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# Promoting Reviewer-Related Attribution: Moderately Complex Presentation of Mixed Opinions Activates the Analytic Process

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**Abstract:** Using metacognition and dual process theories, this paper studied the role of types of presentation of mixed opinions in mitigating negative impacts of online word of mouth (WOM) dispersion on consumer's purchasing decisions. Two studies were implemented, respectively. By employing an eye-tracking approach, study 1 recorded consumer's attention to WOM dispersion. The results show that the activation of the analytic system can improve reviewer-related attribution options. In study 2, three kinds of presentation of mixed opinions originating from China's leading online platform were compared. The results demonstrated that mixed opinions expressed in moderately complex form, integrating average ratings and reviewers' impressions of products, was effective in promoting reviewer-related attribution choices. However, too-complicated presentation types of WOM dispersion can impose excessively on consumers' cognitive load and eventually fail to activate the analytic system for promoting reviewer-related attribution choices. The main contribution of this paper lies in that consumer attribution-related choices are supplemented, which provides new insights into information consistency in consumer research. The managerial and theoretical significance of this paper are discussed in order to better understand the purchasing decisions of consumers.

**Keywords:** analytic system; cognitive load; metacognition theory; presentation type of mixed opinions; attribution choices

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## 1. Introduction

According to the recent surveys released by China Internet Network Information Center (CINIC), 77.5% of participants have considered online word-of-mouth (WOM) to be the most significant factor in affecting their purchasing decisions [1]. Moreover, prevalent and available online word of mouth makes it possible that consumers can encounter WOM dispersion about the same product [2–5]. Retailers actually believe that WOM dispersion leads to much more risks and uncertainties for prospective consumers [4–6], and consumers normally prefer products with consistent WOM [7]. Therefore, they usually tend to pursue products with ratings of five stars (highly praised by all reviewers) after offering reviewers coupon codes or other incentives (i.e., gifts such as Mickey Mouse, pen containers, and sometimes even cell-phone refill cards). Real practice, however, tells us that the distribution of ratings is often highly dispersed with a J-shape or unimodality, rather than consistent [8]. This problem, reflected in practice, has attracted continuous research endeavors devoted to understanding the relationship between product sales and WOM dispersion, and further developing positive intervention measures to influence the manner in which WOM dispersion is perceived [2,9]. This would be useful in maximizing the positive impacts of WOM dispersion, and simultaneously mitigating its negative influence on retailers facing consumers' disparate opinions about their products and/or service [4,10,11].

Unfortunately, in spite of its importance, the mechanism for mitigating the negative effect of WOM dispersion on product sales is still very limited:

On the one hand, very limited attention has been paid to explain how physical characteristics of the WOM distribution display may mitigate the negative influence of WOM dispersion. The extensive literature regarding WOM dispersion and product evaluations has highlighted the important roles of product/service [4,12,13], review properties [2,10,13], and reviewers' characteristics [5] in affecting WOM dispersion. Therefore, almost without exception, WOM distribution in previous studies was displayed with a horizontal bar chart [2,4,5,12,14,15], which usually depicted an 'overall' rating scale attempting to integrate both positive and negative opinions with a single number. However, unlike Amazon.com and some other foreign online retailers which use a five-star horizontal bar chart, major Chinese retailers, such as Jingdong Mall (jd.com) and Taobao (taobao.com) adopt a three-level rating system (i.e., good, medium, and bad). Studies have shown that different physical characteristics of the WOM distribution display may have a role to play in affecting WOM dispersion through impacting consumers' perceptions [16,17].

On the other hand, how divided opinions are interpreted by consumers was rarely examined until the proposal of an attribution-based account, originating from the affirmation that consumers who have noticed WOM dispersion will be involved in the process of attribution to clarify it [4,18]. According to this work, attribution is the cognition consumers generate to infer the reason behind the mixed opinions about a product or service. A further discussion of attribution-based accounts suggested that attributional inferences about dispersion were related to either product or reviewer [19]. The function of WOM which is related to product indicates the degree of a product's performance in accordance with what is promised or expected [2,20]. Moreover, different people judge the same product differently, which highlights the possible factor of variation between reviewers making a contribution to a ranking distribution [4]. The basic proposition is that, for high WOM dispersion, attribution to product is negatively correlated with production evaluations, whereas attribution to reviewer reflects variability in reviewers' preferences or expectations and makes the dispersion markedly less negative, since consumers' reviewer-related attribution choices are critical in mitigating negative influences of WOM dispersion on product sales. However, few studies have focused on how to promote consumers' attribution of the presence of WOM dispersion to reviewer-related attribution rather than product-related attribution when they encounter WOM dispersion.

Extending prior research, this study aims to develop a conceptual framework based on psychological theories of metacognition and dual processing. We conducted two studies to address two important questions: (1) Will the activation of the analytic system (the analytical or deliberate capacity of the individual to act on the world) effectively promote reviewer-related attribution choices? Studies have pointed out that reviewer-related attribution needs the elaborate processing of WOM dispersion [4,21]. If information is processed with difficulty or disfluency, this metacognitive experience will serve as a cue that the task is difficult [22,23], then reduce the individual's intuitive confidence [24,25], thereby activating more elaborate (analytic system) processing [24,26,27]. The analytic system is a relatively slow, resource-dependent system, that takes into account objective reasons and is more dependent on internal cues (i.e., reviewer causality), by putting a heavy load on working memory [24,28].

More importantly, (2) is the activation of the analytic system influenced by the form in which mixed opinions are presented? Three types of presentation of mixed opinions frequently used in major online shopping platforms in China are categorized into three conditions (i.e., simple, moderately complex, and very complex). Since each cognitive process, requiring conscious control, imposes a cognitive load on working memory that might be used when solving problems, a linear relationship is hypothesized between reviewer-related attribution choices and the perceived difficulty or disfluency (reduced ease of processing) [29] caused by presentation types of mixed opinions.

Across two studies our results reveal that the activation of the analytic system refers to the use of thorough thinking that is likely to evoke reviewer-related attribution choices, and the presentation type of mixed opinions exerts a powerful influence on consumers' deliberations and analytical systems of reasoning. That is, consumers are more likely to attribute discrepancy to a reviewer when mixed opinions are displayed in a moderately complex presentation, due to the experience of difficulty or disfluency and the consequent activation of the analytic system incurred by this presentation type. However, mixed opinions presented in too complicated forms would increase viewers' cognitive loads immensely and take up too many psychological resources; consequently the analytic system cannot be activated. These findings were also supported by the results of eye-tracking studies.

This study not only offers important theoretical insights into the mechanism underlying the influence of WOM dispersion on product sales, but also provides practical implications for retailers to reduce the negative influence of mixed opinions about products and/or services.

## 2. Theoretical Background and Research Hypotheses

### *2.1. The Negative Influence of WOM Dispersion*

Dispersion is the opposite of consensus and is generally examined from the statistical perspective and represented by statistical variance (i.e., the second moment of product ratings) [30,31]. Since mixed opinions underline a mixture of positive and negative reviews about the same product and/or service, WOM dispersion is a statistical indicator of the extent to which mixed opinions differ. Highly dispersed WOM distributions connote substantial uncertainties and decision risks [4], which is typically undesirable from a consumer's perspective [32]. Therefore, prior studies, either about the influence of WOM dispersion on product sales [8,15,33] or on important moderators [2,4,5,10], have attempted to develop positive intervention measures to influence the manner in which WOM dispersion is perceived, with an ultimate purpose of maximizing the positive impacts of WOM dispersion and simultaneously minimizing its negative influence on retailers. However, little work has been carried out to investigate the physical characteristics of WOM dispersion display. Therefore, we propose that the format of the display (i.e., rather than being depicted with a constant horizontal bar chart) is an important consideration in mitigating the negative influence of mixed opinions.

### *2.2. Mechanism to Promote Reviewer-Related Attribution Choices*

#### 2.2.1. The Important Role of Reviewer-Related Attribution Choices

The interpretation of mixed opinions involves interpersonal and informal processes [20,34]. Attribution theory is particularly helpful for understanding consumers' perceptions of cause-and-effect relationships [35]. In our study, attribution choice is defined as the cognition a recipient generates to infer the reason behind mixed opinions under different (and predictable) circumstances; for example, why the crowd is divided about the same product/service [4].

According to Weiner and LeBoeuf & Norton [18,36], attribution choices substantially influence consumer satisfaction and drive most purchasing decisions. This can be categorized into either external (sources related to products) or internal (sources related to reviewers) cues [2,4,37]. In response to mixed opinions, different attribution choices would incur positive or negative influences on product sales. Particularly, when uncertain expectations (i.e., the WOM dispersion is high) for a product are attributed to differences among reviewers rather than the product itself, they may represent an opportunity for self-enrichment, curiosity seeking, or other desirable goals [4]. Consequently, this enables consumers to understand their own preferences through extensive learning [38], satisfy their curiosity about consumers' potential experience, and demonstrate their open-mindedness [39]. That is, reviewer-related attribution choices are critical in mitigating negative influences of WOM dispersion on product sales. This forms a theoretical base for

conceiving the research hypotheses in the present study, based on psychological theories of dual processing and metacognition.

#### 2.2.2. Dual Processing and the Promotion of Reviewer-Related Attribution Choices

How to attribute the presence of WOM dispersion to reviewer-related attribution when consumers encounter WOM dispersion is still an unresolved question. According to Chen & Berger [21], the significance of studying WOM dispersion can be obvious only when consumers are aware that the explanation of WOM dispersion's presence depends on the cognitive processing of this WOM dispersion. Further, He and Bond [4] proposed a model for analyzing the attribution for dispersion in online WOM; however, the precondition for the model is that consumers tend to understand and explain the presence of WOM dispersion through a psychological cognition process when they encounter it. Thus, the process of understanding WOM dispersion actually regards a type of consumers' psychological cognition activity.

In line with the dual process theory, individual's thinking process can be partitioned into two main families, including the traditionally called Type 1 and the Type 2 that are now widely embraced under the general label of dual-process theory [40]. According to the classic dual-process view, Type 1 processing is a relatively effortless system and relies on prior knowledge and judgmental heuristics based on natural associative assessments, such as similarity matching, memory fluency and immediate experience. This fast, autonomous, unconscious operation depends primarily on external cues (i.e., product causality), and is activated in order to assess judgement issues rapidly and crudely as they arise [28]. In our specific case, it is related to figuring out immediately which option should be chosen. In contrast, Type 2 processing is a relatively slow, resource-dependent, and analytical system that, occasionally, takes into account objective reasons. It operates consciously and is controlled by putting a heavy load on working memory. Type 2 processing is more dependent on internal cues (i.e., reviewer causality) [24,28] and overrides or undoes intuitive and associative responses through a deliberate and analytical system of reasoning. These two processing types are also often referred to as 'intuitive' or 'heuristic' and 'rational' or 'analytical', respectively [41]. Notably, studies have shown different focuses on various types of dual process theory [42]. For example, partial studies have underscored the default-interventionist dual process (DI), in which a fast and intuitive heuristic answer might be followed and corrected by a deliberate or analytical answer subsequently [22,23,43]. In our study, the focus is on the different attributional choices incurred by the two different cognitive processes, rather than the presence or absence of the subsequent correction.

As cognitive psychology states, the reason that individuals tend to use Type 1 (intuitive or heuristic) lies in that, when making assessments, they usually try to categorize things they encounter in order to decrease complexity to a level that they can manage [44]. Since consumers interpret a distribution of others' ratings as reflecting potential outcomes that they may experience, the extent of WOM dispersion will be correlated with the degree to which a product performs according to what is promised or expected [4]. On such occasions, intuition enables prospective consumers to process information quickly, and consequently they tend to make inferences and decisions based on the heuristic system. However, more objective attributional choices of WOM dispersion can be made through guiding them to utilize more cognitive resources and activating the analytical system among prospective consumers in their product-learning process. The heuristic system operates on the principle of simplicity without further investigation, whereas the analytic system is based on inferential rules structured by logical thinking. Hence, the activation of the analytic system refers to the use of thorough thinking likely to evoke reviewer-related attribution choices. Officially, what we predict is as follows:

**Hypothesis 1a.** *For consumers who encounter mixed opinions, the activation of the analytic system promotes more reviewer-related attribution choice than product-related attribution choice.*

**Hypothesis 1b.** *For consumers who encounter mixed opinions, the activation of the heuristic system promotes more product-related attribution choice than reviewer-related attribution choice.*

### *2.3. The Way to Promote Reviewer-Related Attribution Choices*

#### 2.3.1. The Influence of the Presentation Type of Mixed Opinions on Attribution Choices

If the activation of the analytical system contributes to prospective consumers' choices of reviewer-related attribution of WOM dispersion, a more important question this study will investigate is: when will the analytic system be activated and ultimately result in reviewer-related attribution choices? The findings related to metacognition have indicated that the type of information present is influential on individuals' deliberation and decisions in reasoning tasks. Metacognition is a broad term involving both knowledge and regulation of cognitive activity with an assumption that control affects monitoring [27,41,45]. According to Flavell [46], metacognition includes three basic elements, which are metacognitive experiences, metacognitive knowledge, and metacognitive skills. The three elements operate in such a way that when a decision is weighty and risky, the tendency to think carefully and highly consciously provides individuals with a metacognition experience, which then activates related metacognitive knowledge in long-term memory and links it to the current cognitive activities. As a result, individuals will utilize metacognitive skills to complete cognitive activities. A cognitive strategy in nature, the analytic system belongs to the category of metacognitive skills. According to metacognitive theory, in order to utilize the cognitive strategy or analytic system, relevant metacognitive experiences must first be activated [46]. Because consumers' decision making and judgements are usually based on (metacognitive) experiences while they are browsing WOM distribution, experiences regarding whether the information is fluent (easy) or disfluent (difficult) to process will serve as a metacognitive cue that affects subsequent processing [29,41]. Moreover, the more disfluently information is processed on a perceptual level, the less confident individuals are that the information can be interpreted (e.g., [27,47]). This is referred to as improving monitoring accuracy by reducing overconfidence—a metacognitive bias that relies on intuition to process information and can be detrimental to self-regulated judgement (e.g., [26]). Therefore, whether the analytic system is activated depends on the perceived fluency or disfluency in a given cognitive task that can be operationalized as a simple (i.e., ease of processing) or complex (i.e., difficulty of processing) form of displaying mixed opinions.

Generally, the analytic system will be activated if the metacognitive experience of the current task reduces the individual's intuitive confidence. If information is processed easily or fluently, intuitive (heuristic system) processes will guide the judgement. If information is processed with difficulty or disfluency, however, this experience will serve as a cue that the task is difficult, thereby activating more elaborate (analytic system) processing [24,26,27]. In line with the existing literature, we thus predict that experienced difficulty or disfluency due to the way in which mixed opinions are presented will reduce an individual's intuitive confidence, promote individuals' information processing through the analytic system, and thereby actively enhance reviewer-related attribution choices.

#### 2.3.2. The Presentation of Types of Mixed Opinions and Cognitive Load

As a measure of social consensus, dispersion in WOM denotes the risk of uncertainty [4,5]. Much of our attention is concentrated on exploring the best way to communicate risk information under the tenets of prospect theory [48], which states that risk-relevant behavior reacts differently to factually equivalent messages depending on how they are framed (e.g., gain frame vs. loss frame). Prominent examples include studies conducted by Lipkus & Hollands and Stone et al. [16,49], in which perception of risks were determined by alternative methods of displaying risk magnitude information. In the same vein, psychologists propose that how information is presented engenders correspondingly different cognition and thereby affects how individuals engage in message processing (heuristic vs. analytic) [50].

In the fields of popular media and scientific communication, information is prevalently described in horizontal bar graphs. Similarly, WOM distribution in previous studies has usually been depicted with a five-star horizontal bar chart. However, the presentation of WOM distribution on two popular Chinese websites, Jingdong Mall (jd.com) and Taobao (taobao.com) takes the form of a three-level (i.e., good, medium, and bad) horizontal bar chart. In addition to graphical summaries of reviewer ratings, some websites, such as Tmall.com and Taobao.com also display "reviewers' impressions of products" (phrases to summarize the performance of products, extracted based on the frequency of their mention in reviews). In this study, we explore WOM dispersion in terms of both its practical and statistical significance, represented by presentation types ① and ②, respectively; and presentation type ③ reflects both perspectives. Table 1 shows the three presentation types of mixed opinions on major online platforms in China.

**Table 1.** Three presentation types of mixed opinions on major online platforms in China.

| Type | Main Online Platforms in China | The Presentation of Mixed Opinions |
|---|---|---|
| ① | Amazon.cn | A five-star horizontal bar chart |
| ② | Tmall.com<br>Jumei.com | A set of reviewers' impressions of the product |
| ③ | Jingdong.com<br>Taobao.com<br>Dangdang.com | A three-dimension horizontal bar chart and a set of reviewers' impressions of the product |

As mentioned above, physical characteristics of presentation may lead to different perceptions of WOM dispersion [16,17,51], and affect cognitive processes (i.e., heuristic vs. analytic) that determine whether distributional information is experienced easily (fluently) or difficultly (disfluently). The role of disfluency has been frequently discussed based on the principle of cognitive load, which refers to effects of material disfluency that can be linked to demand on cognitive capacity (i.e., working memory storage) [52,53]. Every cognitive process requiring conscious control will put a cognitive load on the working memory that might be used in attempting to solve the problem. In particular, within cognitive load, a distinction has been made between the load caused by the element interactivity of a specific cognitive task of the task itself (intrinsic cognitive load) or of the load caused by the format of instruction (extraneous cognitive load) [25,53]. Therefore, different from the degree of dispersion that imposes an intrinsic load, physical characteristics of the presentation of mixed opinions are supposed to place specific extraneous cognitive load on working memory. In particular, the amount of perceived extraneous cognitive load rises with increase of difficulty (disfluency) [54].

Germane cognitive load encourages individuals to engage consciously in cognitive processing because disfluency serves as a metacognitive cue of perceived task difficulty and results in a more elaborated process [24,25]. In contrast, a low and excessively high level of disfluency might be negative for task performance. This has been supported by Seufert et al. [25], proposing that the connection between disfluency and performance follows a reversed u-shaped pattern. In other words, low levels of disfluency lead to low engagement in material processing. Likewise, when the sum of cognitive load imposed by increasing level of disfluency exceeds the learner's working memory capacity, the extraneous load may be too heavy for the person to perform cognitive tasks and interfere with cognitive processing, especially the conscious cognitive processing that is directly relevant to the activation of the analytic system [55].

In this study, we collect three presentation types of mixed opinions at different disfluency levels (i.e., simple, moderately complex, and very complex), and then examine cognitive processes in our participants. We predict that the difficulty or disfluency in information processing carried by different presentation types of mixed opinions does not always activate the analytic system. Specifically, neither inadequate cognitive load imposed

by simple presentation nor excessive cognitive load imposed by very complex presentation of mixed opinions can activate the analytic system in information processing, and this would result in the failure of the two presentation types to promote reviewer-related attribution choices.

Formally, the conceptual framework is summarized in Figure 1, and the following three hypotheses are proposed:

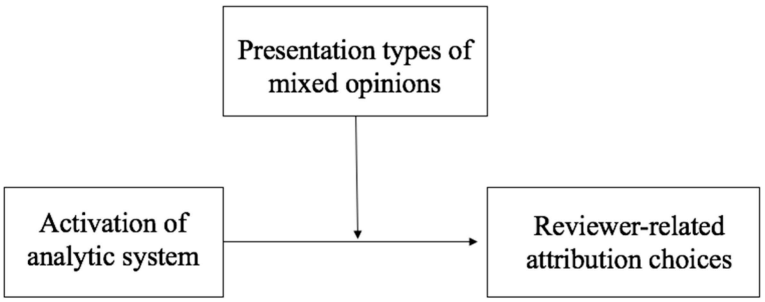



**Figure 1.** Conceptual framework.

**Hypothesis 2a.** *Compared with the simple presentation of mixed opinions, the moderately complex presentation of mixed opinions promotes more reviewer-related attribution choice than product-related attribution choice, due to the activation of the analytic system.*

**Hypothesis 2b.** *Compared with the very complex presentation of mixed opinions, the moderately complex presentation of mixed opinions promotes more reviewer-related attribution choice than product-related attribution choice, due to the activation of the analytic system.*

**Hypothesis 3.** *There will be no significant difference in attribution choices between the simple presentation of mixed opinions and the very complex presentation of mixed opinions; specifically, both the simple presentation of mixed opinions and the very complex presentation of mixed opinions fail to promote reviewer-related attribution choices.*

### *2.4. Visual Processing Research in Cognition*

Our final goal is to investigate how consumers allocate their visual attention when viewing different presentation types of mixed opinions. At a given time, consumers have finite cognitive resources to allocate to encode, process and retrieve information [53,56,57]. For prospective consumers encountering different presentation types of mixed opinions, a specific presentation type demands a corresponding level of cognitive processing, and the different cognitive systems used might result in different visual processing behaviors. Further, the review of the literature also shows a limitation which lies in the methodology used by prior studies. Participants in most prior studies were asked to view WOM distributions and report their preferences or feelings through independent questionnaires or traditional experiments without the support of physiological data. However, consumers are not always consciously paying attention, and only after paying attention to the WOM distribution can participants provide their cognitive and affective responses [4]. Therefore, physiological data would be very helpful in complementing traditional experimental approaches and revealing more persuasive research findings [56,57]. Thus, to address this research gap, this study adds an eye-tracking approach to investigate how consumers allocate their visual attention during the viewing process.

## 3. Methodology and Results

Study 1 utilized two different processing goals based on the cognitive psychology literature [58] to test Hypotheses 1a and 1b. In Study 2, in order to test Hypotheses 2 and 3, we presented participants with attribution choice scenarios that specified dispersive opinions of reviewers about two products (smartphone vs. movie) in the form of three

different presentation types. There are several variables affecting potential consumers' reviewer-related attribution choices, and these variables had to be controlled for validating both studies.

(1) Skill. Potential consumers' responses to reviews can differ depending on how skilled they are at online shopping [59]. Therefore, participants were asked to report their online shopping frequencies on a seven-point scale ranging from "rarely" to "very frequently" in both studies.
(2) Average ratings. Although average ratings are positive for the vast majority of products on real-world platforms and consumers tend to avoid low-rated options, a range of average ratings were manipulated directly to examine the validity of our predictions for both studies [4]. All participants need to report the minimum average ratings (1–10) and the ratio of good-level ratings (1%–100%) required for products in their consideration set. As described below, stimuli in the main studies were constructed with average ratings (and ratios of good-level ratings) above this level.
(3) S-standard. Behavioral results do not reflect the existence of the dual systems, except that the rule-based (analysis) and the automatic (heuristic) processes lead to different responses [41,58]. This means different systems will result in different attribution choices only when WOM is high in dispersion. Therefore, the target distribution depicted high dispersion in both studies.
(4) Samples. Considering that most active online shoppers are young adults under the age of thirty [60], choosing undergraduates as samples seems suitable for achieving the purpose of our study. The participants were all Chinese. Therefore, the language in all stimuli was Chinese. Since participants had to look at picture stimuli, a qualified participant needed to have normal or corrected-to-normal vision.
(5) Equipment. An SR Research Eyelink 2000 eye tracker with a sampling rate of 500 Hz was used to collect participants' eye movement data. Eye movement data were only recorded from the left eye. When participants arrived in the research lab, they were seated in front of a 27-inch monitor with a resolution of 1024 × 768 pixels, and then the pupils' locations were calibrated.

### *3.1. Study 1*

Study 1 measured the promoting effect of the activation of the analytic system on reviewer-related attribution choice. We directly examined causal attribution choices as a primary dependent measure [4] and compared attribution choices between two experimental groups [25].

#### 3.1.1. Method

A total of 60 Chinese students (68% male) were recruited through posters on campus and each student received $2.90 for their participation. Participants were narrowly distributed in education and disposable personal income but varied considerably in age (M = 22.39 years, SD = 2.38) and online shopping skill (SD = 1.58). They were randomly assigned to one of the two conditions representing distinct cognition processes (rational condition vs. intuitive condition). To perform the given task, participants in the rational condition were encouraged to rely on the deliberate and analytical system of reasoning, whereas those in the intuitive condition were encouraged to judge based on natural associative assessments. We measured the dependent variable (i.e., attribution choices) immediately after participants finished viewing the stimuli. All responses were collected on computers. The following procedures were applied for data collection. For both studies, before escorting the participant to a room equipped with PC-compatible computers, all participants were briefed with an introduction to the experiment by a facilitator.

First, participants were asked to place their foreheads and chins on corresponding rests mounted on the desk to stabilize their heads while their eye movements were monitored.

Then, two instruction sets corresponding to two experimental conditions [58] were orally explained and displayed on the monitor. Half of participants were randomly as-

signed to the rational condition and the other half to the intuitive condition. Both dispersion and average ratings were manipulated within subjects. In the rational condition, the experiment was introduced as an examination of human rationality and the instruction set was as follows: "This study's goal is to evaluate your scientific reasoning ability when you have to make choices on the basis of incomplete information. You are encouraged to behave like scientists and to base your answer on rational thinking". In the intuitive condition, the experiment was introduced as an examination of human intuition and the instruction set was as follows: "This study's goal is to evaluate your intuition and sensibility when you have to make choices on the basis of incomplete information. You are encouraged to base your answer on intuition and personal sensitivity".

Finally, participants were presented with three pictures, as shown in Table 2: in all pictures, the distribution including ratings from 40 reviewers were exhibited on a scale ranging from 1 to 10 stars, and distributions with a combination of high dispersion (variance > 8.0). On the right side of each star rating, there was a horizontal bar showing the number of reviewers which had assigned that rating, while at the top of each distribution the overall average rating was presented. Next, participants needed to make attribution choices [37] for each picture by responding to the item "Do you think the product or the reviewer was more responsible for the ratings above?" (1 = "the product," 7 = "the reviewer"), with higher (lower) scores indicating greater reviewer (product) attribution choices. The stimuli were adapted from the study of He and Bond [4]. To maintain tighter control of confounding variables in the experiment, the three pictures within each group contained similar characteristics. The viewing task was employed to ensure that each participant had a consistent goal during the eye-tracking studies, given that task can affect visual attention [57]. In the eye-tracking studies, the viewing time of each picture was self-paced by the participants without any time restrictions (We did not give time instruction for two reasons. First, the time needed for browsing varies among participants in the real world. Second, as stated before, we assume that the ultimate attributional choice is caused by the functioning of the analytical system, whether due to the direct effect of analytical system activation or to an analytical answer proceeded by the heuristic system. Therefore, we did not discuss the time course assumption [22,23].). The presentation order of the pictures was pseudorandomized for each participant in each experimental condition, but the content was identical. After completing the questionnaire, participants were thanked and dismissed.

**Table 2.** Stimulus pictures.

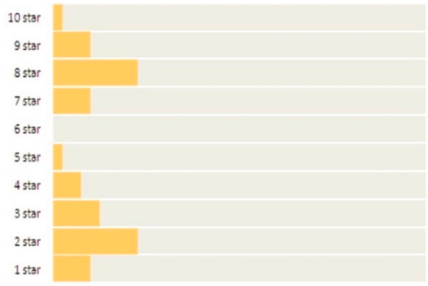
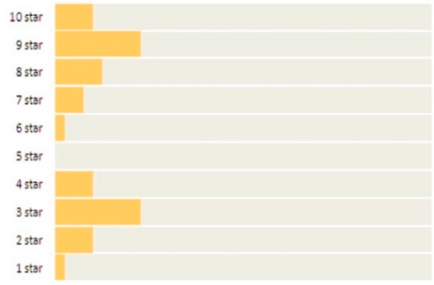
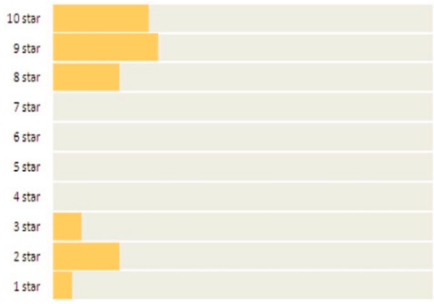
| Word of Mouth (WOM) Dispersion (N = 40) | |
|---|---|
| **Average Ratings** | **High Dispersion** |
| 5 stars |   |
| | (Variance = 8.9) |

**Table 2.** *Cont.*

| Word of Mouth (WOM) Dispersion (N = 40) | |
|---|---|
| **Average Ratings** | **High Dispersion** |
| 6 stars |   (Variance = 8.9) |
| 7 stars |   (Variance = 10.9) |

Note: The variances provided in the figure were not shown to participants.

#### 3.1.2. Results

Manipulation Check

Due to the fictional situation used in the instructive material, a process dissociation procedure (PDP) was used to obtain separate estimates of rule-based reasoning (RB) and heuristic reasoning (H) in the form of a list containing base-rate problems, conjunction problems, and ratio-bias effect problems. The list had an inclusion version (List 1) and an exclusion version (List 2), such that inclusion problems in List 1 became exclusion problems in List 2 and vice versa. Every participant could respond to the two versions of the same problem by manipulating List 1 and List 2. For List 1 and List 2, we sorted problems differently in order to control for participants' order effects, resulting in Lists 1A and 1B and Lists 2A and 2B (see Appendix A for details), respectively. Finally, each group could obtain the probability of correct number under "included version" and the probability of error number under "excluded version", then RB and H estimates across the rational and intuitive conditions were calculated according to the formula as shown in Table 3. As expected, the mean proportion of dominant answers (inclusion version) has increased (M_intuitive = 0.75 vs. M_rational = 0.78) and the non-statistical answers (exclusion version) have decreased (M_intuitive = 0.68 vs. M_rational = 0.44) from the intuitive condition to the rational condition, respectively. Moreover, for the estimates of H and RB across instruction conditions, the RB in the rational condition was significantly higher than that in the intuitive condition ($t$ (58) = 6.50, $p$ = 0.005 < 0.01), indicating that the instructions in the rational condition effectively activated the analytic system and then enhanced participants' performance. Therefore, the manipulation of the analytic system was successful.

**Table 3.** Mean proportion of dominant answers for inclusion problems, nonstatistical answers for exclusion problems, and estimates of H and RB across instruction conditions.

| | Problem Version | | Estimate | |
|---|---|---|---|---|
| **Condition** | **Inclusion** | **Exclusion** | **H** | **RB** |
| Intuitive | 0.75 | 0.68 | 0.74 | 0.05 |
| Rational | 0.78 | 0.44 | 0.71 | 0.33 |

Note: For both conditions, $n$ = 30; RB (rule-based reasoning) = P (dominant answers$_{inclusion\ problems}$) − P(nonstatistical answers$_{exclusion\ problems}$); H (heuristic reasoning) = P (nonstatistical answers$_{exclusion\ problems}$)/(1 − RB).

## Causal Attribution Choices

According to our framework, mixed opinions are more likely to be attributed to reviewers when the analytic system is activated. Analysis of the causal attribution choices measure was conducted using a mixed ANOVA, in which decision condition (rational vs. intuitive) was entered as a between-subjects factor, and average rating (five to seven stars) was entered as a repeated-measure factor. Results of the mixed ANOVA revealed a main effect of average rating ($F$ (2, 58) = 47.22, $p$ = 0.003 < 0.01, 1 − $\beta$ = 0.61), such that participants preferred to make reviewer attribution choices for a higher rating. However, average ratings did not significantly interact with other effects ($F$ < 1, *NS*). More importantly, the analysis also revealed a main effect of decision condition ($F$ (1, 58) = 36.19, $p$ = 0.005 < 0.01, 1 − $\beta$ = 0.73), such that the activation of the analytic system actively promoted the reviewer-related attribution choices judgement. This is consistent with hypotheses 1a and 1b. Table 4 presents the mean causal attribution choices by average rating, decision condition, and variance of high dispersion. Planned follow-up contrasts revealed that participants in the rational condition assigned higher scores than those in the intuitive condition ($M_{Rational\ condition}$ = 4.68 vs. $M_{Intuitive\ condition}$ = 2.77, $t$ (28) = 7.15, $p$ < 0.01, $p$ = 0.008 < 0.01, 1 − $\beta$ = 0.68).

**Table 4.** Mean causal attribution choices by decision conditions and WOM average.

| | | Decision Conditions | |
|---|---|---|---|
| **WOM Average** | **High Dispersion** | **Rational** | **Intuitive** |
| Rating = 5 | Variance = 8.9 | 3.75 (0.31) | 1.89 (0.21) |
| Rating = 6 | Variance = 8.9 | 4.46 (0.28) | 2.43 (0.24) |
| Rating = 7 | Variance = 10.9 | 5.82 (0.30) | 3.96 (0.34) |

Note: Standard errors are reported in parentheses.

## Visual Attention Analysis

Current eye-tracking approaches uses optical devices (i.e., eye-tracking cameras) to record eye movements, including the number and duration of fixations (e.g., [57,61]). A fixation is defined as the brief amount of time when the eyes temporarily remain still and gaze at a specific point of the visual field [61]. The variables of fixation duration and number measure different facets of viewers' eye movements. Fixation duration reflects the time that a participant spends on a gaze, and number of fixations measures how many times the participant's eye paused on the stimuli.

Further, to verify Hypotheses 1a and 1b, the average total viewing time and average number of fixations for each stimulus were calculated by computing the means of the summed fixation durations and how many times a participant's gaze paused on the given area of each group (rational vs. intuitive), respectively. Results of the mixed MANOVA revealed significant main effects of condition ($F$ (1, 58) = 20.32, $p$ = 0.003 < 0.01, 1 − $\beta$ = 0.70) and average rating ($F$ (2, 58) = 5.50, $p$ = 0.003 < 0.01, 1 − $\beta$ = 0.64), but no significant interaction between the two variables ($F$ (1, 60) = 1.00, *NS*). Figures 2 and 3 show the differences in the average total viewing time (unit: seconds) and average number of fixations between

the two conditions for each level of average ratings. The results suggested that the average total viewing time ($M_{Rational}$ = 10.56 s vs. $M_{Intuitive}$ = 6.52 s, $t$ (28) = 5.83, $p$ = 0.004 < 0.01, 1 − $\beta$ = 0.70) was significantly longer and the number of fixations ($M_{Rational}$ = 40.70 vs. $M_{Intuitive}$ = 25.84, $t$ (28) = 5.48, $p$ = 0.003 < 0.01, 1 − $\beta$ = 0.60) was significantly greater in the rational condition than those in the intuitive condition. Hypotheses 1a and 1b were therefore supported.

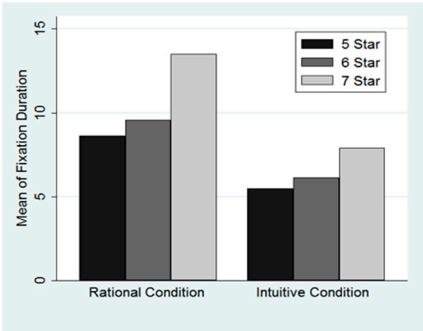



**Figure 2.** Fixation durations by decision conditions and WOM average (unit: seconds).

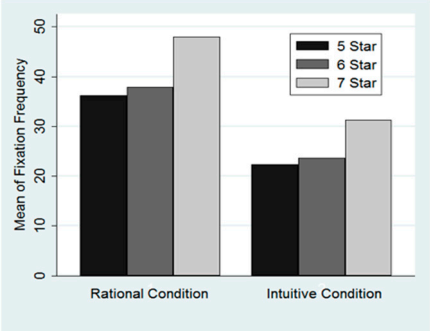



**Figure 3.** Number of fixations by decision conditions and WOM average.

#### 3.1.3. Discussion

Study 1 provided initial support for our proposition that the activation of the analytic system would have a positive effect on promoting reviewer-related attribution choice (H1a), and the activation of the heuristic system would have a positive effect on promoting product-related attribution choice (H1b). Additionally, participants viewed the target distribution for a longer time and more frequently in the rational condition (i.e., analytic system) than in the intuitive condition (i.e., heuristic system). Therefore, consistent with prior researchers (e.g., [57,61]), a more cognitive process will lead to longer duration and greater number of fixations. Moreover, the findings were robust across different average WOM levels.

### *3.2. Study 2*

In our second study, we extended our investigation in two important ways. First, we directly manipulated the form in which mixed opinions were presented through three types of presentation. Second, given that consumers are more skeptical of information, claims or advertising for experience products compared to search products [62,63], and this skepticism may result in, at least in part, different perceptions and attribution choices of distributional information, we took into account product attributes to examine the robustness of our findings.

3.2.1. Pretest

For type ①, the distribution including ratings from 40 reviewers was exhibited on a scale ranging from 1 to 10 stars, with more stars denoting greater satisfaction. On the right side of each star rating, there was a horizontal bar showing the number of reviewers who had assigned that rating, while at the top of each distribution the overall average rating was presented. We refer to prior research and regard the distribution which depicted low variance (*var*. > 8.0) as high dispersion [4].

The two sets of reviewers' impressions of products developed for types ② and ③ resembled the reviews on two popular Chinses retailer websites and were manipulated to depict a high level of dispersion in consumer opinions. Notably, we selected product stimuli for our study based on prior research: a smartphone was chosen to represent search products [63], and a movie was chosen to represent experience products [64,65]. 20 undergraduates familiar with online reviews helped to determine the number of words and specific contents of reviewers' impressions of the product and dispersion in WOM [63,66] (Table 5 provides detail) (We used a purchase context and collected 40 phrases respectively for smartphone and movie through a content analysis of review websites. Respondents were asked to rate the positivity and negativity of each of these phrases on a 7-point Likert scale. The five most positive and three most negative phrases from among the smartphone/movie phrases were incorporated into the reviewers' impressions of the product. This approach follows Purnawirawan et al. [66].). Respondents in a second pretest (N = 33) were then asked to rate the dispersion of each set of reviewers' impressions of the product on a 7-point semantic differential ("To what extent do you find this set of reviewers' impressions is consistent or dispersive?"). The results confirmed that the reviewers' impressions of the smartphone were perceived as highly dispersive ($M$ = 5.49, $SD$ = 1.26), and so were the reviewers' impression of the movie ($M$ = 6.13, $SD$ = 0.98).

**Table 5.** Products and reviewers' impressions.

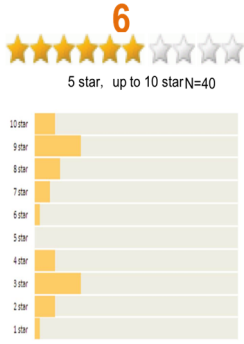
| Product | Reviewers' Impressions of the Product |
| --- | --- |
| Smartphone | Good camera quality; Smooth system performance; Decent call quality; High resolution; Metal-made; Bad sound quality; Poorly-designed; Slow. |
| The Golden Era (Movie) | Good plot; Heartwarming story; Creative storytelling; Good movie; Good cast; Bad script; Incoherent storyline; Terrible soundtrack. |

48 undergraduates were presented with three presentation types of mixed opinions with distributions (if any) depicting high dispersion and asked to rate the legibility of each presentation type of mixed opinions using a 100-point scale (1 = "not at all complex," 100 = "very complex"). Based on the results, types ①, ②, and ③ were labeled as simple ($M$ = 21.31, $SD$ = 0.78), moderately complex ($M$ = 39.58, $SD$ = 0.89), and very complex ($M$ = 45.35, $SD$ = 1.16) conditions, respectively.

3.2.2. Method

168 undergraduates (57% male) were recruited through posters on campus and each paid $2.90 for the participation. Participants were narrowly distributed in education, disposable personal income, and age ($M$ = 22.39 years, $SD$ = 0.88), but varied considerably in online shopping skill ($SD$ = 2.36). Similar to Study 1, participants were randomly and uniformly assigned to simple, moderately complex, and very complex conditions and asked to imagine that they were shopping on a popular online retail site and would make independent decisions about products. Both product attributes (experience vs. search) and average ratings (three levels) were manipulated within subjects. In particular, all the original pictures in the experimental procedure have the same portrait orientations (e.g., Table 6), but, as a typesetting requirement, the pictures in Tables 7 and 8 are distorted to have landscape orientations.

**Table 6.** The stimuli for simple condition.

| **Type ①: Simple Condition WOM Dispersion (N = 40)** | |
|---|---|
| **Search Product** | **Experience Product** |
| Smartphone  average review 5   | Movie  average review 5   |
| Smartphone  average review 6   | Movie  average review 6   |
| Smartphone  average review 7   | Movie  average review 7   |

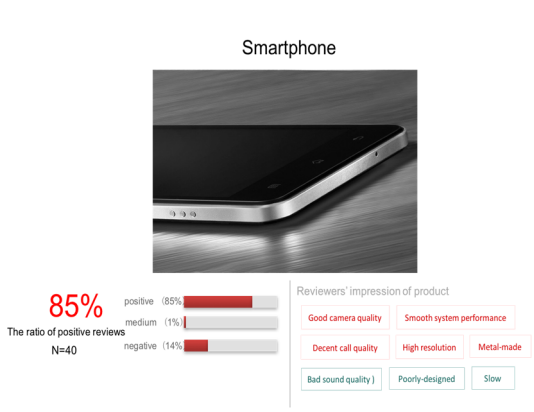
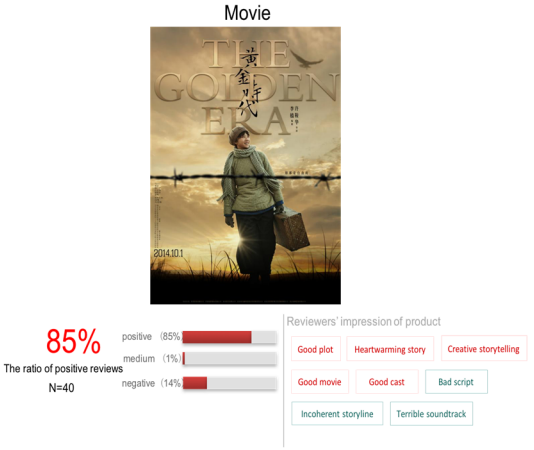
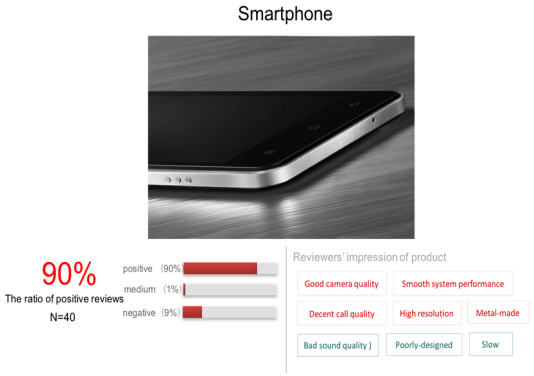
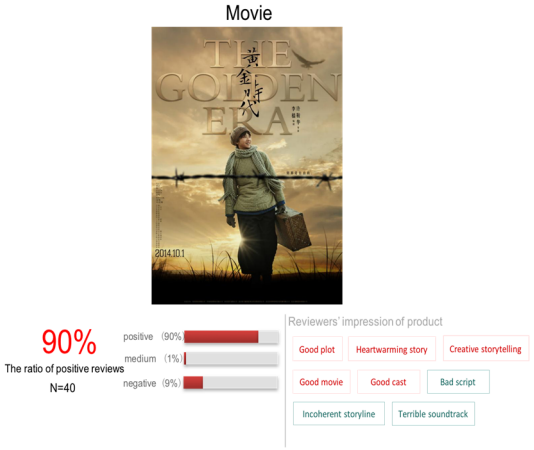
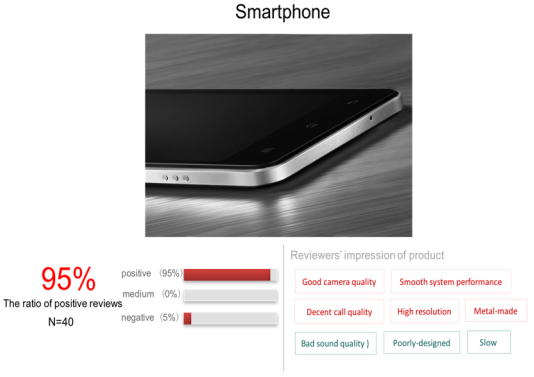
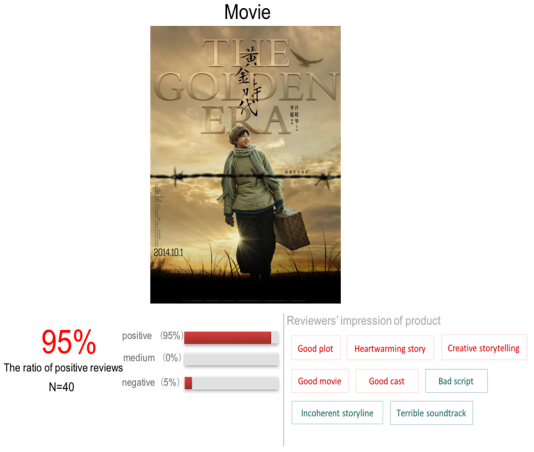
Note: The stimuli imitated Amazon.com (the color and font size etc.).

**Table 7.** The stimuli for moderately complex condition.

| Type ②: Moderately Complex Condition WOM Dispersion (N = 40) | |
|---|---|
| **Search Product** | **Experience Product** |
| Smartphone<br>  <br>average review<br>5<br>5 star, up to 10 star N=40<br>Reviewers' impression of product<br>Good camera quality / Smooth system performance / Decent call quality / High resolution / Metal-made / Bad sound quality ) / Poorly-designed / Slow | Movie<br>  <br>average review<br>5<br>5 star, up to 10 star N=40<br>Reviewers' impression of product<br>Good plot / Heartwarming story / Creative storytelling / Good movie / Good cast / Bad script / Incoherent storyline / Terrible soundtrack |
| Smartphone<br>  <br>average review<br>6<br>6 star, up to 10 star N=40<br>Reviewers' impression of product<br>Good camera quality / Smooth system performance / Decent call quality / High resolution / Metal-made / Bad sound quality ) / Poorly-designed / Slow | Movie<br>  <br>average review<br>6<br>6 star, up to 10 star N=40<br>Reviewers' impression of product<br>Good plot / Heartwarming story / Creative storytelling / Good movie / Good cast / Bad script / Incoherent storyline / Terrible soundtrack |
| Smartphone<br>  <br>average review<br>7<br>7 star, up to 10 star N=40<br>Reviewers' impression of product<br>Good camera quality / Smooth system performance / Decent call quality / High resolution / Metal-made / Bad sound quality ) / Poorly-designed / Slow | Movie<br>  <br>average review<br>7<br>7 star, up to 10 star N=40<br>Reviewers' impression of product<br>Good plot / Heartwarming story / Creative storytelling / Good movie / Good cast / Bad script / Incoherent storyline / Terrible soundtrack |

Note: The stimuli imitated Tmall.com (the color and font size etc.).

**Table 8.** The stimuli for very complex condition.

| Type ③: Very Complex Condition WOM Dispersion (N = 40) | |
|---|---|
| **Search Product** | **Experience Product** |
|   |   |
|   |   |
|   |   |

Note: The stimuli imitated Jingdong.com (the color and font size etc.).

Each group was then successively presented with six different scenarios (product attributes × average ratings) containing corresponding presentation types of mixed opinions (see Tables 6–8). Similar to Study 1, the six stimuli within each group contained similar characteristics. The set of six scenarios was arranged into six different presentation orders for every group and presented in a Latin-square design. After viewing each scenario, participants were asked to respond to a question measuring causal attribution choices.

In contrast to Study 1, attribution choices for mixed opinions in Study 2 were measured by two separate items [4]. The first item asked participants to rate the extent to which they believed that product characteristics (e.g., quality) were responsible for causing the observed mixed opinions, and the second item requested participants to rate the extent to which reviewer characteristics (e.g., individual styles) were responsible. Both items utilized a seven-point scale (1 = "not at all important," 7 = "very important"). Next, consumer knowledge, activation of the analytic system, and cognitive load were measured on a questionnaire as a check of our manipulation. Finally, participants were thanked and dismissed.

#### 3.2.3. Results

Manipulation Check

(1) Consumer knowledge

Consumer knowledge is important for theoretical models of consumer behavior and comprises three components: subjective knowledge (what the consumer thinks he or she knows), objective knowledge, and prior experience with the product. We measured subjective knowledge with eight items rated on a six-point Likert scale [67], and the other two categories were measured by having the participants specify their prior knowledge on a seven-point scale [65,68] ranging from "I have never heard about it" to "I already know about it". The results confirmed that our instructional manipulation was successful. Results suggested that there was not significant difference in consumer knowledge among the three groups ($M_1 = 2.09$, $M_2 = 1.89$, $M_3 = 2.01$, $F$ (2, 165) = 1.80, $NS$).

(2) Activation of the analytic system

The cognitive reflection test (CRT) (see Appendix A) is a short (three-item) measure of a person's ability to resist intuitive response tendencies and to produce a normatively correct response based on effortful reasoning [69]. It is a popular measure of rational decisions posited by dual-process theory (e.g., a bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost? Correct answer = 5 cents; heuristic answer = 10 cents). Therefore, in Study 2, we utilized CRT to check our manipulation of the activation of the analytic system. The results revealed that participants achieved higher accuracy when the stimuli were moderately complex than when they were simple or very complex ($M_{\,moderately\ complex} = 2.69$, $M_{\,very\ complex} = 1.84$, $M_{simple} = 1.52$, $t$ (167) = 9.63, $p = 0.005 < 0.01$, $1 - \beta = 0.68$), showing that the analytic system was successfully activated by moderately complex presentation.

(3) Cognitive load of the presentation types

For the measurement of cognitive load [70], participants had to report their invested mental effort on a symmetrical scale ranging from 1 (very, very low mental effort) to 9 (very, very high mental effort) and their feelings about the task on another scale ranging from 1 (very, very simple task) to 9 (very, very complex task). The results indicated that participants' cognitive loads in the very complex condition were significantly higher than in the simple condition and the moderately complex condition ($M_{\,very\ complex} = 1.84$, $M_{\,moderately\ complex} = 1.54$, $M_{simple} = 0.84$, $t(167) = 1.80$, $p = 0.003 < 0.01$, $1 - \beta = 0.72$), indicating that our manipulation of presentation type of mixed opinions was successful.

Causal Attribution Choices

To create a relative attribution choice score, we computed the difference between the two items, with a higher score indicating greater reviewer attribution choices. Table 9 presents the mean attribution choice scores for the three forms of mixed opinions in the two product categories at each level of average ratings.

Similar to Study 1, causal attribution choices were analyzed using a mixed ANOVA, in which the presentation type of mixed opinions (simple vs. moderately complex vs. very complex) was entered as a between-subjects factor, and both average rating (five to seven stars) and product attribute (search vs. experience) were entered as repeated-measure factors. The results revealed significant main effects of the presentation type of mixed

opinions ($F$ (2165) = 22.94, $p$ = 0.003 < 0.01, $1 - \beta = 0.63$). This is consistent with our predictions. More importantly, the presentation type of mixed opinions did not significantly interact with any other variables, indicating that our findings were robust across average ratings and product attributes. Planned follow-up contrasts revealed that participants in the moderately complex condition assigned higher attribution choices scores to the target stimuli than those in the simple and very complex conditions ($M_{moderately\ complex} = 4.51$, $M_{simple} = 3.47$, $M_{very\ complex} = 3.44$, $F$ (2, 1008) = 38.30, $p$ = 0.005 < 0.01, $1 - \beta = 0.70$) (H2a and H2b were supported), and the difference was smaller between the simple condition and very complex condition ($M_{simple} = 3.47$, $M_{very\ complex} = 3.44$, $F < 1$, *NS*) (H3 was supported). The results also revealed significant effects of average rating ($F$ (2, 165) = 22.85, $p$ = 0.004 < 0.01, $1 - \beta = 0.77$) and product attribute ($F$ (1165) = 175.31, $p$ = 0.003 < 0.01, $1 - \beta = 0.70$). Moreover, a significant interaction between average rating and product attribute shows that, although participants preferred higher average ratings when they needed to make causal attribution choices of the target stimuli ($F$ (1165) = 8.56, $p$ = 0.004 < 0.01, $1 - \beta = 0.64$), they tended to assign higher scores for the experience product than for the search product, irrespective of average rating.

**Table 9.** Attribution choices by WOM average, product attribute, and presentation type.

| WOM Average | Presentation Type of Mixed Opinions | Product Attribute | |
|---|---|---|---|
| | | **Search Product (Smartphone)** | **Experience Product (Movie)** |
| Rating = 5 | Simple condition | 2.59 (0.20) | 3.41 (0.19) |
| | Moderately complex condition | 3.52 (0.19) | 4.73 (0.16) |
| | Very complex condition | 2.61 (0.16) | 3.45 (0.18) |
| Rating = 6 | Simple condition | 2.71 (0.25) | 4.48 (0.22) |
| | Moderately complex condition | 3.80 (0.24) | 5.30 (0.25) |
| | Very complex condition | 2.60 (0.20) | 4.29 (0.20) |
| Rating = 7 | Simple condition | 2.95 (0.21) | 4.69 (0.19) |
| | Moderately complex condition | 4.14 (0.18) | 5.60 (0.20) |
| | Very complex condition | 2.98 (0.22) | 4.70 (0.24) |

Note: Standard errors are reported in parentheses.

Visual Attention Analysis

Similar to Study 1, we supplemented the analysis of participants' visual attention in the present study with eye movement data. The result of Bartlett's Test of Sphericity was significant ($p$ = 0.007 < 0.01), so the analysis of visual attention measures was also conducted using a mixed ANOVA with the same repeated-measure factors, between-subjects factor, and interactions as in Study 1. The results revealed a main effect for average rating ($F$ (2, 165) = 23.86, $p$ = 0.008 < 0.01, $1 - \beta = 0.66$), indicating that participants preferred to spend more time looking at stimuli with higher average ratings than those with lower average ratings. The results also revealed a main effect of product attribute ($F$ (1165) = 114.46, $p$ = 0.003 < 0.01, $1 - \beta = 0.72$), showing that participants tended to look at the stimuli for a longer time when they displayed an experience product. More importantly, the results confirmed a significant main effect of presentation type ($F$ (2165) = 169.15, $p$ = 0.006 < 0.01, $1 - \beta = 0.72$), and this is consistent with our conceptual framework, However, no significant interactions were found among the three variables. Therefore, the robustness of study 2 was verified.

We also calculated and compared the average total fixation duration and average number of fixations across conditions. Figure 4 shows the differences in the average total fixation duration (unit: second), Figure 5 shows the average total number of fixations among the three conditions for each level of average rating. Figures 6 and 7 show the differences in the two eye-movement indices between search product and experience product. Figures 8 and 9 exhibit the differences in the two eye-movement indices among the three presentation types of mixed opinions for search product and experience

product. These results suggested that the average total viewing time on stimuli was significantly longer in the moderately complex condition than in the other two conditions ($M_{moderately\ complex} = 18.79$ s, $M_{simple} = 8.99$ s, $M_{very\ complex} = 11.50$ s, $F$ (2, 1008) = 72.64, $p = 0.005 < 0.01$, $1 - \beta = 0.70$), and participants tended to pay more frequent visual attention to the target stimuli in the moderately complex condition ($M_{moderately\ complex} = 53.08$, $M_{simple} = 28.74$, $M_{very\ complex} = 31.74$, $F$ (2, 1008) = 380.76, $p = 0.004 < 0.01$, $1 - \beta = 0.66$). Therefore, both Hypotheses 2a and 2b were supported. In addition, the results revealed a significant difference between the simple and very complex condition in fixation duration ($M_{simple} = 8.99$ s, $M_{very\ complex} = 11.50$ s, $F$ (1, 672) = 82.00, $p = 0.006 < 0.01$, $1 - \beta = 0.59$) and number of fixations ($M_{simple} = 28.74$, $M_{very\ complex} = 31.74$, $F$ (1, 672) = 13.50, $p = 0.003 < 0.01$, $1 - \beta = 0.65$). However, the attribution choices score between the simple condition and very complex condition ($M_{simple} = 3.47$, $M_{very\ complex} = 3.44$, $F < 1$, $NS$) has no significance, so Hypothesis 3 was supported.

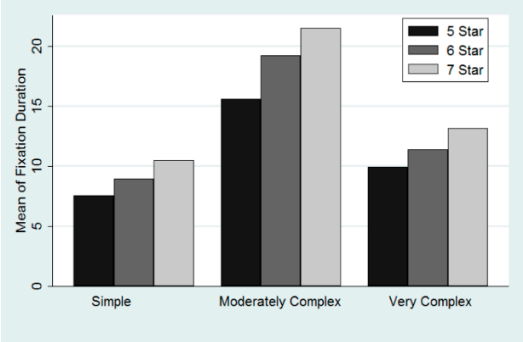



**Figure 4.** Fixation durations by WOM average and presentation type of mixed opinions (unit: second).

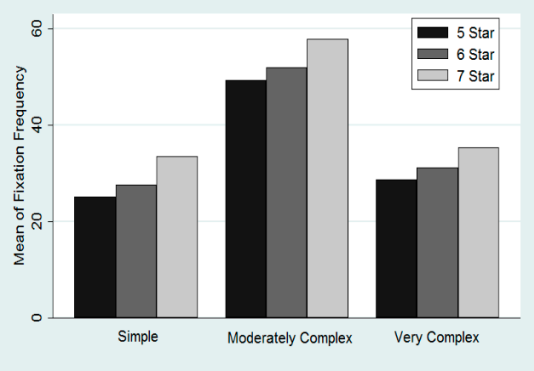



**Figure 5.** Numbers of fixations by WOM average and presentation type of mixed opinions.

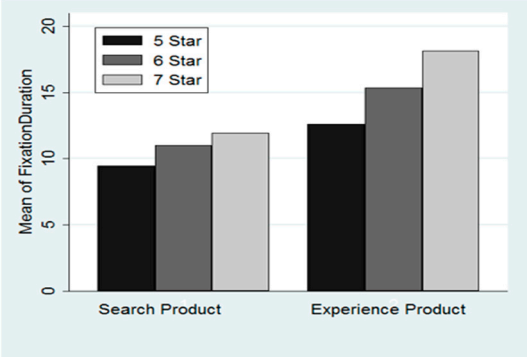



**Figure 6.** Fixation durations by WOM average and product attributes (unit: second).

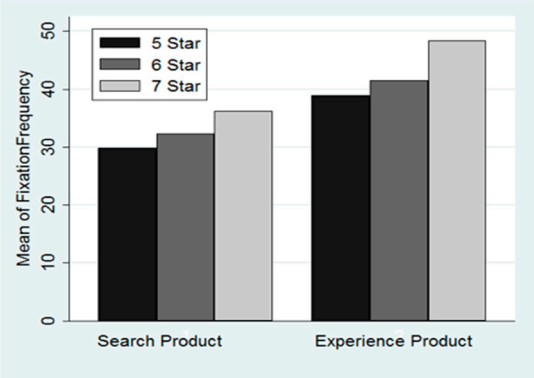



**Figure 7.** Numbers of fixations by WOM average and product attributes.

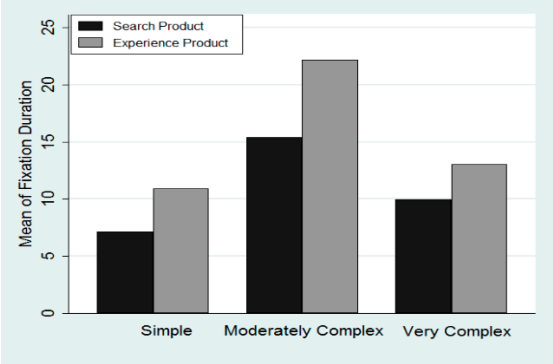



**Figure 8.** Fixation durations by product attribute and presentation type of mixed opinions (unit: second).

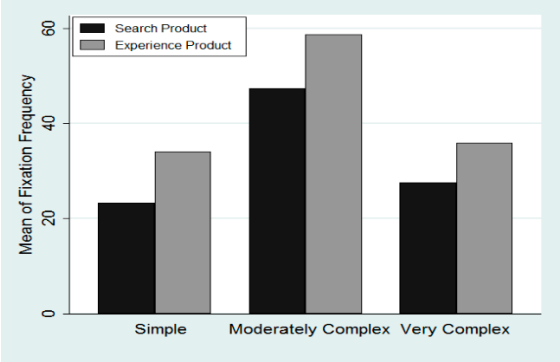



**Figure 9.** Numbers of fixations by product attribute and presentation type of mixed opinions.

### 3.2.4. Discussion

Extending our investigation to an attribution choice setting by manipulating the presentation of mixed opinions directly, Study 2 provided important evidence that the activation of the analytic system depends on the form in which mixed opinions are displayed. Although participants showed a general preference for experience products and products whose average ratings were higher, they were much more likely to attribute the mixed opinions to reviewers in a condition characterized by the moderately complex presentation of mixed opinions. In all conditions, participants exhibited the highest reviewer attribution choices for mixed opinions displayed in a moderately complex form. Moreover, the findings on visual attention highlight the fact that not all presentation types of mixed opinions causing disfluency/difficulty in information processing promote positive attribution. In particular, mixed opinions presented in too complicated forms immensely increase viewers' cognitive loads and take up too many psychological resources, so that the analytic

system cannot be activated. Mixed opinions presented in too simple a form is not enough to activate the cognitive load of consumer analytic processing.

## 4. Conclusions

### *4.1. Theoretical Contributions*

As a measure of evaluating social information consensus, mixed opinions present much uncertainty to prospective consumers when making their purchasing choices. Hence, most prior studies on effects of mixed opinions on purchasing decisions has been devoted to providing positive interventions regarding consumers' perceptions of WOM dispersion, with an ultimate aim to highlight positive connotations and simultaneously mitigate negative influences. A small part of the literature (e.g., [4,19]) has, by using an attribution choices-based approach, attempted to explain how consumers interpret mixed opinions and their influence in their purchasing decisions. They stated that negative effects of mixed opinions could be mitigated by reviewer-related attribution choices. In this regard, our study attempted to promote reviewer-related attribution choices by introducing the theories of metacognition and dual process. We suggested that the analytical system is effective in promoting reviewer-related attribution choices. The comparison of three presentation types of mixed opinions derived from major Chinese online platforms demonstrated that mixed opinions presented in moderately complex form combining average ratings and reviewers' impressions of products can effectively promote reviewer-related attribution choices. Although there might be several variables affecting consumers' perceptions of WOM dispersion [4,14], we suggest that the presentation type of mixed opinions can be an important consideration in mitigating negative effects of WOM dispersion on consumers' purchasing decisions. We believe the above findings can be valuable for supplementing the consumer attribution-related choices and beneficial to consumer research in information consistency. Further, our work made a methodological supplement by adopting an eye-tracking approach to record consumers' cognitive and affective responses to WOM distributions. Although this approach has been commonly applied in psychology and education, it effectively reveals the relationship between mixed opinions and consumers' purchasing decisions.

### *4.2. Managerial Implications*

Our study offered several managerial implications for social media retailers and marketers. Having recognized the importance of WOM consistency in influencing consumers' purchasing decisions, various measures, such as coupon codes, gifts and acknowledgement letters for reviewers, have been developed to maintain five-star (full-mark) ratings. However, because of multi-channel information and diverse preferences, consensus is more difficult than ever to achieve. Thus, marketing practitioners are faced with a variety of challenges in updating their marketing strategies. Our study indicated that social media retailers and marketers should focus on presentation types of mixed opinions rather than unilaterally pursuing high-rating consistency.

We also found that, in the context of Chinese markets, the traditional presentation type of WOM distributions with only one horizontal bar chart has no obvious effect on promoting reviewer-related attribution choices. Taking Amazon (i.e., Amazon.cn) as an example, the traditional presentation of WOM distributions provides few cues, due to which the heuristic system can be more effective and consumers can tend to attribute WOM dispersion to product-related causality. Rather, our study found that actually more cues can be obtained from presentations of consumer ratings and reviewer impressions of products, allowing consumers to attribute WOM dispersion to reviewer-related causality. Based on the above, marketers can manipulate the way mixed opinions are presented to guide consumers to make more objective and reasonable judgments about their purchasing decisions.

### *4.3. Limitations and Future Research*

Our study has limitations worth further investigation. First, consumers normally employ subjective standards to perceive WOM dispersion. Thus, consumers' evaluations of WOM dispersion cannot be simply categorized as "low" or "high", though our study applied this rule for WOM dispersion categorization. Future research is suggested to improve the principle for dividing the degree of WOM dispersion; for example, a principle comprising two parts, with one based on WOM dispersion's explicit variance and the other on consumers' subjective perceptions of WOM dispersion, would be valuable. Second, although the activation of the dual process (heuristic vs. analysis) is affected by the level of cognitive load perceived, one might argue that these findings are in agreement with the time course assumption—giving a response that is assumed to result from the slow analytic system takes more time than giving a response that is assumed to result from fast heuristic processing [22,23]. Nevertheless, consumer attribution-related choices may have changed in the time course during which they were made. Therefore, a direct manipulation of the time course would be worth future exploration.

**Author Contributions:** Conceptualization, G.X. and H.Y.; methodology, G.X.; software, G.X.; validation, W.D., H.Y. and G.X.; formal analysis, G.X.; investigation, Y.J.; resources, Y.J. and H.Y.; data curation, G.X.; writing—original draft preparation, H.Y. and Y.J.; writing—review and editing, H.Y., Y.J.; visualization, W.D.; supervision, H.Y. and Y.J.; project administration, W.D. and Y.J.; funding acquisition, G.X. All authors have read and agreed to the published version of the manuscript.

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## Appendix A

Process Dissociation Procedure (PDP) (List 1)

*Base-Rates Problem*

One hundred undergraduate students applied for a part-time job. Of the applicants, 15 were humanities students, and 85 were science students. Mike was one of the 100 students who applied for the job. His name was randomly chosen by computer to participate in the first day of interviews. Mike is 23 years old, he likes to travel, and he was quite a good student in high school. His preferred subjects were English poetry, modern art, and sports. Which of the following is more likely?

(a) Mike is one of the humanities students.
(b) Mike is one of the science students.

*Conjunction Problem*

A company that makes beauty products is about to launch a new product line. The marketing department wanted to begin with the promotion of this new line as quickly as possible. To do this they can either deliver all the promotional work to a large publicity agency, or they can divide the promotional work between two smaller publicity agencies. The large agency has a record of meeting deadlines of 60%. One of the smaller agencies has a record of meeting deadlines of 80%, and the other has a record of meeting deadlines of 70%. The marketing department can begin the promotion only when all the promotional work is ready to be used. Which of the following is more likely?

(a) The best possibility of starting the promotion sooner would be to deliver all the promotional work to the larger publicity agency.
(b) The best possibility of starting the promotion sooner would be to divide the promotional work between the two smaller agencies.

*Ratio-Bias Effect Problem*

Elaine was on a TV show where she had to choose an envelope from one of two sets of envelopes. In the first set, there were 100 envelopes, 21 of which contained a prize ticket of $5000. In the second set, there were 10 envelopes, 2 of which contained a prize ticket of $5000. If you were Elaine, what would you do?

(a) I would choose an envelope from the first set of envelopes.
(b) I would choose an envelope from the second set of envelopes.

Process Dissociation Procedure (PDP) (List 2)

*Base-Rates Problem*

One hundred undergraduate students applied for a part-time job. Of the applicants, 85 were humanities students, and 15 were science students. Mike was one of the 100 students who applied for the job. His name was randomly chosen by computer to participate in the first day of interviews. Mike is 23 years old, he likes to travel, and he was quite a good student in high school. His preferred subjects were English poetry, modern art, and sports. Which of the following is more likely?

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(b) I would choose an envelope from the second set of envelopes.

Process Dissociation Procedure (PDP) (List 1A)

*Conjunction Problem*

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(a) Mike is one of the humanities students.
(b) Mike is one of the science students.

Process Dissociation Procedure (PDP) (List 1B)

*Ratio-Bias Effect Problem*

Elaine was on a TV show where she had to choose an envelope from one of two sets of envelopes. In the first set, there were 100 envelopes, 21 of which contained a prize ticket of $5000. In the second set, there were 10 envelopes, 2 of which contained a prize ticket of the $5000. If you were Elaine, what would you do?

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(b) Mike is one of the science students.

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Process Dissociation Procedure (PDP) (List 2A)

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(a) I would choose an envelope from the first set of envelopes.
(b) I would choose an envelope from the second set of envelopes.

Process Dissociation Procedure (PDP) (List 2B)

*Ratio-Bias Effect Problem*

Elaine was on a TV show where she had to choose an envelope from one of two sets of envelopes. In the first set, there were 100 envelopes, 19 of which contained a prize ticket of $5000. In the second set, there were 10 envelopes, 2 of which contained a prize ticket of the $5000. If you were Elaine, what would you do?

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(a) Mike is one of the humanities students.
(b) Mike is one of the science students.

Cognitive Reflection Test (CRT)

1. A bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost?

[Correct answer = 5 cents; heuristic answer = 10 cents]

2. If it takes 5 min for five machines to make five widgets, how long would it take for 100 machines to make 100 widgets?

[Correct answer = 5 min; heuristic answer = 100 min]

3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

[Correct answer = 47 days; heuristic answer = 24 days]

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