Illogical Classification-Based Thinking and Positive, Negative and Neutral Associations

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Abstract

This paper explores Illogical Classification-Based Thinking (ICBT) and its role in forming Positive, Negative, and Neutral Associations. Building on established theories such as the Halo and Horns Effects, and introducing Neutral Associations, this research examines how impressions lead to the automatic grouping of traits based on impressionistic judgments rather than logical reasoning. Using AI-generated images and a diverse participant pool, two studies were conducted: Study 1 confirmed the reliability of attractiveness categorizations, while Study 2 tested hypotheses related to trait associations. Results indicated that initial impressions significantly influence trait grouping across positive, negative, and neutral contexts, supporting the presence of ICBT. The integration of Kahneman's dual-process theory provided a comprehensive framework for understanding the cognitive processes involved. Findings have broad implications for social psychology, decision-making, consumer behavior, and organizational behavior, offering insights into how stereotypes and labeling are formed. Despite limitations such as sample representativeness and potential gender bias, this research contributes to a deeper understanding of impression-based judgments and cognitive categorization processes.

Keywords: Illogical Classification-Based Thinking, Halo Effect, Horns Effect, Neutral Associations, impression-based judgments, cognitive categorization, dual-process theory, social psychology, stereotypes.

Introduction

In cognitive psychology, understanding the mechanisms by which individuals form and categorize impressions is crucial for comprehending human judgment and decision-making. Two well-established phenomena in this field are the Halo Effect and the Horns Effect, where initial positive or negative impressions lead to the automatic attribution of other unrelated traits. These effects highlight the significant influence of initial perceptions on subsequent evaluations (Nisbett & Wilson, 1977). Recent research continues to explore these phenomena, providing deeper insights into how first impressions affect subsequent judgments. For instance, studies have shown that initial judgments can persist over time, affecting long-term perceptions and decisions (Sutherland et al., 2017).

While the Halo and Horns Effects offer valuable insights into positive and negative trait associations, the literature lacks a thorough exploration of how neutral traits are grouped and perceived. Additionally, the cognitive processes driving these impression-based categorizations, particularly those defying logical reasoning, require further investigation. This study aims to address these gaps by introducing the concept of Illogical Classification-Based Thinking (ICBT) and expanding on the existing frameworks of the Halo and Horns Effects. ICBT is a cognitive process where individuals classify an object or person based on attribute(s) and associate the attribute(s) with other often related traits, forming an overall impression. This classification relies on impressionistic judgments rather than logical reasoning, influenced by cultural norms, linguistic habits, personal experiences, social expectations, and stereotypes etc.

Building on the foundational work of Nisbett and Wilson (1977) and recent studies by Todorov et al. (2015), Thorndike and Barnhart (2022), and Zebrowitz and Montepare (2020), this research examines how Positive, Negative, and Neutral Associations are formed through ICBT. These studies have reinforced the lasting impact of first impressions on trait

perception, demonstrating that people quickly form lasting impressions based on facial features and other initial cues. Furthermore, recent studies have highlighted the persistence of these effects in various social and professional contexts, reinforcing the need to understand the underlying cognitive mechanisms (Kervyn et al., 2015; Forgas & Laham, 2016; Fiske, 2018).

In addition, this study integrates Kahneman's (2011) dual-process theory, which distinguishes between fast, intuitive thinking (System 1) and slow, deliberate thinking (System 2). ICBT is primarily associated with System 1, where quick, impression-based judgments are made without logical analysis. However, this research also considers how ICBT can manifest through more extended deliberation, aligning with the thoughtful processing characteristic of System 2. Recent findings have shown that even with more deliberate thought processes, initial impressions can still exert a strong influence, highlighting the complexity of cognitive processing in impression formation (Kahneman, 2011; Evans & Stanovich, 2013).

By exploring these cognitive processes and their implications, this study contributes to a broader theoretical framework encompassing the full spectrum of impression-based trait grouping. It aims to elucidate the automatic categorization processes driving our associations and stereotypes, providing insights for several fields, including social psychology, decision-making, consumer behavior, and organizational behavior. This approach offers a nuanced understanding of how impressions shape our perceptions and judgments across different contexts, enhancing our knowledge of human cognition and behavior.

Theoretical Framework

Positive Associations: A Conceptual Expansion of the Halo Effect

Positive Associations involve the tendency to group favorable traits based on impression(s) in specific context, without logical reasoning. This concept is closely related to

the Halo Effect, where one positive trait, such as physical attractiveness, leads to assumptions of other unrelated positive traits, such as kindness or intelligence (Nisbett & Wilson, 1977). Recent research has reinforced the Halo Effect, demonstrating that first impressions significantly influence subsequent judgments.

For example, Todorov et al. (2015) showed that people quickly form lasting impressions based on facial features, which then affect perceptions of other unrelated traits. Thorndike and Barnhart (2022) confirmed the persistence of the Halo Effect in workplace assessments, where initial positive traits influence evaluations and hiring decisions. Zebrowitz and Montepare (2020) found that facial appearance significantly impacts social outcomes, reinforcing the role of first impressions. Sutherland et al. (2017) demonstrated that even brief exposure to a face can lead to lasting impressions affecting personality trait evaluations.

While Positive Associations share similarities with the Halo Effect, they emphasize the non-logical grouping of traits based on initial impressions. This process, termed Illogical Classification-Based Thinking (ICBT), is influenced by cultural norms, linguistic habits, personal experiences, social expectations, and stereotypes. For instance, describing someone as kind may evoke associations with traits such as friendliness and gentleness. However, context can alter these associations: a beautiful woman smiling against a blue background may be perceived as gentle, while another beautiful woman laughing against a red background may be seen as passionate. This contextual dependency highlights that specific trait groupings can vary based on situational, cultural and social factors, which is not fully addressed by the traditional Halo Effect framework.

Negative Associations: A Conceptual Expansion of the Horns Effect

Negative Associations involve grouping unfavorable traits based on impression(s) in specific context, without logical reasoning. This concept aligns with the Horns Effect, where

one negative trait leads to assumptions of other negative traits. Studies have illustrated that first impressions significantly influence subsequent judgments, particularly negatively.

Kervyn, Bergsieker, and Fiske (2015) found that initial negative impressions can lead to perceptions of other unrelated negative traits. Forgas and Laham (2016) confirmed the prevalence of the Horns Effect in various social and professional contexts, affecting evaluations and decision-making processes. Fiske (2018) reviewed the impact of initial negative impressions on social outcomes, reaffirming their significant effect on subsequent judgments. Macrae and Bodenhausen (2000) found that brief exposure to a negative trait can lead to enduring negative impressions.

Negative Associations emphasize the non-logical grouping of unfavorable traits based on ICBT. This process suggests that negative impressions are categorized as 'bad' first and associated with other negative traits in specific context. For instance, in a workplace setting, describing someone as lazy might evoke traits like inefficiency and irresponsibility, while in an academic setting, laziness might be associated with a lack of discipline and ambition. This contextual dependency indicates that specific trait groupings under negative associations can differ, a nuance not clearly captured by the Horns Effect.

Neutral Associations: A New Perspective on Impression-Based Trait Grouping

Neutral Associations involve grouping neutral traits based on impression(s) in specific context, without logical thinking. Individuals might associate someone with an average appearance with traits like being unremarkable or inconspicuous, despite a lack of logical evidence. This concept expands the understanding of how impressions influence perceptions beyond clearly positive or negative traits.

Although Neutral Associations are less explored, they function similarly to Positive and Negative Associations through ICBT. Neutral Associations emphasize the automatic categorization process and collective grouping of neutral traits, providing a comprehensive

understanding of how impressionistic judgments shape our perceptions across the full
spectrum of trait grouping.

Classification-Based Thinking (CBT)

Classification-Based Thinking (CBT) is defined in this paper as a cognitive process
where individuals organize information, objects, or people into categories based on perceived
characteristics or attributes. This process involves grouping entities according to shared traits,
thereby managing large amounts of information by creating manageable subsets and making
sense of complex data.

Illogical Classification-Based Thinking (ICBT)

ICBT is defined as a cognitive process where individuals classify an object or person
based on impression(s) and subsequently associate this attribute with other related attributes,
forming an overall impression. This classification relies on impressions and empirical
experiences rather than logical reasoning. For example, perceiving a person as intelligent
might lead to assumptions that they are also diligent and hardworking, despite no logical
connection between these traits.

The essence of ICBT is its reliance on empirical judgment. Such judgments are often
practical in real-life scenarios, despite the absence of logical reasoning. For instance,
associating green with safety and health is common in marketing, as environmentally friendly
products often use green packaging. Similarly, intelligent individuals are frequently perceived
as diligent based on empirical observations rather than logical reasoning.

ICBT is a key factor in forming and reinforcing stereotypes, which are often grounded
in empirical applicability rather than accuracy. This process resembles Kahneman's System 1
(fast, intuitive thinking) and System 2 (slow, logical thinking), although even with careful
consideration, people may still rely on ICBT. This reliance leads to comprehensive
impressions based on single attribute(s), resulting in biases such as stereotyping.

Manifestations of ICBT

ICBTmanifests in two primary ways:

Associative Thinking-Based Classification

When an individual perceives Person A as intelligent, they may draw on personal experiences with Person B, who is also perceived as intelligent, diligent, and determined. This leads to the assumption that Person A shares these additional traits due to the personal association with Person B. Similarly, if an individual knows a group of intelligent people (Persons B, C, and D) who are diligent and determined, they might generalize that Person A, like this group, is also diligent and determined based on their collective experiences.

Figure S.1 Associate Thinking-Based Classification
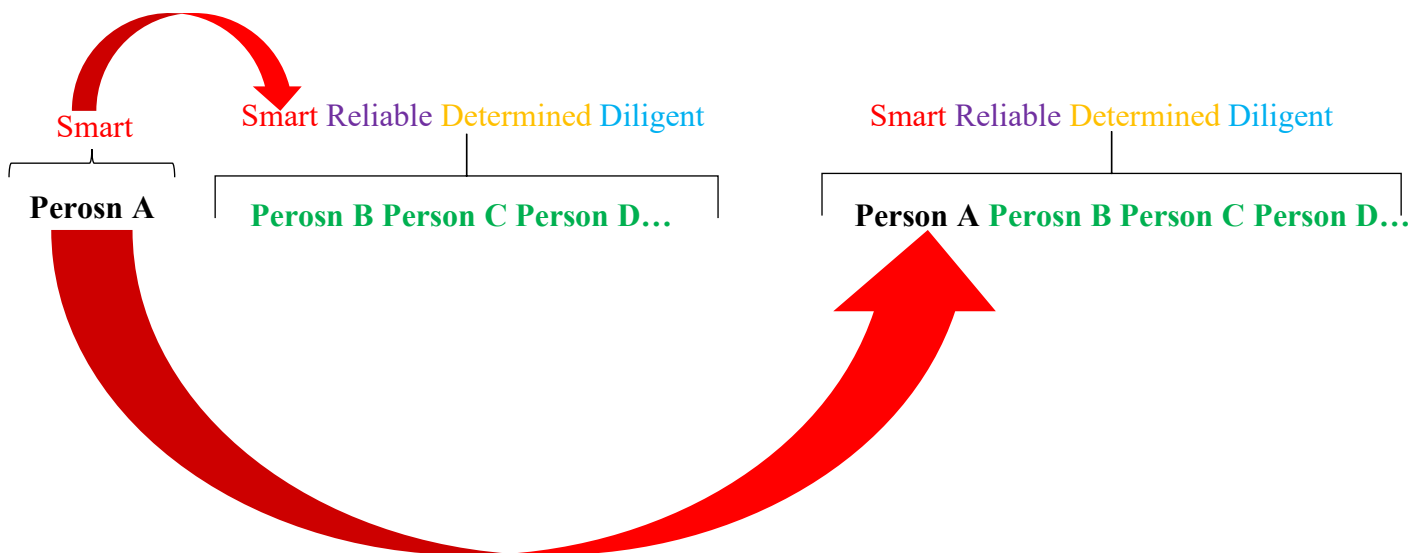
Trait Co-occurrence-Based Classification

When Person A is perceived as intelligent, societal expectations, stereotypes, and cultural norms often associate intelligence with diligence and determination. As a result, an individual may infer that Person A possesses these traits due to these broader social and cultural associations.

Figure S.2 Trait Co-occurrence-Based Classification
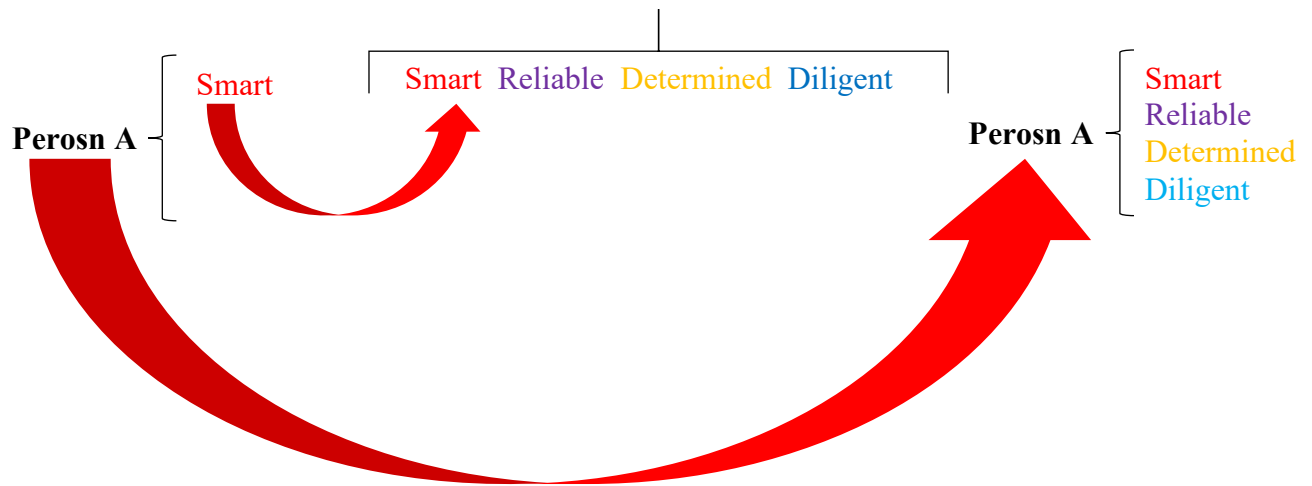
Intuition-Based Classification

Some individuals inherently believe that a smart person must also possess qualities such as diligence and determination. This belief is driven by intuition rather than any logical reasoning or empirical evidence.

Logical Classification-Based Thinking (LCBT)

LCBT differs from ICBT as it is based on logical and critical reasoning. This process involves evidence-based classification, where logical relationships are clear and straightforward. For example, recognizing a vehicle with police lights as a police car is a logic-based judgment. LCBT aligns with Kahneman's System 2, which is characterized by deliberate and effortful cognitive processing.

The Role of ICBT in Forming Positive, Negative, and Neutral Associations

ICBT serves as a fundamental mechanism underpinning the formation of Positive, Negative, and Neutral Associations. This process involves categorizing individuals based on impression(s) and subsequently associating this primary attribute with a range of other related traits, without logical reasoning or evidence.

In the context of Positive Associations, ICBT elucidates how single favorable impression(s) can lead to the grouping of multiple related positive traits. Similarly, ICBT plays a crucial role in forming Negative Associations, where negative impression(s) leads to

the automatic clustering of other unfavorable traits. ICBT also provides a framework for understanding Neutral Associations, where neutral traits are grouped based on initial impressions that do not elicit strong positive or negative reactions.

In summary, the conceptual expansion provided by Positive, Negative, and Neutral Associations, alongside ICBT, offers a comprehensive understanding of how impressionistic judgments shape our perceptions. This theoretical framework emphasizes the automatic and often illogical categorization processes that drive our associations and stereotypes, providing a nuanced perspective on the cognitive mechanisms underlying social judgments.

ICBT&LCBT Versus System 1&System 2

ICBT and System 1

ICBT involves the formation of associations and classifications based on impressionistic judgments, without logical reasoning. This process could be fast, automatic, and intuitive, aligning with System 1, which is known for its reliance on past experiences and heuristic-based processing to make rapid decisions (Kahneman, 2011). However, ICBT diverges from System 1 in its emphasis on the illogical and impressionistic nature of these classifications, which are influenced by cultural norms, social expectations, and stereotypes etc.

Moreover, while System 1 involves quick, heuristic judgments, ICBT specifically refers to the non-logical grouping of traits based on initial impressions. These judgments are not necessarily quick and are also shaped by external factors such as cultural context and social biases, which may not always be the case with System 1 processes (Todorov et al., 2015; Zebrowitz & Montepare, 2020).

In addition, ICBT operates through impression-based judgments, but it can involve both quick and more extended periods of deliberation. This aspect of ICBT diverges from the typical characterization of System 1, which focuses on rapid and automatic processing. In

extended ICBT, judgments may still be driven by intuitive impressions rather than logical

analysis, indicating a complex interplay between intuitive thinking and more reflective

processes (Evans & Stanovich, 2013).

LCBT and System 2

LCBT involves categorization and judgment based on logical reasoning and empirical

evidence, resembling System 2's slow, deliberate, and effortful cognitive activities. System 2

engages in analytical thinking, requiring cognitive resources to evaluate information and

make reasoned decisions (Kahneman, 2011). However, LCBT diverges from System 2 in its

specific application to classification-based thinking, where the emphasis is on systematic

categorization rather than broader analytical tasks.

For example, LCBT involves recognizing logical relationships and making evidence-

based classifications, such as identifying a vehicle with police lights as a police car. This

process is systematic and deliberate, similar to System 2, but is particularly focused on

classification and organization of information (Stanovich & West, 2000).

Comparative Analysis

While ICBT and LCBT share similarities with System 1 and System 2, they diverge

in key ways. ICBT's reliance on impressions and experiences reflects System 1's heuristic-

based nature but includes a broader range of influences such as cultural and social factors,

highlighting its illogical foundations. Conversely, LCBT's emphasis on logical and evidence-

based classification aligns with System 2's analytical processing but is specifically concerned

with categorization tasks.

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Research Hypotheses

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Positive Associations in Trait Grouping

H1: Individuals will associate multiple favorable traits with a person based on a single

positive impression, even when there is no logical correlation between these traits.

H1-0: There will be no significant association between multiple favorable traits and a person based on a single positive impression.

Contextual Dependency in Positive Trait Associations

H2: The specific positive traits grouped together will vary depending on the context in which the positive impression is formed.

H2-0: The specific positive traits grouped together will not vary significantly depending on the context in which the positive impression is formed.

Negative Associations in Trait Grouping

H3: Individuals will associate multiple unfavorable traits with a person based on a single negative impression, even when there is no logical correlation between these traits.

H3-0: There will be no significant association between multiple unfavorable traits and a person based on a single negative impression.

Contextual Dependency in Negative Trait Associations

H4: The specific negative traits grouped together will vary depending on the context in which the negative impression is formed.

H4-0: The specific negative traits grouped together will not vary significantly depending on the context in which the negative impression is formed.

Neutral Associations in Trait Grouping

H5: Individuals will associate multiple neutral traits with a person based on a single neutral impression, even when there is no logical correlation between these traits.

H5-0: There will be no significant association between multiple neutral traits and a person based on a single neutral impression.

Contextual Dependency in Neutral Trait Associations

H6: The specific neutral traits grouped together will vary depending on the context in which the neutral impression is formed.

H6-0: The specific neutral traits grouped together will not vary significantly depending on the context in which the neutral impression is formed.

Illogical Classification-Based Thinking (ICBT)

H7: Individuals will rely on Illogical Classification-Based Thinking (ICBT), grouping traits into categories based on impressions rather than logical reasoning, leading to positive, negative, and neutral associations.

H7-0: Individuals will not rely significantly on ICBT when grouping traits into categories based on impressions rather than logical reasoning.

Methods

Participants

Participants for Study 1 consisted of 50 individuals, while Study 2 included 1,100 individuals. The participants were recruited from various provinces in mainland China and were aged 18 and above. There were no restrictions based on gender, sexual orientation, educational background, or occupational background. Participants were recruited through the Credamo platform, which facilitated random selection by the system. Exclusion criteria for both studies included incorrect responses to trap questions and age not meeting the requirements. If participants initially chose "disagree" on the informed consent form but subsequently selected "agree" and submitted the questionnaire, their responses were considered valid.

Study 1 encountered no failed samples. In Study 2, 55 samples were automatically rejected by the Credamo platform due to failure on the questionnaire's trap question (Q2_8). Participants were sourced from across 31 provinces, autonomous regions, and the Macau Special Administrative Region. The gender distribution revealed that 29.36% of participants identified as male, 70.27% as female, and 0.36% as non-binary. In terms of sexual orientation, 95.36% identified as heterosexual, 3.55% as bisexual, 0.82% as homosexual, and

0.27% as other. The age distribution was predominantly within the 21-30 years (46.36%) and 31-40 years (34.91%) brackets. The majority of participants were employed in private enterprises (46.55%), followed by students (24.09%). Educational attainment showed that the highest proportion of participants held a bachelor's degree (69.91%), followed by those with a master's degree (13.64%) and an associate degree (10.55%).

Study Design

Study 1 focused on image-based impressions, while Study 2 expanded to include both text and image-based impressions. The overall objective was to explore how initial impressions influenced trait associations across positive, negative, and neutral contexts.

Materials

Images for Study 1 were generated using ChatGPT 4.0 with specific prompts to create depictions of individuals aligned with common perceptions of beauty, unattractiveness, and averageness. The images included:

1. A beautiful woman smiling with a blue background

2. A beautiful woman laughing with a red background

3. An unattractive and obese man eating

4. An unattractive woman with a punk style smoking

5. An average-looking middle-aged woman drinking coffee

6. An average-looking middle-aged woman with average intelligence working

Procedure

Participants were first presented with an informed consent form detailing the study's purpose, procedures, risks, and benefits. Upon agreeing to participate, they provided demographic information and responded to trap questions designed to ensure attentiveness.

In Study 1, participants rated the attractiveness of each image on a scale from 1 to 10, with 1 being very unattractive and 10 being very attractive. In Study 2, participants were

exposed to text descriptions and images, followed by questions assessing their impressions and trait associations.

Questionnaire Design

The questionnaire for both studies included demographic questions, trap questions, and impression-related questions. In Study 2, questions were designed to test specific hypotheses regarding positive, negative, and neutral trait associations and the concept of Illogical Classification-Based Thinking (ICBT). Each multiple-choice question consisted of 22 options, including a mix of logically unrelated positive, negative, and neutral traits, along with options for no impression and other, which required a text response.

Data Collection

Data were collected online through the Credamo platform. The sample size of Study 1 (n=50) was justified by a post hoc power analysis, which revealed a power of 1.0, indicating sufficient sensitivity to detect significant differences in impressions. The pilot study for Study 2 involved 68 participants to determine the necessary sample size for the main study, which was calculated to be 116 based on Cramér's V values obtained from the pilot data. For the main study, data collection from the 1,100 participants occurred over two days.

Data Analysis

Reliability and validity analyses were performed using Cronbach's alpha and factor loadings to ensure the internal consistency and construct validity of the measures. Descriptive statistics, including means, standard deviations, and medians, were calculated to confirm participants' perceptions of attractiveness, unattractiveness, and averageness in the images. Hypothesis testing involved chi-square goodness of fit tests to examine the distribution of responses and validate the hypotheses related to positive, negative, and neutral trait associations. The presence and formation of ICBT were analyzed through response time data

and qualitative analysis of participant explanations. The analysis tool used was SPSSAU online.

Test-Retest Reliability

To assess the reliability of the questionnaire, a test-retest analysis was conducted with a randomly selected 10% subset of the original sample from Study 2, resulting in 110 participants. Consistency checks involved calculating the percentage of agreement for each option in both tests and aggregating the average consistency percentage for each question. The consistency results for multiple-choice questions demonstrated high reliability, validating the test-retest method.

Ethical Considerations

All participants were informed about the study's objectives, procedures, risks, and benefits. Participation was voluntary, and confidentiality was ensured through anonymous data collection. Participants were allowed to withdraw from the study at any time without negative consequences. The study adhered to ethical guidelines for research with human subjects, ensuring that the data collection process protected participant privacy and complied with institutional review board requirements. This study was approved by the Institutional Review Board (IRB) of Hephaestus Education Technology Ltd.

The Use of AI Statement

During the preparation of this work, the author used the latest version of ChatGPT 4o to generate images and figures (word clouds), analyze sample sizes for Study 1 and Study 2, perform the test-retest analysis for Study 2, translate the questionnaires for Study 1 and Study 2, and proofread and improve the language clarity and structure of this report. After using this tool/service, the author reviewed and edited the content as needed and take full responsibility for the content of the publication.

Data Availability

The data that support the findings of this study will be publicly available on Figshare under the Creative Commons Attribution 4.0 International (CC BY 4.0) license upon publication.

Editors and Reviewers can access to raw data, supplementary materials, tables, and questionnaire templates etc. via https://figshare.com/s/2545037d1cc9e4901d4e

Code Availability

Not applicable.

Results

Participant Demographics

In Study 1, the sample comprised 50 participants from various provinces in mainland China, all aged 18 and above. Study 2 involved 1,100 participants with similar demographic diversity. The gender distribution in Study 2 included 29.36% identifying as male, 70.27% as female, and 0.36% as non-binary. Sexual orientation data revealed 95.36% identified as heterosexual, 3.55% as bisexual, 0.82% as homosexual, and 0.27% as other. Age distribution was primarily within the 21-30 years (46.36%) and 31-40 years (34.91%) brackets. Occupational categories showed the majority were employed in private enterprises (46.55%), followed by students (24.09%). Educational attainment indicated 69.91% held a bachelor's degree, 13.64% a master's degree, and 10.55% an associate degree.

Image Ratings (Study 1)

Participants rated the attractiveness of the images on a scale from 1 to 10. The mean attractiveness scores were:

1. Beautiful woman smiling (blue background): Mean = 7.1, SD = 1.854, Median = 7.0

2. Beautiful woman laughing (red background): Mean = 8.5, SD = 1.359, Median = 9.0

3. Unattractive and obese man eating: Mean = 2.6, SD = 1.761, Median = 2.0

4. Unattractive woman with a punk style smoking: Mean = 1.3, SD = 0.647, Median = 1.0

5. Average-looking middle-aged woman drinking coffee: Mean = 5.12, SD = 1.913, Median = 5.0

6. Average-looking middle-aged woman with average intelligence working: Mean = 4.18, SD = 1.662, Median = 4.0

These ratings confirmed the initial categorization: scores of 1-3 were considered unattractive, 4-6 as average, and 7-10 as attractive.

Reliability and Validity Analysis (Study 1)

The reliability of the measures was assessed using Cronbach's alpha, yielding the following values:

1. Attractiveness (positive association) scale: Cronbach's alpha = 0.877, Factor loadings = 0.944, KMO = 0.500, Bartlett's Test of Sphericity: $\chi^2(1) = 44.808$, $p < 0.001$

2. Unattractiveness (negative association) scale: Cronbach's alpha = 0.835, Factor loadings = 0.926, KMO = 0.500, Bartlett's Test of Sphericity: $\chi^2(1) = 34.223$, $p < 0.001$

3. Average appearance (neutral association) scale: Cronbach's alpha = 0.706, Factor loadings = 0.879, KMO = 0.500, Bartlett's Test of Sphericity: $\chi^2(1) = 16.747$, $p < 0.001$

These results indicated adequate reliability and validity of the scales used in Study 1.

Hypothesis Testing (Study 2)

Chi-square goodness of fit tests were conducted to examine the distribution of responses and validate the hypotheses related to positive, negative, and neutral trait associations.

Positive Associations

Q3.1 ("He is a highly intelligent man"): Significant traits included diligent, determined, persistent, strong, calm, and reliable ($\chi^2 = 4138.229$, $p < 0.001$)

Q4.1 ("He is a kind man"): Significant traits included diligent, honest, gentle, enthusiastic, and reliable ($\chi^2 = 5235.992$, $p < 0.001$)

Image of a beautiful woman smiling (Q5.1): Significant traits included kind, gentle, quiet, enthusiastic, cheerful, independent, and confident ($\chi^2 = 5028.577$, $p < 0.001$)

Image of a beautiful woman laughing (Q6.1): Significant traits included kind, enthusiastic, cheerful, independent, and confident ($\chi^2 = 11727.834$, $p < 0.001$)

These findings supported the hypotheses that individuals associate multiple favorable traits based on a single positive impression (H1) and that these associations vary depending on the context (H2).

Negative Associations

Q7_1 ("He is a foolish man"): Significant traits included lazy, self-abased, selfish, impatient, impulsive, violent, and boring ($\chi^2 = 2769.818$, $p < 0.001$)

Q8_1 ("He is a bad-tempered man"): Significant traits included gloomy, selfish, impatient, impulsive, and violent ($\chi^2 = 9617.091$, $p < 0.001$)

Image of an unattractive and obese man eating (Q9_2): Significant traits included lazy, gluttonous, weak-willed, and rude ($\chi^2 = 7914.520$, $p < 0.001$)

Image of an unattractive woman with a punk style smoking (Q10_2): Significant traits included rude, rebellious, weird, bullying, and vulgar ($\chi^2 = 7528.800$, $p < 0.001$)

These results confirmed the hypotheses that individuals associate multiple unfavorable traits based on a single negative impression (H3) and that these associations vary depending on the context (H4).

Neutral Associations

Q11_1 ("He is an average-intelligence middle-aged man"): Significant traits included average education, average career, average wealth, average work ability, and plain (χ^2 = 3997.727, p < 0.001)

Q12_1 ("He is an average-looking middle-aged man"): Significant traits included calm, average career, average work ability, plain, and unnoticed (χ^2 = 2591.878, p < 0.001)

Image of an average-looking middle-aged woman drinking coffee (Q13_2): Significant traits included kind, gentle, quiet, calm, casual, and plain (χ^2 = 3609.496, p < 0.001)

Image of an average-intelligence middle-aged woman working (Q14_2): Significant traits included kind, gentle, quiet, calm, average education, average career, average work ability, and plain (χ^2 = 2599.165, p < 0.001)

These findings confirmed the hypotheses that individuals associate multiple neutral traits based on a single neutral impression (H5) and that these associations vary depending on the context (H6).

Illogical Classification-Based Thinking (ICBT)

The concept of Illogical Classification-Based Thinking (ICBT) was explored through both quantitative and qualitative analyses to understand how individuals categorize traits based on initial impressions.

Quantitative Analysis

The response time data indicated a pattern of deliberate, analytical thinking among participants. The median response times for the multiple-choice questions ranged from

12.944 to 36.986 seconds, with the median total response time for the survey being 893 seconds. These findings suggest that participants engaged in thoughtful, analytical processing.

Chi-square goodness of fit tests on response distributions confirmed significant differences, supporting the hypothesis that participants relied on ICBT when categorizing traits based on initial impressions. Traits such as "kind," "gentle," and "confident" were frequently associated with positive impressions, while "lazy," "selfish," and "violent" were linked to negative impressions.

Qualitative Analysis

Qualitative data from participants' explanations of their trait associations provided deeper insights into the mechanisms of ICBT. Participants often referenced personal impressions, stereotypes, and societal expectations as the basis for their associations. For instance, individuals described as highly intelligent were frequently associated with traits such as reliability and diligence. Some responses were influenced by personal experiences, linguistic characteristics, intuition, and color associations, providing a comprehensive understanding of how ICBT arises primarily from empirical experiences rather than logical reasoning. Only a few responses invloved LCBT and selected 'I have no impression'.

Figure S3. Word Clouds

Test-Retest Reliability (Study 2)

A randomly selected 10% subset of the original sample from Study 2 (N = 110) was used to assess test-retest reliability. The average consistency percentages for multiple-choice questions Q3_1 to Q14_2 ranged from 77.60% to 88.51%, demonstrating a high level of consistency between the two tests. This validated the reliability of the questionnaire design and data collection process.

Table S.1 Test-Retest Rebilability

Question	Average Consistency (%)
Q3_1	81.98%
Q4_1	82.11%
Q5_2	81.36%
Q6_2	88.51%
Q7_1	77.60%
Q8_1	87.56%
Q9_2	86.19%
Q10_2	81.45%
Q11_1	79.26%
Q12_1	81.36%
Q13_2	81.36%
Q14_2	78.51%

Discussion

This paper provides an exploration of Illogical Classification-Based Thinking (ICBT) and its role in forming Positive, Negative, and Neutral Associations. By expanding on established theories such as the Halo and Horns Effects and introducing Neutral Associations,

this research contributes to a more nuanced understanding of how impression-based trait associations are formed.

One significant contribution of this study is the ethical use of AI to generate experimental stimuli. By employing AI-generated images, the research ensures a more controlled and respectful approach to human subjects, reducing potential discrimination associated with using real people's images even with consent. This method provides a reliable means of studying impression formation without the ethical complexities of using real individuals.

The findings from Study 1 confirmed that participants can reliably categorize images as attractive, unattractive, or average, aligning with the initial study design. This confirmation is supported by adequate reliability and validity measures, ensuring that the scales used in Study 1 were appropriate for the intended analysis.

In Study 2, the hypothesis testing confirmed that individuals associate multiple traits with a person based on a single impression, whether positive, negative, or neutral. The chi-square goodness of fit tests revealed significant associations between initial impressions and trait groupings, supporting the study's hypotheses. The results indicate that initial impressions play a crucial role in how individuals categorize and attribute traits, aligning with the principles of ICBT.

The study's integration of Kahneman's dual-process theory (2011) offers a comprehensive framework for understanding the cognitive processes underlying ICBT. The response time data and qualitative analyses suggest that while participants engage in thoughtful, analytical processing, their trait associations are heavily influenced by initial impressions and empirical experiences rather than logical reasoning. This finding underscores the role of System 1 thinking in impression-based categorization, even when participants are given time to deliberate.

The high test-retest reliability in Study 2 further validates the consistency and reliability of the questionnaire design and data collection process. The consistency percentages for multiple-choice questions ranged from 77.60% to 88.51%, demonstrating that the measures used in this study are robust and dependable.

Implications

The theoretical framework proposed in this study, which includes the concept of Neutral Associations and a detailed explanation of ICBT, represents a significant contribution to cognitive and social psychology. This framework not only builds on the Halo and Horns Effects but also extends them by introducing the idea that neutral traits can be grouped based on impressions. This conceptual expansion offers a broader application and a more detailed mechanism for understanding impressionistic judgments.

The implications of this theoretical framework extend across various fields, including social psychology, decision-making, consumer behavior, and organizational behavior. Understanding how ICBT influences stereotypes, labeling, and decision-making processes provides valuable insights for these disciplines. For instance, in consumer psychology, this framework can explain why advertisements featuring specific positive attributes can lead to a broader range of positive associations among consumers.

Limitations

Despite the strengths of this study, several limitations must be acknowledged. The sample, although large and diverse, was drawn from a single online platform (Credamo) and may not fully represent the broader population. The higher proportion of female participants could introduce a gender bias, potentially influencing the associations observed. Future research should address these limitations by incorporating more diverse samples and exploring the effects of ICBT in real-world scenarios.

Future Research

Future research should aim to expand the empirical evidence supporting the prevalence and impact of ICBT in various decision-making contexts and across different cultural settings. Incorporating cross-cultural comparisons would enhance the generalizability of the findings and provide a more global perspective. Using a more diverse set of images to represent different cultural standards of attractiveness, unattractiveness, and averageness would also strengthen the study. Increasing sample sizes for reliability and validity assessments would ensure the robustness of the measures used, and comparing response time data with baseline measures for similar tasks would substantiate the interpretation of cognitive processes involved in ICBT.

In conclusion, this study contributes to the understanding of impression-based trait associations and the cognitive mechanisms underlying ICBT. While it builds on existing theories, it introduces new dimensions that enhance the theoretical landscape of cognitive and social psychology. By providing a comprehensive framework for understanding how initial impressions shape our perceptions, this research offers insights for both academic and practical applications.

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