. The sample was selected using a stratified random sampling method and consisted of 400 government employees (male and female).

The researcher developed a scale to measure the Illusion of Explanatory Depth (IOED), based on the psychological and social dimensions proposed by Rozenblit & Keil (2002). The scale consists of 20 items. To support the scale, the researcher added two additional tests: a personality traits test (7 items) and an intelligence test (7 items).

The IOED is defined as individuals' tendency to overestimate their understanding of a particular issue and to exhibit excessive confidence in their knowledge and skills. It is also defined as a psychological bias in which individuals believe they understand things more deeply than they actually do (Rozenblit & Keil, 2002, p.521).

Theories Explaining the Illusion of Explanatory Depth

1. Rozenblit & Keil's (2002) Illusion of Knowledge Theory

The Illusion of Knowledge (IOK) theory, proposed by Leonid Rozenblit and Frank Keil at Yale University in 2002, posits that all individuals tend to overestimate the extent of their knowledge about the world to some degree. People rely on abstract, stored knowledge in their memory as if it represents complete knowledge. However, they are often surprised by the superficiality of their understanding once the full reality is revealed.

We are often under the illusion of knowing things, while in reality, we understand very little because we rely on vague, abstract knowledge. Most of our discussions involve connecting scattered pieces of information. The researchers argue that knowledge does not reside solely in our minds but also exists in the people and environment around us, and even experts may overestimate their understanding of complex phenomena. People feel that they understand complex phenomena with accuracy, coherence, and depth, contrary to their actual understanding—they are subject to this illusion (Rozenblit & Keil, 2002, p.521).

Rozenblit and Keil described IOED as a cognitive bias, which becomes apparent when individuals are asked to explain a concept and face the limitations of their understanding directly (Sloman&Fernbach, 2017, p.48).

2. Overconfidence as a Personality Trait

Excessive confidence in IOED is considered a personality trait, leading individuals to view themselves as superior to others and to overestimate their abilities (Meyer, 1975, p.139). It is also defined as a sense of personal efficacy and positive outcome expectations, often referred to as optimism. This interpretation emphasizes the positive evaluation of events, where individuals believe they can influence outcomes due to their superior abilities compared to others (Hirshleifer, 2012, p.145).

Lawson (2006) demonstrated a relationship between overconfidence and IOED, considering both as aspects of the illusion of knowledge. The more overconfident an individual is, the higher the level of IOED. IOED can also be seen as a type of reasoning bias, in which individuals maintain confidence in their prior explanations. When

asked to explain how a mechanism or procedure works, confidence initially increases. However, after being informed of the correct information by an expert, their confidence decreases significantly, indicating they recognized their previous misunderstanding. This shows that people often handle general information with excessive confidence (Lawson, 2006, p.175).

3. Simon's (2002) Intuitive Cognition Theory

Simon (2002) proposed that intuitive or general theories influence nearly every aspect of daily cognition. People rely on causal and interpretive relationships to guide classification, diagnosis, reasoning, and other cognitive tasks across diverse domains such as biology, physics, and psychology. Individuals tend to downplay strong correlations that do not align with intuitive causal models while overemphasizing weak correlations that do. Intuitive theories indicate which features should be emphasized when learning new concepts and highlight relevant dimensions of similarity (Rozenblit & Keil, 2002, pp.21–23).

Although reductions in knowledge ratings may reflect general overconfidence, the intuitive cognition theory suggests that IOED is distinct from general overconfidence, with heuristic beliefs about complex phenomena contributing uniquely to overestimation. For example, individuals may underestimate the environmental support for explanations, assuming that much of the information is already stored in their heads. This can create a false sense of knowledge when interacting with complex systems. The more one can mentally visualize separate components of a system, the more likely one is to attribute deep causal understanding of the system to oneself (Williams et al., 2013, p.675).

Research Instrument

Each research topic requires a suitable instrument. To achieve the objectives of the current study, the researcher reviewed literature and previous studies on IOED and found it necessary to develop a scale based on the psychological and social theory of Rozenblit & Keil (2002).

The initial scale consisted of 20 items, which were reviewed by 21 psychology experts for content validity. All items were approved after suggested modifications. The scale was then administered to the sample, and statistical analysis was conducted using internal consistency, calculating item-total correlations. All IOED items were statistically significant, with correlations exceeding the critical Pearson correlation value of 0.098 at the 0.05 significance level with 398 degrees of freedom.

The researcher supplemented the scale with a personality test (NEO) and an intelligence test (Amin Hashemi) to further validate the IOED scale.

Item Analysis

The purpose of item analysis is to determine the **discriminative power of each item**, keeping significant items and excluding non-significant ones. Discriminative power refers to the ability of an item to differentiate between levels of IOED among employees. This ensures that the psychological scale accurately reflects individual differences.

Two methods were used:

1. **Extremist Groups Method (Top-Bottom 27%)**
2. **Internal Consistency (Item-Total Correlation)**

Steps followed:

- The IOED scale was administered to a **random sample of 400 government employees**.
- Each respondent's **total score** was calculated.
- Scores were ranked from highest to lowest, and the **top and bottom 27%** were selected (108 respondents per group, totaling 216 for analysis).
- An **independent-samples t-test** was conducted to determine the **discriminative power** of IOED items and personality items. All items were significant compared to the critical t-value (1.96) at 0.05 significance and 214 degrees of freedom.
- For the intelligence test, **Jackson's formula** was used since items had **dichotomous answers**. All items were significant based on a 0.30 threshold for acceptance.

Tables summarizing item analysis are provided in Tables 1–3.

Table 1. Discriminative Power of the Illusion of Explanatory Depth Scale Using the Extremist Groups Method

Significance	t-value	Std. Dev.	Mean	Group	Item No.
Significant	2.33	0.96	2.40	High	1
		0.72	2.13	Low	
Significant	5.29	0.90	2.67	High	2
		0.82	2.05	Low	

Significant	6.13	0.88	2.93	High	3
		0.80	2.22	Low	
Significant	11.66	0.69	3.45	High	4
		0.72	2.33	Low	
Significant	8.31	0.96	2.93	High	5
		0.72	1.96	Low	
Significant	10.88	0.72	3.31	High	6
		0.68	2.28	Low	
Significant	3.62	1.01	2.79	High	7
		0.74	2.35	Low	
Significant	9.77	0.97	2.73	High	8
		0.74	1.58	Low	
Significant	12.40	0.75	3.35	High	9
		0.75	2.08	Low	
Significant	12.13	0.65	3.50	High	10
		0.72	2.37	Low	
Significant	11.39	0.91	3.05	High	11
		0.78	1.73	Low	
Significant	12.29	0.68	3.60	High	12
		0.70	2.44	Low	
Significant	18.67	0.56	3.48	High	13
		0.60	2.02	Low	
Significant	15.22	0.62	3.44	High	14
		0.61	2.18	Low	
Significant	16.55	0.72	3.28	High	15
		0.65	1.73	Low	
Significant	14.45	0.84	3.18	High	16
		0.66	1.69	Low	
Significant	20.80	0.57	3.45	High	17
		0.52	1.91	Low	
Significant	10.25	0.54	3.69	High	18
		0.95	2.61	Low	
Significant	12.43	0.68	3.47	High	19
		0.71	2.30	Low	
Significant	13.09	0.70	3.33	High	20
		0.73	2.06	Low	

Table 2. Discriminative Power of the Personality Traits Scale Using Extremist Groups

Significance	**t-value**	**Std. Dev.**	**Mean**	**Group**	**Item No.**
Significant	7.02	0.87	3.05	High	1
		0.76	2.27	Low	
Significant	14.72	0.75	3.36	High	2
		0.71	1.89	Low	
Significant	10.58	0.84	3.46	High	3
		0.98	2.15	Low	
Significant	6.89	0.32	3.91	High	4
		0.82	3.32	Low	
Significant	5.62	0.40	3.88	High	5
		0.77	3.41	Low	
Significant	7.99	1.21	2.36	High	6
		0.62	1.31	Low	
Significant	10.04	0.83	3.06	High	7
		0.75	1.98	Low	

Table 3. Discriminative Power of the Intelligence Test Using Extremist Groups Method

Significance	**Discriminative Power**	**Low Group Responses (27%)**	**High Group Responses (27%)**	**Item No.**
Significant	0.74	1	81	1
Significant	0.87	9	103	2
Significant	0.89	10	106	3

Significant	0.66	35	106	4
Significant	0.76	3	85	5
Significant	0.38	67	108	6
Significant	0.72	30	108	7

Construct Validity Indicators

One indicator of construct validity is the ability of the items to discriminate between individuals, especially when using the extremity comparison method. This refers to the extent to which the scale measures a particular trait or characteristic. Construct validity can be confirmed through several indicators, including verifying a hypothesis derived from the theoretical framework.

For the current study, indicators of construct validity for the scales were obtained using both the extremity groups method and internal consistency, which are considered key measures of construct validity:

1. Item-Total Correlation (Internal Consistency Methods)

The correlation of each item with the total scale score indicates the validity and homogeneity of the items in measuring the behavioral phenomenon. This method assesses the extent to which the items measure in the same direction or construct. It also reflects the interrelationship among the items of the scale.

The total score represents the construct being measured. According to Anastasi (1976), the total score is the best internal criterion when no external criterion is available. To achieve this, Pearson correlation coefficients were calculated between each item score and the total score for the Illusion of Explanatory Depth scale and the Personality Traits scale across 400 respondents. Statistical significance was tested using SPSS. All correlation coefficients were statistically significant, exceeding the critical Pearson correlation value (0.098) at $\alpha = 0.05$ with 398 degrees of freedom.

For the Intelligence Test, the Point-Biserial correlation was used because the items were dichotomous. All correlations were statistically significant compared to the critical value of 0.098 at $\alpha = 0.05$ and 398 degrees of freedom.

Table 4. Item-Total Correlations for the Illusion of Explanatory Depth Scale

Significance	r	Item	Significance	r	Item	Significance	r	Item	Significance	r	Item
Significant	0.63	16	Significant	0.56	11	Significant	0.50	6	Significant	0.21	1
Significant	0.71	17	Significant	0.56	12	Significant	0.27	7	Significant	0.32	2
Significant	0.49	18	Significant	0.68	13	Significant	0.47	8	Significant	0.34	3
Significant	0.58	19	Significant	0.62	14	Significant	0.58	9	Significant	0.54	4
Significant	0.56	20	Significant	0.68	15	Significant	0.57	10	Significant	0.45	5

Table 5. Item-Total Correlations for the Personality Traits Scale

Significance	r	Item	Significance	r	Item
Significant	0.32	5	Significant	0.44	1
Significant	0.52	6	Significant	0.61	2
Significant	0.50	7	Significant	0.51	3
			Significant	0.37	4

Table 6. Item-Total Correlations for the Intelligence Test

Significance	r	Item	Significance	r	Item
Significant	0.59	5	Significant	0.69	1
Significant	0.49	6	Significant	0.72	2
Significant	0.55	7	Significant	0.67	3
			Significant	0.51	4

Reliability Coefficients

Reliability coefficients for the Illusion of Explanatory Depth, Personality Traits, and Intelligence scales were calculated using two methods: Cronbach's alpha and test-retest. The results are shown in the following table:

Table 7. Reliability Coefficients of the Scales Using Test-Retest and Cronbach's Alpha Methods

Intelligence	Personality Traits	Illusion of Explanatory Depth	Method	No.
0.76	0.73	0.89	Test-Retest	1
0.74	0.72	0.85	Cronbach's Alpha	2

RESEARCH RESULTS

Objective 1: Measuring the Level of the Illusion of Explanatory Depth among State Employees

Hypothesis 1: There is no statistically significant difference at $\alpha = 0.05$ between the observed mean and the hypothetical mean on the Illusion of Explanatory Depth scale among employees of the General Secretariat of the Council of Ministers.

To achieve this objective, the Illusion of Explanatory Depth scale was administered to the study sample consisting of 400 employees. The results showed that their mean score on the scale was **52.89** with a standard deviation of **8.89**. Comparing this mean with the hypothetical mean of **50** using a one-sample t-test revealed that the difference was statistically significant in favor of the observed mean. The calculated t-value exceeded the critical t-value of 1.96 at 399 degrees of freedom and $\alpha = 0.05$.

This result indicates that the study sample exhibits a high level of the Illusion of Explanatory Depth by **6.50%**. The Illusion of Explanatory Depth is characterized by individuals' belief that they understand and can explain phenomena around them, while in reality, they are unable to provide accurate explanations. This discrepancy arises from overconfidence in their own knowledge and the difference between perceived knowledge and actual knowledge.

The Illusion of Explanatory Depth is considered a cognitive bias, a natural tendency in humans, manifesting in forms such as selfishness, narcissism, and overconfidence. This illusion can lead to perceptual errors, dominance in opinion and decision-making even in unfamiliar domains, and overestimation of one's knowledge.

For state employees, who are required to keep pace with developments, utilize their capacities, enhance their competencies, and gain self-confidence, this illusion can influence their perception and decision-making processes. Additionally, rapid information flow, sometimes misleading or unchecked, along with reliance on stored knowledge in memory, often leads them to overestimate their understanding of reality. This aligns with the theory proposed by Rozenblit and Frank Keil, highlighting that people tend to overrate their intelligence and cognitive capabilities due to a combination of low self-awareness and cognitive limitations. Such overconfidence is consistent with typical human behavior, where individuals frequently overestimate their knowledge.

Objective 2: Determining the Significance of Differences in the Illusion of Explanatory Depth According to Gender, Educational Attainment, and Age

a. Differences by Gender

Hypothesis 2: There is no statistically significant difference at $\alpha = 0.05$ in the Illusion of Explanatory Depth among state employees according to gender.

An independent samples t-test was conducted to examine gender differences. Results indicated no statistically significant difference, as the calculated t-value was less than the critical value of 1.96 at $\alpha = 0.05$ and 398 degrees of freedom. The researcher explains that the similarity in cognitive habits and work routines between male and female employees accounts for the lack of difference.

b. Differences by Educational Attainment

Hypothesis 3: There is no statistically significant difference at $\alpha = 0.05$ in the Illusion of Explanatory Depth among state employees according to educational attainment.

A one-way ANOVA was conducted, revealing no statistically significant differences, with a calculated F-value of **0.37**, less than the critical F-value of 2.37 at $\alpha = 0.05$ and 395 degrees of freedom. The researcher suggests that professional work is more interactive than academic study and that other factors, such as personality traits or the nature of tasks, may influence explanatory depth.

c. Differences by Age

Hypothesis 4: There is no statistically significant difference at $\alpha = 0.05$ in the Illusion of Explanatory Depth among state employees according to age.

A one-way ANOVA indicated no statistically significant differences, with a calculated F-value of **2.30**, less than the critical F-value of 2.60 at $\alpha = 0.05$ and 396 degrees of freedom. This suggests that the Illusion of Explanatory Depth manifests similarly across age groups. The phenomenon is a moderate human tendency that may increase with exposure to rapid, diverse, and sometimes unverified information sources, especially social media, and is not strongly linked to age.

RECOMMENDATIONS

- Encourage employees to confront cognitive biases that hinder appreciation of others' perspectives by learning from their own and others' errors through workshops, seminars, discussions, and training courses.

- Raise awareness among employees about the Illusion of Explanatory Depth, helping them recognize and understand their blind spots before making judgments.
- Promote intellectual analysis, continuous learning, and deep reading to enhance understanding and awareness.
- Conduct historical-psychological studies on the motives behind illusions that have influenced major world events, particularly the Illusion of Explanatory Depth, which has contributed to extremist interpretations of religious texts and the spread of hate culture in Iraq.

SUGGESTIONS FOR FUTURE RESEARCH

- Conduct similar studies on other societal groups such as university professors, military leaders, judges, doctors, and decision-makers, given their responsibility for critical decisions.
- Conduct extensive research on the relationship between cognitive illusions and terrorism to examine the psychological motives underlying violent and extremist behaviors, focusing specifically on the Illusion of Explanatory Depth, which may help explain the misuse of religious doctrines contrary to their humanistic and peace-oriented messages.

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