

# "Nothing to be ashamed of" or "Nagging"? The Interaction Effects of Service Type and Failure Attributions on Satisfaction with Service Remediation

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**Abstract**

With the development of Internet technology, more and more transaction scenarios are realised through the Internet, but how service failures are remediated on line born with it has raised concerns. Current research on how service type and failure attribution affect service remediation satisfaction through processing fluency and consumer perceived behavioural control is relatively weak, and this paper analyses the mechanisms in depth through three experiments. It is found that service type and failure attribution have a matching effect, in which intelligent customer service is more suitable for resolving objective failures and manual customer service is more suitable for resolving subjective failures; processing fluency and perceived behavioural control play a dual mediating role; and remediation strategy plays a moderating role in the main effect. This study not only enriches the research on the influence mechanism of service remediation satisfaction, but also has a better guidance on how enterprises can choose different types of customer service and remediation strategies under different attributed service failure scenarios.

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**introductory**

At the end of 2022, OpenAI announced the successful development of ChatGPT, the creation of the Big Model which provides more options for intelligent marketing. One of the Artificial Intelligence (AI) developed on the basis of the Big Model has changed the possibilities of the service<sup>[1]</sup>. Data suggests that by 2030, about 25 per cent of jobs in the US hospitality industry will be automated<sup>[2]</sup>; Juniper Research predicts that 275 million voice assistant devices will be in use by 2023<sup>[3]</sup>. While the use of AI represents the next wave of modern service transactions, such advanced technology still creates dis<sup>[4]</sup>. Most of the current AI services research in academia focuses on consumer acceptance and willingness to adopt AI devices during the initial use and rollout phase<sup>[5,6,7,8,9]</sup>. Only a few studies have discussed AI service failures and recovery.

Existing research in academia on service failures has focused on the attribution of responsibility when customers face failures by both service agents, AIs and humans<sup>[10]</sup> and the

differences in their willingness to spread negative word-of-mouth<sup>[11]</sup> The study of service failures has been relatively one-sided in terms of categorisation. Meanwhile the classification of failures is also relatively one-sided, usually attributing all service failures to intelligent customer service, for example, summarising the five major failures caused by service robots: user mishandling, lack of human social norms, machine malfunctions, unexpected behaviours, and misrecognition of human features<sup>[12]</sup>. But in the real scenario, if the service failure is generated by the consumer's carelessness or even irrationality, how to deal with it? What factors regulate such errors? There is no clear answer yet. According to the psychological community, perceived behavioural control (PBC) is the perceived ease or difficulty in performing a behaviour, and is thought to reflect past experience as well as the obstacles experienced<sup>[13]</sup>. In the field of service remediation it can be understood as follows: when a consumer perceives that he has sufficient control, he is more likely to take action to obtain the desired service remediation; on the contrary, if he perceives that he does not have sufficient control, he may lower his expectations or even give up on obtaining the service remediation. This can be a good way to discuss how to carry out service remediation from the perspective of subjective failures due to consumers' own reasons. Most of the existing studies on consumers' perceived experience of smart customer service focus on the anthropomorphism and emotional dependence of smart customer service and language style. For example, some scholars suggest that social communication style has an enhancing effect on the service satisfaction of high-anxiety attachment customers, but not on the service satisfaction of low-anxiety attachment customers.<sup>[14]</sup> and other scholars have suggested that cuteness increases customers' tolerance of technical service failures<sup>[15]</sup>. And these studies are relatively understudied on the linguistic language of customer service output. Processing fluency is the ease with which consumers recognise or perceive stimulus targets<sup>[16]</sup> and perceptual consistency is a determinant of processing fluency. Perceptual consistency may lead to fluency; that is, the higher the content match between cognitive elements, the higher the processing fluency<sup>[17]</sup>. If there is a high match between the service remedy received by the consumer and the desired service remedy, processing fluency is high, the consumer will reflect positive emotions, and the corresponding service remedy satisfaction will increase.

Based on the above analysis, this study is based on the theory of perceptual behavioural control to study in depth the interaction effect of service type (intelligent customer service vs. manual customer service) and error attribution (subjective error vs. objective error) on service remediation satisfaction. Specific research questions include: first, whether intelligent customer service and objective error matching and manual customer service and subjective error matching have an interaction effect on service remedy satisfaction; second, whether there is a mediating effect of service type and attribution of errors on service remedy satisfaction from the customer level for both verbal and textual perceptions and behavioural control perceptions; third, whether remediation strategies can modulate the interaction between service type, attribution of errors and service remedy satisfaction; and third, whether remediation strategies can modulate the interaction between service type, attribution of errors and service remedy satisfaction. and service remediation satisfaction. This paper constructs a specific research model based on the preliminary survey and literature reading, and then further tests the hypotheses by designing four scenario experiments. This study aims to provide practical lessons learnt and management strategies for the service industry to meet consumers' demand for quality service experience and promote the sustainable development of the industry.

## **I. Literature review and hypothesis**

### **1. Interaction effects of service type and failure attribution on satisfaction with service remediation**

With the rapid development of Internet technology and the addition of millennials to the consumer workforce, the online shopping community is getting bigger by the day.<sup>[18]</sup> However, the expansion of the base of the online shopping group will inevitably increase the number of service errors. However, the expansion of the base of online shopping group will inevitably increase the number of service errors. Currently, there are studies on service errors in the academic world. Some studies have classified service errors according to the outcome-process classification.<sup>[19,20,21]</sup> For example, if the service process treats consumers rudely, it is a process failure, and if the courier company loses the consumer's courier, it is a result failure. There are also some studies based on the attribution theory (attribution).<sup>[22]</sup> Some other studies, based on the attribution theory, classify service failures into customer-caused failures and business-caused failures according to the different subjects in the service scenario, and find that the former are easier to remedy than the latter.<sup>[22]</sup> The former is found to be easier to remedy than the latter. However, there are fewer studies in academia that classify the causes of service failures based on attribution theory, which can be divided into subjective causes (internal) and objective causes (external) based on attribution theory.<sup>[22]</sup> Subjective errors are service failures caused by subjective reasons such as poor customer experience, which are usually highly subjective and relatively complicated to judge; objective failures are service failures caused by objective reasons such as product quality does not comply with national standards or industry standards, which are usually simple to judge and have evidence to follow. For example, because the consumer misread the size of the clothes purchased does not fit belong to the subjective error, while the customer purchased a dress but received a pair of trousers, is an objective error.

On the classification of customer service in the academic community has basically formed a consensus, that is, divided into intelligent customer service and artificial customer service. Intelligent customer service is, in essence, "a computer program that simulates human dialogue through voice commands or text chat and acts as a virtual assistant to the user."<sup>[23]</sup> On the technical side, intelligent customer service is highly efficient at handling targeted, procedural and repetitive tasks, and has a strong ability to recognise and search for product information<sup>[24]</sup> that has caused human customer service providing customer service on many websites, social media and messaging services to begin to be replaced (or supplemented) by intelligent customer service<sup>[25,26,27]</sup>. Although the adoption of intelligent customer service represents a modern wave of online transactions, many problems have been identified in its popularity<sup>[28]</sup>. Especially when it comes to solving some personalised and non-programmed problems, human customer service always performs better. Human customer service is able to provide a more personalised and efficient service experience by providing personalised answers and solutions based on the customer's needs and questions<sup>[29]</sup> The human customer service is able to provide a more personalised and efficient service experience.

Based on the role congruity theory ( Based on the role congruity theory Based on the role congruity theory (RCT), customers usually believe that after a service error, robot employees and human employees should bear the same service recovery responsibility, and will not greatly reduce the expectation of service remedy because the other party is a robot.<sup>[30]</sup> It can be seen that in the case of subjective errors and objective errors, consumers have basically the same expectation of service remediation for intelligent customer service and human customer service. When subjective errors occur, human customer service provides more insightful and highly empathetic service remedies that will increase the satisfaction of service remedies, and when consumers have basically the same expectations of service remedies, because intelligent customer service cannot experience or sense consumers' subjective intentions and expectations, its service satisfaction will not be as good as that of human customer service.<sup>[31]</sup> , its service satisfaction will

not be as high as that of human customer service. Relatively speaking, when an objective error occurs, as the objective error is usually procedural, repetitive and based on evidence, the intelligent customer service can respond quickly to consumers according to the preset procedures; while the artificial customer service is usually slower than the intelligent customer service in the speed of response, and there is a delay in communication, which leads to the satisfaction of service remediation is not as high as that of the intelligent customer service.<sup>[32]</sup> In summary, the subjective error situation is not as good as the intelligent customer service. In summary, subjective errors in the case of artificial customer service can effectively enhance the consumer's service remedy satisfaction; and in the case of objective errors, intelligent customer service can effectively enhance the consumer's service remedy satisfaction. Thus, the hypothesis is proposed:

H1. There is a significant interaction effect between service type and failure attribution on consumers' satisfaction with service remediation, i.e., for subjective failures due to dissatisfaction with the user's subjective experience, it is better to use human customer service, while for objective failures due to product attribute mismatch, it is better to use intelligent customer service.

## **2. The mediating role of processing fluency**

The concept of processing fluency (processing fluency) first originated in the academic discussion of individual metacognitive awareness. Metacognition is a psychological concept that refers to an individual's awareness of his or her own cognitive processes.<sup>[33,34]</sup> metacognition. Metacognition consists of three main components: metacognitive knowledge, metacognitive experience and metacognitive monitoring.<sup>[35]</sup> Metacognitive knowledge is people's knowledge of their own cognitive processes. Metacognitive knowledge refers to the extent to which people know about their cognitive activities<sup>[36]</sup> Metacognitive experience refers to people's subjective experience of their cognitive processes.<sup>[37]</sup> Metacognitive monitoring is the monitoring of one's own cognitive process.<sup>[38]</sup> Metacognitive monitoring is the monitoring of one's own cognitive processes. Based on the above concepts, an individual's cognitive activity is actually the individual's understanding and processing of external information, so the individual's metacognitive experience is essentially the subjective experience of people's understanding and processing of information.<sup>[39]</sup> . Since people in most cases use fluency to describe their subjective experience of understanding and processing information, metacognitive experience has also been called processing fluency by scholars. In short, processing fluency actually refers to the metacognitive experience people have when processing information.

Scholars in the marketing community have also defined processing fluency, specifically as the subjective perception of the speed and ease of information processing produced by an individual during mental processing such as perception, memory, etc.<sup>[40]</sup> The individual in the perception of coherence will be. Individuals produce fluency when they perceive coherence, which means that the higher the content match between cognitive elements, the higher the processing fluency.<sup>[41]</sup> . Therefore, when an individual receives service remediation information that matches the type of service failure, his or her processing fluency will subsequently become higher. When dealing with objective information, the service of intelligent customer service leads to higher processing fluency and higher purchase intention of consumers for search type; when dealing with subjective information, the service of human customer service improves the processing fluency of consumers more, and the purchase intention of consumers for browsing type of goods is more intense<sup>[32]</sup> In the processing of subjective information, the service of human customer service can improve consumers' processing fluency, and consumers' willingness to purchase browsing type products is stronger. Similarly, in the service remediation scenario, consumers' processing fluency is higher when intelligent customer service handles objective

errors and higher when human customer service handles subjective errors. According to the processing fluency-hedonic model, the processing fluency experience itself carries a hedonic attribute, which automatically triggers a positive emotional response in individuals, independent of the stimulus itself<sup>[42]</sup>. Therefore, in service remediation scenarios, consumers also have more positive emotions when they perceive that service errors are handled by service types with higher processing fluency, resulting in higher service remediation satisfaction.

To sum up, when consumers encounter objective disputes, the efficient reply of intelligent customer service will bring higher processing fluency than manual customer service, thus improving users' service remedy satisfaction. And when consumers encounter subjective disputes, human service with empathy can bring higher processing fluency than intelligent customer service, thus improving service remedy satisfaction. As a result, the following hypotheses are proposed:

H2. processing fluency mediates the interaction effect of service type and service errors on service satisfaction, i.e., when intelligent customer service remedies objective errors, consumers have high processing fluency with information, which leads to correspondingly high satisfaction with service remediation; when human customer service remedies subjective errors, consumers have high processing fluency with information, which leads to high satisfaction with service remediation.

### **3. The mediating role of perceived behavioural control**

Perceived Behavioral Control (PBC) refers to an individual's perception of the ease or difficulty of performing a particular behaviour based on his or her past experiences, resources, and abilities [43] PBC. Often this perceived ease is reflected in the resources and capabilities that the individual has to achieve the behaviour.<sup>[44]</sup> At the same time, the resources and abilities that an individual possesses can have a direct impact on the likelihood of achieving the desired behaviour [44].<sup>[43]</sup> The individual's resources and capabilities can directly affect the likelihood of achieving the desired behaviour. Therefore, when individuals have more resources and capabilities, they have higher expectations of performing a particular behaviour.

Existing research in the academic community suggests that consumer power takes two forms - "personal power", which involves independence, and "social power", which involves the ability to obtain desired outcomes from others; little attention has been paid to the relationship between power and forgiveness in the study of interpersonal relationships.<sup>[45][46]</sup> The relationship between power and forgiveness has received little attention in the study of human relationships in the current research.<sup>[47]</sup> The relationship between power and forgiveness has received little attention in the study of interpersonal relationships, and has also been neglected in the context of consumer-business relationships.<sup>[48]</sup> The relationship between power and forgiveness has received little attention in the study of interpersonal relationships. In the service redress scenario, "social power" can be understood as the consumer's ability to obtain the desired outcome from the merchant, and the more resources and social power the consumer has, the higher the expectation of service redress will be.

Anger tends to occur when people attribute goal-inconsistency events to external<sup>[49][50]</sup>. In the case of objective failures, i.e., the product is inconsistent because of the merchant, this can trigger consumer anger; furthermore, because consumers are supported by national standards and industry norms in the case of objective failures, this reinforces the consumer's perception of power, which can lead to anger<sup>[51]</sup> and self-serving attributions<sup>[52]</sup> and this will strengthen the consumer's attribution of service failures to the merchant, resulting in positive feedback, with the two reinforcing each other. Angry consumers usually adopt confrontational responses<sup>[53]</sup> which will greatly increase the difficulty of human customer service remediation and tend to trigger

lower satisfaction with service remediation. Research has shown that in the case of low-complexity tasks, consumers perceive AI problem-solving ability to be greater than human customer service and are more likely to use AI<sup>[54]</sup>, while the remediation of objective errors is relatively uncomplicated and can usually be resolved using the logic and discourse pre-implanted in intelligent customer service by the platform's algorithmic engineers, at which point intelligent customer service can better compensate for service remediation satisfaction. External attribution of the kind described above implies blaming others for the (objectionable) situation<sup>[55]</sup>. People may also blame themselves for the aversive event (internal attribution), which, on the contrary, fosters feelings of guilt<sup>[55]</sup>, i.e., in subjective failure situations, consumers will develop feelings of guilt. The inability of consumers to obtain support from national standards and industry norms of the same strength relative to objective failures in subjective failure situations will weaken the perception of power. In the strong frustration, low power perception of emotional dominance, will be more conducive to service remediation, and reflect a higher level of service remediation satisfaction. In general, the causes and logic of subjective failures are more complex compared to objective failures. Research suggests that individuals' higher expectations of higher task complexity problems will lead to potential disappointment in AI<sup>[54]</sup>; therefore, in the case of subjective errors, the use of human customer service can circumvent the potential disappointment of users and result in higher satisfaction with service remediation. In summary, human customer service in the case of subjective errors can effectively improve consumers' service remedy satisfaction; while in the case of objective errors, intelligent customer service can effectively improve consumers' service remedy satisfaction. As a result, the hypothesis is proposed:

H3. Perceived behavioural control mediates the effects of service type and error attribution on service remediation satisfaction. Intelligent customer service remedies objective errors with lower perceived behavioural control, which in turn reflects higher service remediation satisfaction, while manual customer service remedies subjective errors with high perceived behavioural control and lower service remediation satisfaction.

#### **4. The moderating role of remedial strategies**

With the development of the economy, consumers are demanding more and more from their shopping experience, and service failures occur when the products or services provided by a company do not meet consumers' expectations. After a service failure occurs, a company's service remedial behaviour can affect consumers' subsequent shopping behaviour. Satisfactory service remedies can motivate consumers and enhance their desire to repurchase while also increasing consumers' willingness to praise the company<sup>[56]</sup>. The service remediation behaviour of a company is therefore crucial. Therefore, the service remedies of enterprises are crucial. At present, there is no unified conclusion on the definition and theory of service remedies in the academic world. The concept of service recovery was first introduced in 1988 and is defined as a service provider's response to a service failure, the main function of which is to reduce consumers' negative emotions and resolve consumer dissatisfaction and complaints.<sup>[57]</sup> Its main function is to reduce consumer negativity and resolve consumer dissatisfaction and complaints. Later on, service recovery was defined as a timely response to consumer complaints, which maintains consumer loyalty to the brand.<sup>[58]</sup> Service Remediation As research progressed, service remediation was defined as a management strategy to address service failures and improve service quality.<sup>[59]</sup> service remediation. In conclusion, service remediation is a remedial response by companies to customer dissatisfaction and complaints.

There is no uniform academic definition of the dimensions of service remediation, i.e., the ways of service remediation. The classification adopted in this study is to classify service remediation strategies into two categories: economic recovery and social recovery, where

economic recovery specifically refers to giving financial compensation to the customer, who receives tangible benefits, such as money, discount cards, etc., and solving the problem efficiently and quickly; whereas social recovery refers to The social remediation refers to explaining and apologising to the customer, soothing the customer's emotion, valuing, respecting and solving the problem in a way that the customer wishes, etc.<sup>[60]</sup> .

Since service remediation research is primarily concerned with the concept of justice in a social exchange perspective, justice theory (JT) is applied as a theoretical framework to service remediation research.<sup>[61,62]</sup> Theories of justice are used as a theoretical framework in service redress research. Consumers usually evaluate justice related to service remedies from three dimensions: distributive justice, procedural justice, and interactional justice, where distributive justice refers to paid service remedies received by consumers from businesses, and procedural justice is more related to the way of service redress<sup>[63,64]</sup> and interactional justice is defined as the fairness in the interaction and communication process between consumers and firms in resolving service failure problems<sup>[64,65]</sup> . Most a priori studies have confirmed that distributive justice is primarily perceived through monetary compensation, such as coupons, discounts and funds<sup>[63,64,66,67,68]</sup> , which in this study is embodied in financial compensation; while interactional justice is usually associated with apologies<sup>[66,69,71]</sup> which in this study is related to social redress; and procedural justice is based on the speed of response to remedies, such as the timing and speed of the refund process<sup>[63,68,70]</sup> . It has been suggested that compensation in kind is the most effective measure in the case of service failures, as it provides customers with an intuitive sense of fairness in the outcome.<sup>[69]</sup> . At the same time, a large number of studies have shown that among the three types of fairness, distributive fairness is the most decisive predictor of satisfaction<sup>[68,72]</sup> . Within the appropriate amount of compensation, economic remediation strategies have a significant effect on service remediation satisfaction<sup>[73]</sup> . Existing research suggests that chatbot politeness strategies are more effective on consumer satisfaction with service remediation compared to apology strategies, but the remediation effect is limited<sup>[74]</sup> . So social remedies such as apology and consolation have limited effect on consumer satisfaction with service in the context of interaction between service type and dispute type.

In summary, when merchants use economic remediation strategy, the effect of this remediation strategy on consumers' satisfaction with service remediation is significantly higher than the matching effect of service type and dispute type, and the positive moderating effect of remediation strategy is larger; when merchants use social remediation strategy, the effect of this remediation strategy on the team's consumers' satisfaction with remediation is smaller compared to the matching effect of service type and dispute type, and the positive moderating effect of remediation strategy is smaller. positive moderating effect is smaller. Thus, we hypothesise:

H4. remediation strategies play a moderating role in the interaction between service type and service failure, i.e., when merchants use economic remediation strategies, the matching effect of service type and dispute type has a smaller effect on consumers' satisfaction with service remediation and the positive moderating role of remediation strategies is larger; when merchants use social remediation strategies, the matching effect of service type and dispute type has a have a larger impact and the positive moderating effect of remediation strategies is smaller.

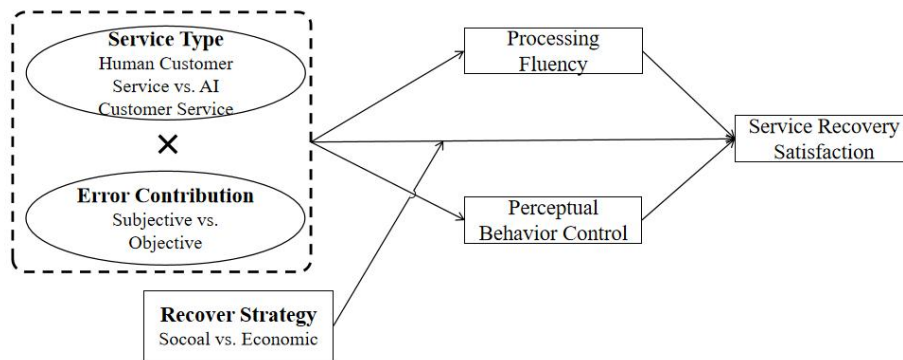


Figure 1 Research model

## II. Experimental design and analysis of results

### 1. Experiment 1: Matching effects of service type and dispute type

Experiment 1 used a 2 (service type: intelligent customer service vs. manual customer service)  $\times$  2 (failure attribution: subjective failure vs. objective failure) between-group factorial design to validate the interaction effect of service type and failure attribution on satisfaction with service remediation.

(1) Pre-test. Before the formal experiment, in order to let participants better integrate into the experimental situation and perform the relevant tests, this paper will let the subjects carefully read the text and picture materials. Considering the influence of scene familiarity on the experimental results, this paper chooses common scenarios and dialogues in daily life as the experimental stimulus materials. In this experiment, the subjects will read the experimental material "You will read the chat records on a travel app. You are the customer side and are having a dialogue with the online customer service." Subjects will then be presented with specific error type events and complete the corresponding questions (subjective error type: missing item; objective error type: not receiving an invoice). The different customer service types will be provided with the appropriate handling options and responses. All experiments will use chat dialogue box images processed with Adobe Photoshop software as intervention stimuli. These processed images will be carefully designed to ensure that they are visually and content-wise appropriate for the experiment. Such treatment will ensure the authenticity and uniformity of the experimental context.

(2) The measurements were mainly based on the well-established scale of Siran Wang et al. and were adjusted accordingly based on the research context. The independent variable service type includes "customer service is able to understand my needs accurately", "customer service response is accurate", "customer service response to my needs meets my expectations", "customer service perceives my emotional state during the interaction", and the error type includes "customer service perceives my emotional state during the interaction". "The customer service is aware of my emotional state in the interaction", and the types of errors include "The after-sales service is due to my personal negligence" "The after-sales service is due to the merchant's negligence" "This incident reflects an oversight on my part" "This incident reflects an oversight on the part of the merchant", and the satisfaction level of service remediation includes "I hope the customer service will do everything in its power to solve this problem" "I hope the customer service will do everything in its power to solve this problem" "I hope the customer service will do everything in its power to solve this problem". I don't expect customer service to make a great deal of effort to resolve this issue" "I expect customer service to provide me with a workable solution". Measurements in this paper were made on a Likert 7-point scale (1=strongly disagree,



7=strongly agree). Measures of satisfaction with service remediation were devised for this paper and these measures were set in all subsequent experimental questionnaires.

A total of 150 subjects (70 males and 80 females) were recruited through the Credamo platform. Paired-sample t-tests found that: regarding service type, there was a statistical difference between subjects' perceptions of subjective and objective errors in human customer service handling ( $M_{\text{Subjective Error}} = 6.1081$ ,  $SD = 1.24239$ ,  $M_{\text{Objective Error}} = 1.7838$ ,  $SD = 1.20497$ ,  $t = 11.507$ ,  $P < 0.001$ ); and there was a statistical difference between subjects' perceptions of subjective and objective errors in smart customer service handling ( $M = 1.8684$ ,  $SD = 1.54519$ ,  $M = 5.54519$ ,  $P < 0.001$ ). statistical difference ( $M_{\text{Subjective Error}} = 1.8684$ ,  $SD = 1.54519$ ,  $M_{\text{Objective Error}} = 5.4737$ ,  $SD = 2.10195$ ,  $t = -6.819$ ,  $P < 0.001$ ). There is also a significant difference between human customer service and intelligent customer service in handling subjective errors ( $M_{\text{人工客服}} = 6.3784$ ,

$SD = 0.59401$ ,  $M_{\text{智能客服}} = 6.0270$ ,  $SD = 0.83288$ ,  $t = 2.594$ ,  $p < 0.05$ ); and there is also a significant difference between human customer service and intelligent customer service in handling objective errors ( $M_{\text{人工客服}} = 6.0000$ ,  $SD = 1.16248$ ,  $M_{\text{智能客服}} = 5.6579$ ,  $SD = 1.04691$ ,  $t = 2.978$ ,  $p < 0.05$ ).

Therefore, all the error attributions in the pre-test can be put into use in the formal experiment.

(3) In the formal experimental phase, the same experimental manipulations and procedures as in the pre-test were used. Three hundred subjects were successfully recruited to participate in this experiment through the Credamo platform, and were randomly assigned to four different experimental groups. Excluding invalid questionnaires, a total of 276 valid samples were collected, with a validity rate of 92%. There were 108 males and 168 females included. The subjects' education was mainly distributed at the level of bachelor's degree accounting for 81.5%, and the monthly income was mainly distributed at 6001 yuan and above accounting for 64.9%.

(4) Two-factor ANOVA results show that when human customer service performs problem solving for users, higher user service satisfaction is obtained in the context of dealing with subjective error attribution compared to objective error attribution, and there is a significant interaction effect between human customer service and subjective errors on consumers' satisfaction with service remediation ( $M_{\text{Objective Error}} = 1.4030$ ,  $SD_{\text{Objective Error}} = 0.75998$ ,  $F = 0.307$ ,  $p = 0.820$ ;  $M = 4.1045$ ,  $SD = 0.74130$ ,  $F = 4.348$ ,  $p < 0.05$ ), and when intelligent customer service performs problem solving for users, it obtains higher user service satisfaction. 0.820;  $M_{\text{Subjective Error}} = 4.1045$ ,  $SD_{\text{Subjective Error}} = 0.74130$ ,  $F = 4.348$ ,  $p < 0.05$ ), when intelligent customer service performs problem solving for the user, the user service satisfaction obtained is higher in the context of dealing with objective failure attribution compared to subjective failure attribution, and there is a significant interaction effect between intelligent customer service and subjective failure on consumer satisfaction with service remediation ( $M_{\text{Objective Error}} = 4.0432$ ,  $SD = 1.095$ ,  $F = 3.315$ ,  $p < 0.001$ ;  $M_{\text{Subjective Error}} = 3.4676$ ,  $SD_{\text{Subjective Error}} = 1.2586$ ,  $F = 0.886$ ,  $p = 0.60$ ), and H1 is further validated: there is a significant interaction effect between service type and lapse attribution on consumers' service remediation satisfaction



Fig. 2 Effect of the interaction of service type and failure attribution on satisfaction with service remediation

## 2. experiment 2: dual mediation of processing fluency and perceived behavioural control effect

Experiment 2 used a 2 (service type: intelligent customer service vs. manual customer service)  $\times$  2 (lapse type: subjective lapse vs. objective lapse) between-group factorial design to validate the interaction effect of service type and lapse attribution on satisfaction with service remediation and to explore the dual mediating roles of processing fluency and perceived behavioural control in order to validate H2 and H3.

(1) Pre-test. In Experiment 2, the scenario has been changed, in this experiment, participants will be randomly assigned to a specific scenario, which takes place on an e-commerce platform's app. In order to investigate the mediating role of information processing fluency between service type, dispute type, and satisfaction, in this experiment, subjects will read the experimental material "You will be reading a chat transcript on an e-commerce app. You are the customer side and are having a dialogue with online customer service." Subjects will then be presented with specific failure type events and complete the corresponding questions (subjective failure type: purchasing the wrong size product; objective failure type: product delivery error). The different customer service types will be provided with appropriate treatment options and responses. All experiments will use chat dialogue box images processed by Adobe Photoshop software as intervention stimuli. These processed images will be carefully designed to ensure that they are visually and content-wise appropriate for the experiment. Such treatment will ensure the authenticity and uniformity of the experimental context.

(2) Experiment 2 included measures of processing fluency and perceived behavioural control. Processing fluency included "I think the customer service is difficult to understand", "I think the customer service is difficult to understand", "I think it takes a long time from the time I ask a question to the time the customer service solves the problem", and perceived behavioural control included "I think the customer service gives me a sense of familiarity", "I think the customer service gives me a sense of familiarity"., perceived behavioural control includes "I think this customer service gives me a sense of familiarity", "I think this customer service is similar to me", "I think this customer service is psychologically close to me", "I will treat this customer service like a friend", "I will treat this customer service like a friend", and "I will treat this customer service like a friend". ""I would give this customer service a bad rating for this customer service", service remediation satisfaction includes service remediation satisfaction includes "I expect the customer service to do everything in their power to solve this problem" "I I don't expect the customer service to make a lot of effort to solve this problem" "I hope the customer service can provide me with a feasible solution". Measures in this paper were taken on a 7-point Likert scale

(1=strongly disagree, 7=strongly agree).

A total of 147 subjects (56 males and 91 females) were recruited through the Credamo platform. The paired-samples t-test found that there was a statistical difference between subjects' perceptions of subjective and objective errors in manual customer service handling with respect to the type of service ( $M_{\text{Subjective Error}} = 6.7105$ ,  $SD = 0.61106$ ,  $M_{\text{Objective Error}} = 1.5526$ ,  $SD = 1.30896$ ,  $t = -19.433$ ,  $P < 0.001$ ); and there was a statistical difference between subjects' perceptions of subjective and objective errors in intelligent customer service handling ( $M = 1.7778$ ,  $SD = 1.31173$ ,  $M = 1.7778$ ,  $M = 1.31173$ ,  $M = 1.31173$ ). There is a statistical difference ( $M_{\text{Subjective Error}} = 1.7778$ ,  $SD = 1.31173$ ,  $M_{\text{Objective Error}} = 6.3333$ ,  $SD = 0.95618$ ,  $t = -13.923$ ,  $P < 0.001$ ). There is also a significant difference between human customer service and intelligent customer service in handling subjective errors ( $M_{\text{人工客服}} = 5.6970$ ,  $SD = 0.88959$ ,  $M_{\text{智能客服}} = 5.5152$ ,  $SD = 1.05601$ ,  $t = 1.976$ ,  $p < 0.05$ ); and there is also a significant difference between human customer service and intelligent customer service in handling objective errors ( $M_{\text{human customer service}} = 5.1795$ ,  $SD = 1.55380$ ,  $M_{\text{intelligent customer service}} = 4.6410$ ,  $SD = 1.79894$ ,  $t = 2.829$ ,  $p < 0.01$ ). Therefore, all the error types in the pre-test can be put into use in the formal experiment.

(3) In the formal experimental phase of Experiment 2, recruited 300 subjects on the Credamo platform to participate in this experiment and randomly assigned them to four different experimental groups. Excluding invalid questionnaires, there were a total of 276 valid samples, with a validity rate of 92%. The sample included 108 males and 168 females. The subjects' education was mainly distributed at the level of bachelor's degree accounting for 81.5 per cent, and the monthly income was mainly distributed at 6001 yuan and above accounting for 64.9 per cent.

(4) The results of two-way ANOVA showed that H1 was further validated: there was a significant interaction effect between service type and failure attribution on consumers' satisfaction with service remediation ( $F = 16.5995$ ,  $p < 0.001$ ).

Next, service type and lapse attribution were set as categorical variables, and Model 8 in PROCESS 4.1 was chosen to test processing fluency and perceived behavioural control. When the type of error was subjective, the mediating effect of processing fluency existed, with a confidence interval of [0.0377, 0.0932] and an indirect effect value of 0.196; when the type of error was subjective, the effect of perceived behavioural control existed, with a confidence interval of [0.0246, 0.0520] and an indirect effect value of -0.019; and when the type of error was objective, the mediating effect of processing fluency mediation effect exists, the confidence interval is [0.0009, 0.0941], and the indirect effect value is 0.0187; when the failure type is objective failure, the perceived behavioural control mediation effect exists, the confidence interval is [0.5245, 0.8505], and the indirect effect value is 0.6875; the above results proved the H2 and H3 of this paper. therefore the service type and failure attribution can interact to influence service remediation satisfaction through processing fluency and perceived behavioural control, and the mediating effect path coefficients are shown in Figure 2.

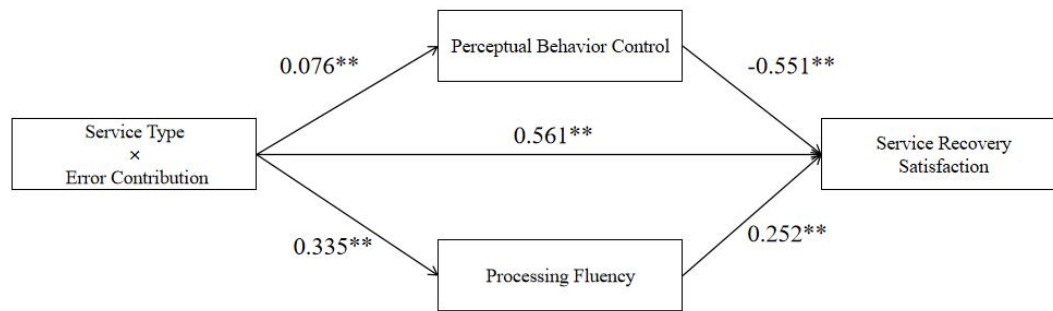


Figure 2 Intermediation effect path diagram

### 3. Experiment 3: Moderation of remedial strategies effects

Experiment 3 used a 3 (service type: smart customer service vs. human customer service)  $\times$  2 (type of error: subjective vs. objective)  $\times$  2 (remediation strategy: social vs. economic) between-groups factorial design as a way to detect the interaction effect of remediation strategies to validate H4.

#### (1) Experimental Procedures

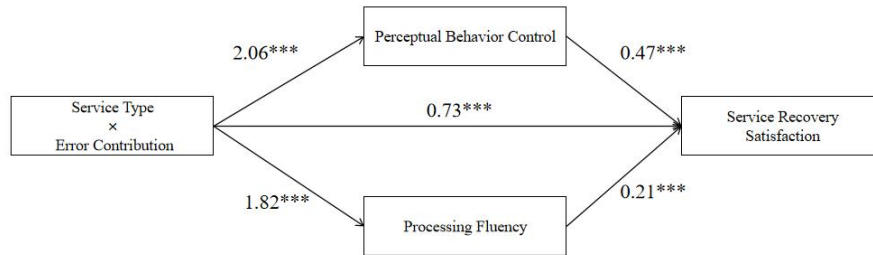
Pre-test. Experiment 2 changed the scenario, in this experiment, participants will be randomly assigned to a specific scenario, which takes place on a communication platform app. In order to investigate the mediating role of information processing fluency between service type, dispute type, and satisfaction, in this experiment, subjects will read the experimental material "You will be reading a chat transcript on a communication app. You are the customer side and are having a dialogue with online customer service." Subjects will then be presented with specific error type events and complete the corresponding questions (subjective error type: top-up to the wrong account; objective error type: top-up did not arrive in time). The different customer service types will be provided with the appropriate treatment options and responses. All experiments will use chat dialogue box images processed by Adobe Photoshop software as intervention stimuli. These processed images will be carefully designed to ensure that they are visually and content-wise appropriate for the experiment. Such treatment will ensure the authenticity and uniformity of the experimental context.

(2) Experiment 3 included measures of remedial strategies. Social remediation strategies included "I think the customer service treated me the way I deserved to be treated", "I think the customer service showed empathy for the problem", "I think the customer service treated me with respect for the problem", and economic remediation strategies included "The customer service handled the problem in a way that made me feel that I got my money's worth", "I think the customer service treated me with respect for the problem". ", and economic remediation strategies include "Customer service handled the issue in a way that made me feel like I got my money's worth," "I think the customer service provided a good solution to the problem," and "I think customer service values my time." I think the customer service valued my time" Satisfaction with service remediation included Satisfaction with service remediation included "I think I received good service from the customer service" "I think the customer service had a certain level of enthusiasm" "I think customer service is more willing to build a relationship with me than just complete a task". Measures in this paper were taken on a 7-point Likert scale (1=strongly disagree, 7=strongly agree).

(3) In the formal experimental phase of Experiment III, the same process as the above experiment was used. Three hundred subjects were recruited on the Credamo platform to participate in this experiment and were randomly assigned to four different experimental groups. Invalid questionnaires were excluded, resulting in a total of 276 valid samples with a validity rate of 92%.

The sample included 108 males and 168 females. The subjects' education was mainly distributed at the level of bachelor's degree accounting for 81.5 per cent, and the monthly income was mainly distributed at 6001 yuan and above accounting for 64.9 per cent.

(4) The results of two-way ANOVA showed that H1 was further validated: there was a significant interaction effect between service type and failure attribution on consumers' satisfaction with service remediation ( $F=8.5995, p<0.001$ ).



Next, service type and error attribution were set as dummy variables, and model 8 in PROCESS 4.1 was chosen to test processing fluency and perceived behavioural control. When the service type is manual customer service, the mediating effect of processing fluency exists, the confidence interval is [0.0650, 0.1019], and the value of the indirect effect is 0.0866; when the service type is manual customer service, the effect of perceived behavioural control exists, the confidence interval is [-0.0919, -0.0381], and the value of the indirect effect is -0.055; when the service type is intelligent customer service, the Processing fluency mediation effect exists, the confidence interval is [-0.1012, -0.0241], and the indirect effect value is -0.072; when the service type is intelligent customer service, the perceived behavioural control mediation effect exists, the confidence interval is [0.0860, 0.1276], and the indirect effect value is Fig. 3 The mediation effect path diagram is 0.0936; the above results prove H2 and H3 of this paper. thus service type and lapse attribution can interact to influence service remediation satisfaction through processing fluency and perceived behavioural control, and the mediating effect path coefficients are shown in Fig. 3.

Based on the establishment of the principal component effect, an interaction term of "service type × failure attribution" was constructed, and regression analyses were conducted with service remediation satisfaction as the dependent variable and remediation strategy and the interaction term as the dependent variable. The results of the analyses showed a significant effect of remediation strategy and the interaction effect ( $F=8.24, p<0.05$ ), and the results are shown in Table 1.

Table 1 Effect of remediation strategy and service type x failure attribution on satisfaction with service remediation

Dependent variable: satisfaction with service remediation	Human Customer Service - Subjective Errors		Intelligent Customer Service-Objective Failure	
	Social remedies	Economic remedies	Social remedies	Economic remedies
average value	3.6	4.54	3.1	4.3
variance (statistics)	1.68	0.76	0.69	1.13

The results of the study show that in the case of subjective errors, human customer service adopts economic remedies more than social remedies to improve consumer service remediation satisfaction ( $M_{\text{human customer service-subjective errors-economic remedies}}=4.54, SD=0.76$ ;  $M_{\text{human customer$

service-subjective errors-social remedies=3.6, SD=1.68;  $p<0.05$ ); in the case of objective errors case, the adoption of economic remedies by intelligent customer service improved consumer service remediation satisfaction more than the adoption of social remedies ( $M_{\text{Intelligent Customer Service-Objective Mistake-Economic Remedy}}=4.3$ , SD=1.13;  $M_{\text{Intelligent Customer Service-Objective Mistake-Social Remedy}}=3.1$ , SD=0.69;  $p<0.05$ ), i.e., H4 remediation strategy in the service type-service mismatch interaction playing a moderating role was validated.

### III. Conclusions and discussion of the study

#### 1. Conclusions of the study

With the development of language models and intelligent algorithms, intelligent customer service has been widely used in the field of online service failure remediation. How to remediate service failures for different attributions, and the extent of the borderline impact of different remediation strategies on service remediation satisfaction have become the focus of attention in the academic community. Based on attribution theory, metacognitive theory, perceived behavioural control, role congruence theory and justice theory, this paper mainly classifies service failures into subjective and objective attributions, and investigates their interactions with service types, as well as the mechanisms that affect service remediation satisfaction under the dual mediation of perceived behavioural control and processing fluency. The hypotheses were tested through three experiments.

Experiment I showed a significant interaction between service type (intelligent customer service vs. manual customer service) and error attribution (subjective error vs. objective error), in which higher service remediation satisfaction could be obtained in both cases of intelligent customer service resolving objective errors and manual customer service resolving subjective errors. Experiment 2 found the dual mediating mechanism of perceived behavioural control and processing fluency. That is, intelligent customer service obtains higher service remediation satisfaction due to higher processing fluency when resolving objective errors, while manual customer service obtains relatively more perceived behavioural control when resolving subjective errors, thus increasing service remediation satisfaction. Experiment 3 shows that economic remediation strategies are more likely to increase service remediation satisfaction than social remediation strategies, and in general, service remediation satisfaction is positively related to the amount of compensation in economic strategies.

#### 2. Theoretical contributions

This paper explores the dual-mediated influence mechanism of service type (intelligent vs. manual customer service) and failure attribution (subjective vs. objective failure) on consumer satisfaction with service remediation, as well as the moderating role of remediation strategy (social vs. economic) on the above influence paths. The specific theoretical contributions are as follows:

First, this study combines service type and failure attribution and discusses their interaction. In existing research in the field of service remediation, service failures are usually categorised into process failures and outcome failures according to the outcome-process theory, or into business failures and customer failures according to the attribution theory; however, the former does not pay attention to who triggers the service failures, and it is usually easier if the consumer is the one who triggers the failures. However, the former does not pay attention to who triggered the service failure, and it is usually easier to remedy a service failure if the consumer is the one who triggered the failure. The latter uses attribution theory but does not include the cause, e.g., if a flight is delayed due to heavy rainfall in an airline scenario, the service failure is neither a business failure nor a customer failure. Therefore, this study focuses on attributing service failures and more comprehensively categorising them into objective and subjective failures,

investigating the interactions with service types in different service failure scenarios, and finding that intelligent customer service is more suitable for resolving objective failures and manual customer service is more suitable for resolving subjective failures. This paper not only enriches the research on service remediation in the framework of attribution theory, but also enriches the research on the application of role congruence theory in the field of service remediation.

Second, this study explores the mechanism of service type and failure attribution on consumers' satisfaction with service remediation from the perspectives of social power and metacognitive theory. Most of the existing literature investigates the mechanism of intelligent customer service on service remedy satisfaction in terms of its degree of anthropomorphism and humour. However, in consumption and service contexts, the service remedy satisfaction of customer service depends more on consumers' own feelings. This study extends the application of metacognition theory and perceived behavioural control theory to the field of service remediation, and finds that intelligent customer service has higher service remediation satisfaction in solving objective errors due to a better fit with consumers' metacognition and faster response speed, while intelligent customer service obtains higher service remediation satisfaction in solving subjective errors due to higher perceived behavioural control of the customer, and artificial customer service can provide more flexible and more personalized solutions. higher service remediation satisfaction. This finding explains the mechanism of influence on service remediation satisfaction in the case of interaction between service type and lapse attribution.

Third, this study analyses the moderating mechanism between service type and failure attribution from justice theory, and verifies that the use of economic strategies is more likely to result in higher consumer satisfaction with service remediation, whereas the use of societal strategies has a relatively weaker effect on consumer satisfaction with service remediation. The finding provides an effective theoretical basis and reference for strategies to improve consumer service remediation satisfaction in service failure scenarios.

### **3. Management Insights**

First, enterprises should establish a complete service error warning, service error classification, service error handling mechanism. First of all, in the process of consumer service through the service failure warning self-check, self-correction of possible service errors, timely resolution of risk, prevention. If a service error occurs, the enterprise can take the initiative to use big data to trace the cause of the error and its attribution, but also through the consumer's feedback, the use of only language models to determine the attribution of the error; if after the determination of the confirmation of the subjective error, you can let the artificial customer service as soon as possible to intervene in the service remedies, if the objective attribution, you can directly use the intelligent customer service service service to remedy the service. Of course, in addition to designating different service types of customer service for different attribution of service errors, it is also necessary to train and iterate on customer service. In the artificial customer service to solve the subjective attribution of service errors, consumers usually have a strong perception of behavioural control, at this time the need for artificial customer service to provide more flexible solutions, and give consumers as much as possible personal attention and emotional intervention; in the intelligent customer service to solve the objective attribution of service errors, enterprises should actively recover the parameters of each intelligent customer service to solve the errors, and the intelligent customer service language model is continuously Training, upgrading, so that intelligent customer service can be applied to more objective error scenes, while the training can also improve the processing fluency of intelligent customer service to consumers. Through the above methods can greatly improve the consumer's service remedy satisfaction.

Second, companies need to pay attention to the satisfaction of consumer processing fluency during service remediation. One of the major reasons why many intelligent customer services fail to obtain consumer satisfaction is the low processing fluency of such intelligent customer services, i.e., enterprises have not carried out continuous and extensive language training for such intelligent customer services. Only when intelligent customer service's response speed and answer within a better fit with the metacognition of consumers, can it obtain higher service remedy satisfaction from consumers when dealing with objective errors. On the other hand, enterprises can also process and standardise the workflow of artificial customer service, and correspond different groups of artificial customer service with different segments of service errors, in order to speed up the response speed of artificial customer service, improve the precision of question answering, and then improve the processing fluency of consumers, in order to obtain a higher degree of satisfaction with service remediation.

Thirdly, enterprises need to deepen their analysis of subjective errors and strengthen their handling of subjective attribution errors. Generally speaking, many enterprises ignore disputes arising from customers' own problems, which ultimately leads to more serious consequences. Enterprises can collect a large number of subjective error handling scenarios that they have faced or are facing, reclassify subjective errors through the integration of big data, and formulate solutions and plans in advance for subjective errors in each segment, so as to obtain the highest possible satisfaction with service remediation in the face of subjective errors and higher perceived behavioural control by consumers.

Fourth, enterprises should apply economic and social remediation strategies flexibly as appropriate. In the face of more loaded service errors, enterprises can use economic strategies as appropriate to regulate consumer satisfaction with service remediation, to make up for the subjective ability of customer service and other unfavourable factors; but enterprises can not be economic strategies for consistent service remediation strategy, on the one hand, will increase the cost pressure on the enterprise, on the other hand, it will also reduce the adhesion between the consumers, is not conducive to the long-term development of the enterprise. Therefore, enterprises should move towards the reasonable use of the economic strategy to obtain a higher degree of satisfaction with service remediation, depending on the situation.

#### **4. Limitations and future research**

With regard to the limitations of the study, this study analyses its shortcomings and proposes corresponding directions for future research. Firstly, the experiments in this study were realised through the scenario experiments of "picture + narration", and the offline field experiments were not conducted, so the results of the online experiments may have a slight deviation from the results of the real scenarios. Second, the perceived behavioural control in this study is derived from the theory of planned behaviour, in which there are also variables such as behavioural attitudes, subjective norms, and behavioural intentions that can be studied, and this paper does not take into account the influence of these factors on the control of planned behaviour.

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