



The clock is ticking—Or is it? Customer satisfaction response to waiting shorter vs. longer than expected during a service encounter

Delphine Caruelle^{a,*}, Line Lervik-Olsen^b, Anders Gustafsson^b

^aDepartment of Marketing, Kristiania University College, Kirkegata 24-26, 0153 Oslo, Norway

^bDepartment of Marketing, BI Norwegian Business School, Nydalsveien 37, 0484 Oslo, Norway

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Abstract

Customer waits are commonplace in retail settings. To develop efficient wait management strategies, retailers need insights into how customers respond to waiting during service encounters. An intuitive insight supported by extensive research is that a longer wait duration decreases customer satisfaction. However, the same wait duration might have different effects on customers depending on whether it is shorter or longer than what customers expected. To address this question, we draw upon the research on time value and predict asymmetry in the customer satisfaction response to waiting shorter versus longer than expected: Though the clock is often said to be ticking, waiting longer than expected leads to a minor decrease in satisfaction, whereas waiting shorter than expected substantially increases satisfaction. We provide evidence for this asymmetric effect across three studies and identify two boundary conditions: if the source of the expectation is external (e.g., wait time estimate provided by the retailer) or if the wait is *much* longer than expected. Overall, our research encourages retailers to put the customer response to waiting into perspective: Customers will tolerate waiting longer than expected, up to a certain point.

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“Super tasty!!!! I recommend !!! Service could be a little faster, had to wait longer than expected but food is very very tasty !!!!”

—Regina A., 5-star review on Yelp, 1/20/2020

This Yelp review notes a longer-than-expected wait but still offers the highest possible rating, which seems surprising. Being forced to wait usually is considered an aversive experience, and long checkout queues cause frustration (Furniture Today n.d.); survey data suggest waiting is the second most bothersome aspect of retailers for consumers (Lesonsky 2012). So why might Regina A., forced to wait longer than expected, still offer a 5-star review?

Prior research on customer waits has mostly focused on the duration of the wait (e.g., Houston, Bettencourt, and

Wenger 1998; Hui, Dubé, and Chebat 1997; Larson 1987; McGuire et al. 2010; Matilla and Hanks 2012; Pruyn and Smidts 1998; van Riel et al. 2012), while little research has been conducted on waits that violate customers' expectations, i.e., waits that are longer or shorter than what customers expected. The scant research there is shows that waiting longer than expected is less satisfying than waiting shorter than expected (Tom and Lucey 1995, 1997; Whiting and Donthu 2009). A general assumption is that there is a linear relationship between wait time expectations and customer satisfaction, where waiting shorter than expected always increases satisfaction, and waiting longer than expected always decreases it (Maister 1984). According to this assumption, retailers' wait management strategies should always ensure that customers never wait longer than expected. Katz, Larson, and Larson (1991) detail how Disney parks strategically decided that wait time estimates displayed next to attractions should be overestimated, so that visitors never wait longer than expected.

* Corresponding author.

E-mail addresses: delphine.caruelle@kristiania.no (D. Caruelle), line.lervik-olsen@bi.no (L. Lervik-Olsen), anders.gustafsson@bi.no (A. Gustafsson).

But such an assumption may be overly simplistic. We undertake the present research to examine the validity of such an assumption by asking: To what extent does waiting for a shorter time than expected enhance customer satisfaction, and waiting longer than expected damage it, and which of these effects looms larger?

Based on expectancy disconfirmation theory (Oliver 2010), we posit that a shorter- or longer-than-expected wait constitutes a disconfirmation of wait time expectation. Because customers value timeliness in service delivery, a shorter-than-expected wait is a *positive* disconfirmation of wait time expectation, whereas a longer-than-expected wait is a *negative* disconfirmation. To understand how customers respond to positive and negative disconfirmations, we draw on research showing that the value of time is highly flexible (Festjens and Janiszewski 2015; Spiller 2019) and that, due to this flexibility, individuals discount the value of their time if doing so creates more satisfactory psychological outcomes (Okada 2005; Okada and Hoch 2004; Soman 2001). For this reason, we propose that customers discount the value of the time they lose in a longer-than-expected wait (i.e., undervalue what they could have done during the additional time spent waiting), unlike customers who wait for a shorter time than expected. These customers likely do not discount the value of the time they gain because there is no psychological benefit of undervaluing what they might do with time freed up by a shorter-than-expected wait. We further predict that such differential effects lead to a weaker (negative) impact of negative disconfirmation on customer satisfaction and a stronger (positive) impact of positive disconfirmation (i.e., asymmetric effect). In addition, we identify two boundary conditions of this predicted asymmetric effect: when the source of the expectation is external (e.g., a wait time estimate provided by the retailer) and when the wait time is *much* longer than expected such that it surpasses a disconfirmation threshold, thereby leaving the so-called zone of indifference (Oliver 2010).

In three studies, including both a scenario-based experiment and behavioral studies with actual waiting, we provide empirical evidence of the predicted asymmetric effect: Negative disconfirmation decreases customer satisfaction less than positive disconfirmation increases it, unless the source of the expectation is external or the wait is much longer than expected.

With these findings, we make several contributions. In particular, we add nuance to research into customer waits by studying how customers respond to wait durations that are shorter or longer than expected, thus moving beyond simply the wait duration to account for how well it meets customers' expectations (for better or worse). We establish that, compared with waiting as long as expected, waiting shorter than expected results in a major increase in satisfaction, whereas waiting longer than expected results in a minor decrease in satisfaction. Across our studies,¹ the increase in satisfaction

generated by a shorter-than-expected wait is more than 1.6 times greater than the decrease in satisfaction generated by a longer-than-expected wait. This insight is critical because it challenges a common and erroneous belief. Notably, we surveyed 200 store managers about customers' reactions to waiting shorter or longer than expected (Web Appendix A), 91% of whom believed that waiting longer than expected would affect customers more than waiting shorter than expected. Our research disputes this belief. Making customers wait longer than expected (within reason) is not as detrimental as these managers believe. This practical insight is meaningful; retailers cannot always shorten wait times further, and doing so even might lower service quality. Thus, retailers may choose instead to base their wait management strategies on customers' wait time expectations. Understanding the impact of not meeting these expectations (for better or worse) provides valuable information that goes beyond the well-established insight that longer waits damage the customer experience.

Moreover, we identify the mechanism by which the effect of waiting shorter or longer than expected occurs: the perceived value of time. Specifically, customers undervalue what they could have done during the additional time spent waiting, which is why they are less affected by waiting longer than expected, whereas they fully value the time saved by waiting shorter than expected.

Finally, we identify two boundary conditions. First, we show that the source of wait time expectation modifies the asymmetric effect. When customers form expectations based on their own prior experiences (i.e., internal source), a longer-than-expected wait decreases their satisfaction less than a shorter-than-expected wait increases it. However, this asymmetry reverses when customers form their expectations based on a wait time estimate communicated by the retailer (i.e., external source). As Study 2 reveals, this reversal occurs because the satisfaction level of customers who wait as long as expected is higher when the expectation source is external (vs. internal). This finding suggests that communicating a wait time estimate to customers can boost customer satisfaction, and we encourage retailers to do so.

Second, we show that past a certain threshold, the effect of waiting longer than expected becomes detrimental at an accelerating pace, which reconciles our findings with the body of research documenting an aversive response to delays (e.g., Taylor 1994). Our research indicates that the impact of waiting longer than expected on customer satisfaction is not linear, which suggests that not all delays should be managed similarly. In particular, our findings provide some guidance regarding when retailers should offer compensation (e.g., coupon) to customers who have had to wait. If customers wait slightly longer than expected, their satisfaction level is barely affected; compensation likely is not necessary. However, customers respond strongly to waits that are *much* longer than expected—in our study, waits more than 238% longer than expected (Study 3)—so retailers should offer compensation to recover customer satisfaction in such cases.

¹ We provide the results of our single-paper meta-analysis in Web Appendix E.

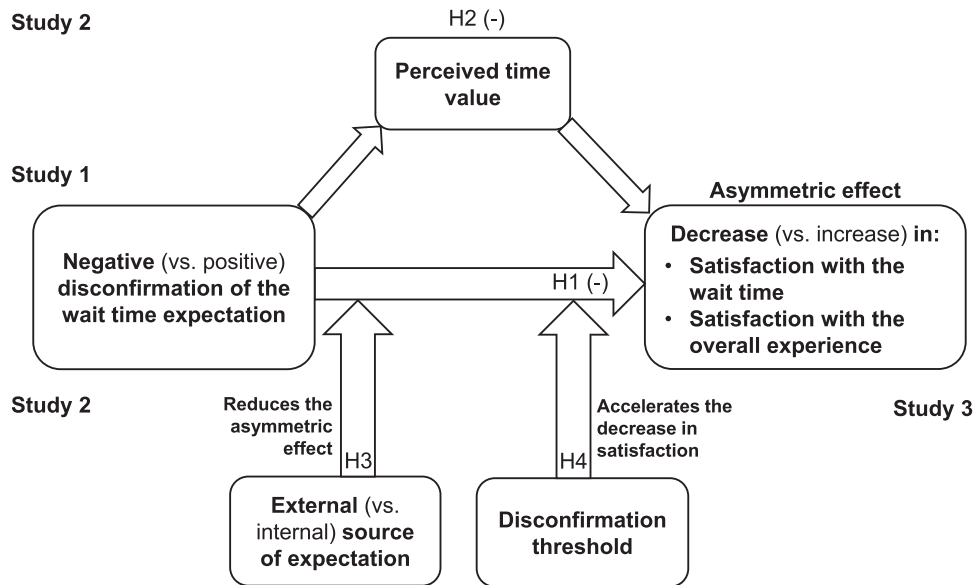


Fig. 1. Conceptual framework.

Conceptual framework

In this section, we first clarify the concepts of wait time expectation and disconfirmation, then draw on studies of the value of time to predict how positive and negative disconfirmations differentially affect customer satisfaction. Next, we discuss how the source of wait time expectation moderates the asymmetric effect of positive versus negative disconfirmations on satisfaction. Last, we draw on expectancy disconfirmation theory and the principle of zone of indifference to propose that past a certain threshold, large negative disconfirmations damage satisfaction at an accelerating pace. The conceptual framework is depicted in Fig. 1.

Wait time expectation

Prior to a service encounter, customers hold beliefs about how long their wait will be (Davis and Vollmann 1990; Durrande-Moreau 1999; Houston, Bettencourt, and Wenger 1998; Kumar, Kalwani, and Dada 1997). This belief is referred to as the wait time expectation. Wait time expectation, as we define it here, is a predictive expectation (also called “will expectation”): It corresponds to how long customers predict they will wait (Boulding et al. 1993; Zeithaml, Berry, and Parasuraman 1993). Due to the heterogeneous nature of services, the actual wait time might differ from this expectation. In line with expectancy disconfirmation theory (Oliver 2010), waiting shorter or longer than expected is a disconfirmation. Customers value timeliness in service delivery (Parasuraman, Zeithaml, and Berry 1985), so waiting shorter than expected represents a beneficial outcome, and we define a shorter-than-expected wait as a *positive* disconfirmation of the wait time expectation. Waiting longer than expected instead is a detrimental outcome, so we define a longer-than-

expected wait as a *negative* disconfirmation of the wait time expectation.

Value of time

The magnitude of customers’ responses to temporal incidents (e.g., disconfirmation of wait time expectation) depends on the value these customers assign to time (DeVoe and Pfeffer 2011; Houston, Bettencourt, and Wenger 1998). The higher the value of time, the more strongly people respond (positively) to saving time and (negatively) to losing time. However, determining the value of time is not straightforward, because it is highly flexible (Festjens and Janiszewski 2015; Okada 2005; Okada and Hoch 2004; Soman 2001; Spiller 2019). The value of time is what people believe their time is worth (Okada and Hoch 2004), which varies across situations and contexts (Leclerc, Schmitt, and Dubé 1995; Monga and Zor 2019). People do not simply equate the value of their time with their wage rate or some monetary equivalent (Marmorstein, Grewal, and Fische 1992; Monga, May, and Bagchi 2017) but instead derive it from possible alternative uses of their time (Schaeffer 2001). This concept is known as the opportunity cost of time (Spiller 2011). The more utility people think they could have derived from alternative uses of their time, the more valuable their time is. The value of time is thus perceived subjectively.

Leveraging this flexibility, people easily discount the value of their time if it provides some psychological benefit. For example, if time is the currency used to make acquisitions, people are willing to trade a product that required a greater temporal investment for what they perceive as a more desirable product, even if it demanded a smaller temporal investment (Soman 2001). If they exchanged 15 h of work for a ticket to a theater performance and also exchanged 5 h of work for a ticket to a more desirable rock concert sched-

uled for the same date, people would rather choose to go to the rock concert, despite having spent much more time to obtain the theater ticket (Soman 2001). In making this trade-off, they mentally discount the value of the 15 h spent to obtain the theater ticket. Similarly, if customers collect multiple offers from firms before making a purchase decision, increasing the amount of time it takes to collect one firm's offer does not change the number of offers people are willing to gather (Monga and Saini 2009). Instead of collecting fewer offers, they simply discount the value of their time. Another context in which consumers discount the value of their time is when they are making purchases that are difficult to rationally justify (Okada 2005). For purchases that are easy to rationally justify (e.g., necessities), consumers prefer to spend money rather than time. However, for purchases that are difficult to rationally justify (e.g., hedonic purchases), consumers prefer to spend time (i.e., work some certain amount of time in exchange for the product, without any monetary exchange), because they can mentally discount the value of their time, so the purchase appears less costly and easier to justify psychologically than if they had spent money (Okada 2005).

Furthermore, when customers spend time to acquire a good or service, they discount the value of their time if the good or service is dissatisfactory but not if it is satisfactory (Okada and Hoch 2004). Thus, when the time spent appears to exceed the value derived from the consumption, customers engage in discounting the value of the time they spent. Customers are particularly concerned with equity in commercial transactions (Oliver 2010; Oliver and Swan 1989), meaning that the output needs to match the customer's input. The flexibility of the value of time makes it possible to restore equity, by lowering the value of the temporal input. If customers experience a negative disconfirmation of wait time expectation for example, they likely perceive the transaction as inequitable, because their temporal input (i.e., amount of time waited) is higher than expected, but the output they ultimately receive (i.e., the service delivered by the firm) remains unchanged. To restore equity, they leverage the flexibility of the value of time and discount the value of the time lost to the longer-than-expected wait. As a result, they perceive this lost time to have little value. For instance, if a customer expected to wait 10 min but actually waits 12 min, they will think, "What could I have done during these 2 min anyway? Not much!"

Customers who experience a positive disconfirmation of wait time expectation instead are unlikely to discount the value of their time. Even though they experience inequity too (temporal input is lower than expected, but output is unchanged), it is in their favor, so they appreciate the time saved in the shorter-than-expected wait. Furthermore, according to the hedonic principle, people seek to maximize pleasant feelings (Förster, Higgins, and Idson 1998; Higgins 1997) and maintain or enhance positive emotion, not reduce it (Tugade and Fredrickson 2007). Thus, customers have no reason to discount the value of the time saved in a shorter-than-expected wait but instead should perceive that time at its fair value. For example, if a customer expected to wait 10 min

but actually waits 8 min, they will appreciate having the opportunity to freely spend the 2 min they have gained.

Our predictions that customers discount the value of the time lost in a longer-than-expected wait but not the value of the time saved in a shorter-than-expected wait also are in line with mobilization–minimization theory (Taylor 1991), which predicts that people cope with negative events by minimizing the effects, whereas they have no need to find ways to cope with positive events. Because the magnitude of the customer response to temporal incidents increases with the value of time (DeVoe and Pfeffer 2011; Houston, Bettencourt, and Wenger 1998), we propose that customers respond less strongly to a negative disconfirmation of the wait time expectation than to a positive one. Combining this prediction with literature on customer waiting that establishes satisfaction with both the wait time (Kumar 2005; Whiting and Donthu 2009) and the overall experience/service (Pruyn and Smidts 1998; van Riel et al. 2012) as central customer responses, we hypothesize:

H1. The direction (negative vs. positive) of the disconfirmation of the wait time expectation has an asymmetric effect on customer satisfaction with the (a) wait time and (b) overall experience, such that a negative disconfirmation decreases satisfaction to a smaller extent than a positive disconfirmation increases satisfaction.

H2. The perceived value of time mediates the effect of the direction (negative vs. positive) of the disconfirmation of the wait time expectation on satisfaction with the (a) wait time and (b) overall experience.

We also explicitly note that an assumption underlying our hypotheses is that the negative and positive disconfirmation have the same objective size (e.g., a wait 1 min longer or shorter than expected). This assumption is needed for a fair comparison of the effects of positive and negative disconfirmation on customer satisfaction.

Expectation source

Customers derive wait time expectations from either internal or external sources (Durrande-Moreau 1999; Houston, Bettencourt, and Wenger 1998). Internal sources correspond to customers' prior experiences with the focal firm and/or other firms (Woodruff, Cadotte, and Jenkins 1983). For instance, customers might expect to wait 10 min to check out at the grocery store because that is how long, on average, they usually wait. A wait time expectation whose source is internal is thus a "personal expectation" (Durrande-Moreau 1999, p. 176). External sources correspond to what the firm signals about wait time, such as when a firm communicates an estimated wait time (Hui and Tse 1996). A wait time expectation whose source is external is thus a "manipulated expectation" (Durrande-Moreau 1999, p. 176).

These different sources have different implications when the expectation is not met (Fullerton and Taylor 2015; Wan, Hui, and Wyer 2011). With an external source, cus-

tomers perceive a longer-than-expected wait not only as a disconfirmation but also as a breach of the promise made by the firm (Fullerton and Taylor 2015). That is, the negative disconfirmation gets aggravated by the violation of an explicit promise, which should augment negative customer responses. We thus predict that a longer-than-expected wait decreases satisfaction (with wait time and the overall experience) to a greater extent when the source of the expectation is external (vs. internal), whereas satisfaction in response to a shorter-than-expected wait remains the same. That is, the asymmetric effect of positive versus negative disconfirmation on satisfaction become less asymmetric. Formally,

H3. The source of the wait time expectation moderates the effect of the direction of the disconfirmation on satisfaction with the (a) wait time and (b) overall experience, such that an external (vs. internal) source reduces the asymmetric effect proposed in H1.

Large negative disconfirmations

Predicting that a negative disconfirmation elicits a mild decrease in satisfaction suggests that the negative disconfirmation falls within the zone of indifference (ZOI). The ZOI corresponds to a range of disconfirmations deemed acceptable and, as such, do not elicit strong emotional or attitudinal responses (Harmeling et al. 2015; Oliver 2010; Wirtz and Mattila 2001; Woodruff, Cadotte, and Jenkins 1983). According to expectancy disconfirmation theory (Oliver 2010), the disconfirmation must be small enough to fall within the ZOI; otherwise, it elicits a stronger response. Consequently, we predict that very large negative disconfirmations (e.g., corresponding to major delays) do not fall within the ZOI. We expect the relationship between the disconfirmation of the wait time expectation and satisfaction (with the wait time and overall experience) to be nonlinear. Precisely, we expect this relationship to be strong (and positive) for positive disconfirmations and weak (and negative) for negative disconfirmations, in line with our prior theorizing (H₁) that negative disconfirmations decrease satisfaction to a smaller extent than positive disconfirmations increase satisfaction. However, we expect a weak relationship for negative disconfirmations only if they are small enough. Past a certain threshold, negative disconfirmations should fall outside the ZOI. We expect the relationship between disconfirmation and satisfaction to be stronger outside than inside the ZOI, such that satisfaction deteriorates at an accelerating rate past a certain threshold. Formally, we hypothesize:

H4. Past a certain disconfirmation threshold, a negative disconfirmation of the wait time expectation deteriorates satisfaction with the (a) wait time and (b) overall experience at an accelerating rate.

Overview of studies

We offer preliminary evidence of the asymmetric effect of negative versus positive disconfirmation on satisfaction in a

Pilot Study (Web Appendix B), a scenario-based experiment in which we examine the degree of satisfaction generated by a positive disconfirmation and the degree of dissatisfaction generated by a negative disconfirmation. It reveals that a negative disconfirmation generates less dissatisfaction than a positive disconfirmation generates satisfaction. This finding provides preliminary evidence for an asymmetric effect, but it still allows for the possibility that a positive disconfirmation may generate just as much satisfaction as a wait that is as long as expected (i.e., no disconfirmation), whereas a negative disconfirmation may considerably lower satisfaction compared with a wait that is as long as expected, which would conflict with H₁. Therefore, in Studies 1–3, we conduct stricter tests to determine the extent to which positive (negative) disconfirmation increases (decreases) satisfaction compared with no disconfirmation (see Table 1).

In detail, Study 1 is a behavioral experiment in which participants wait in an online chat to talk with a customer service agent. This study reproduces actual online customer service encounters, which ensures the ecological validity of the findings. We find that positive disconfirmation improves satisfaction (cf. no disconfirmation), whereas negative disconfirmation barely decreases satisfaction (H₁). Then in Study 2, a scenario-based experiment, we show that the effect of positive versus negative disconfirmation on satisfaction is mediated by perceived time value (H₂) and moderated by the source of the expectation (H₃). Finally, with a behavioral study, we adopt a continuous measure of the disconfirmation of the wait time expectation to model customer satisfaction as a function of a wide range of possible disconfirmation sizes and test H₄. According to Study 3, when a customer waits longer than expected, beyond a certain point, satisfaction drops at an accelerating pace.

Study 1: waiting shorter/longer than expected versus as long as expected

Study design and procedure

In this online behavioral experiment, the disconfirmation type (positive, negative, or no disconfirmation) is manipulated between-subjects. Participants had to seek customer service from a popular U.S. fast-food chain through an online chat. As part of the cover story, we instructed the participants to ask the customer service agent a question (i.e., price of a kids' meal), then report the response. Unbeknownst to the participants, the chat agent was a chatbot designed for this experiment (using a publicly available chatbot platform builder, Snatchbot). When they landed on the chat webpage, participants saw the following message: "All of our agents are currently busy. Please stay in the chat and wait for an agent to be available" (see panel A in Appendix). They waited a certain period of time before the "customer service agent" became available.

To determine how long we should manipulate the wait to last in each condition, we conducted a pretest, involving 100 participants recruited from MTurk. We asked these partici-

Table 1
Overview of studies.

Study	Hypotheses Tested	Study Type	Manipulation of Wait Time	Satisfaction Measure*	Estimated Effects	
					Internal source of expectation	External source of expectation
Study 1	H ₁ (supported)	Behavioral experiment	PD vs. ND vs. control	Satisfaction with the wait time Satisfaction with the overall experience	PD (vs. control): + 23.40 pts ND (vs. control): -9.96 pts PD (vs. control): +13.72 pts ND (vs. control): -8.94 pts	
Study 2	H ₂ and H ₃ (both supported)	Scenario-based experiment	PD vs. ND vs. control	Satisfaction with the wait time Satisfaction with the overall experience	PD (vs. control): +23.43 pts ND (vs. control): -12.04 pts PD (vs. control): +11.89 pts ND (vs. control): -12.50 pts	PD (vs. control): +11.78 pts ND (vs. control): -28.29 pts PD (vs. control): +6.36 pts ND (vs. control): -23.55 pts
Study 3	H ₄ (supported)	Behavioral study	15 different wait times	Satisfaction with the wait time Satisfaction with the overall experience	100% PD (vs. control): + 34.20 pts in satisfaction 100% ND (vs. control): -17.34 pts in satisfaction 100% PD (vs. control): + 22.61 pts in satisfaction 100% ND (vs. control): -13.51 pts in satisfaction	

Notes: ND = negative disconfirmation of the wait time expectation (i.e., a longer-than-expected wait); PD = positive disconfirmation (i.e., a shorter-than-expected wait); Control = no disconfirmation (i.e., a wait that is as long as expected); pts = points.

* Satisfaction with the wait time and satisfaction with the overall experience were measured on 101-point scales.

pants to imagine contacting the fast-food chain through its online chat to gain information. They saw the same online chat webpage, with the same wait message, and had to indicate how long they expected to wait (in minutes and seconds) for an agent to be available. After discarding 10 aberrant values,² the average expected wait duration indicated by the resulting sample (90 participants; 53.3% men, 45.6% women, 1.1% other; $M_{\text{age}} = 33.36$ years, $SD = 11.66$) was 237 s ($SD = 145$).

We used these values to define the wait times in the main study. The average expected wait duration of 237 s represented the no disconfirmation control condition; we defined the wait duration in the positive disconfirmation condition to be one standard deviation below this level and that in the negative disconfirmation condition to be one standard deviation above this level. Thus, participants waited 92 s in the positive disconfirmation condition, 237 s in the no disconfirmation control condition, and 382 s in the negative disconfirmation condition. To make the passage of time salient, a clock appeared next to the online chat window.

After waiting, participants were greeted by a fictitious agent (see panel B in Appendix) and could ask the price of the

kids' meal. Back to the study, they reported this information and then completed a series of measures, which included the dependent variables, namely, satisfaction with the wait time (adapted from Kumar 2005) and satisfaction with the overall experience (adapted from Oliver and Bearden 1983; see also Wirtz and lee 2003). For both satisfaction measures, participants used 101-point scales (0 = "Extremely dissatisfied," 100 = "Extremely satisfied"). Note that we measured satisfaction on 101-point scales to obtain fine-tuned measurements, as in previous consumer studies (e.g., Kim 2013).

We recruited 304 participants from MTurk for this study. However, 35 participants did not report the correct price of the kids' meal, which means they did not interact with the customer service agent as intended. In addition, 81 participants (including 3 who did not report the correct price) stated that they performed another activity (e.g., another study on MTurk) while waiting, which means they did not actually experience the wait. After excluding all these respondents, we retained a sample of 191 participants (57.6% men, 42.4% women; $M_{\text{age}} = 34.87$ years, $SD = 10.63$).

Manipulation check

We checked that our manipulation of the wait time disconfirmation worked as intended by asking participants to indicate whether the duration of the wait was shorter, longer, or as long as they expected. A chi-square test indicated that the

² To detect aberrant values, we used the median absolute deviation technique with a conservative criterion of three standard deviations (Leys et al. 2013). It indicated a rejection criterion of 752.02 seconds. The 10 excluded responses all were higher than 752.02 seconds.

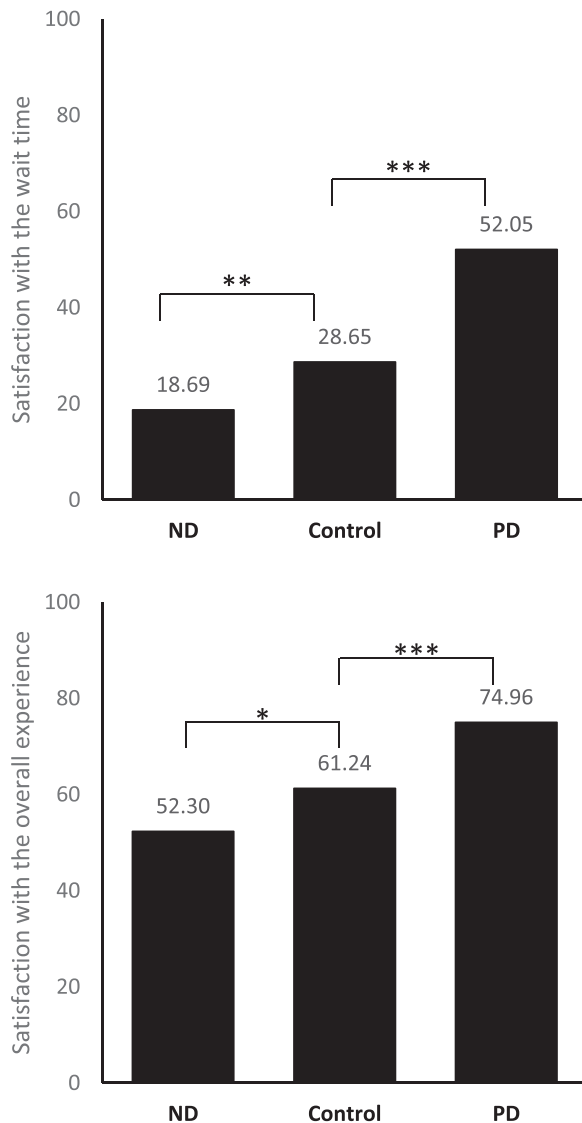


Fig. 2. Satisfaction with the (a) wait time and (b) overall experience, as a function of the disconfirmation of the wait time expectation, Study 1.

Notes: ND = negative disconfirmation of the wait time expectation (i.e., a longer-than-expected wait); PD = positive disconfirmation (i.e., a shorter-than-expected wait); Control = no disconfirmation (i.e., a wait that is as long as expected).

* $p < .1$; ** $p < .05$; *** $p < .005$.

manipulation worked as intended ($\chi^2(4) = 16.25, p = .003$), in that significant associations arose between the condition to which participants were assigned and their perceptions of the wait duration.

Results

According to an analysis of variance (ANOVA), disconfirmation type has a significant effect on satisfaction with wait time ($F(2, 188) = 29.07, p < .001, \eta_p^2 = 0.24$). Planned contrasts indicate that participants in the positive disconfirmation condition are significantly more satisfied with the wait time than participants in the no disconfirmation control condition

($b = 23.40, t(188) = 5.51, p < .001, \eta_p^2 = 0.14$; Fig. 2a). Participants in the negative disconfirmation condition are significantly less satisfied than those in the control condition ($b = -9.96, t(188) = -2.04, p = .043, \eta_p^2 = 0.02$). The absolute value of the effect size estimate for negative disconfirmation is smaller than the effect size estimate for positive disconfirmation ($|-9.96| < 23.40$). To test whether this difference is statistically significant, we performed a z-test, as recommended by Paternoster et al. (1998). The magnitude (absolute value) of the effect of negative disconfirmation on satisfaction with wait time is significantly smaller than the magnitude of the effect of positive disconfirmation ($z = -2.08, p < .05$). Thus, compared with no disconfirmation, negative disconfirmation decreases satisfaction with wait time to a significantly smaller extent than positive disconfirmation increases it, in support of H_{1a} .

The same analysis, applied to satisfaction with the overall experience, reveals another significant effect of disconfirmation type ($F(2, 188) = 10.76, p < .001, \eta_p^2 = 0.10$), in line with H_{1b} . Participants in the positive disconfirmation condition are significantly more satisfied with the overall experience than those in the control condition ($b = 13.72, t(188) = 3.00, p = .003, \eta_p^2 = 0.05$; Fig. 2b). Participants in the negative disconfirmation condition are only marginally significantly less satisfied ($b = -8.94, t(188) = -1.70, p = .091, \eta_p^2 = 0.02$).

Discussion

These results show that positive disconfirmation enhances satisfaction with wait time to a significantly greater extent than negative disconfirmation deteriorates satisfaction with wait time. Moreover, compared with no disconfirmation, positive disconfirmation significantly increases satisfaction with the overall experience, whereas negative disconfirmation only marginally significantly decreases satisfaction with the overall experience. These results are in line with the asymmetric effect of positive versus negative disconfirmation we predicted in H_1 .

Study 2: perceived time value and source of wait time expectation

We pursue two aims with Study 2. First, we seek to identify the mechanism underlying the effect documented in Study 1. In our conceptual framework, we propose that customers discount the value of time that a longer-than-expected wait makes them lose but not the value of time that a shorter-than-expected wait helps them save. We thus test whether the perceived value of time mediates the effect of the disconfirmation direction on satisfaction (H_2). Second, we test the potential moderating role of the expectation source (H_3). Some retailers provide a wait time estimate, which informs customers' expectations. Without such an estimate, customers base their wait time expectations on their own past experiences (internal source), which results in a positive disconfirmation having a stronger effect on satisfaction than a negative one, as Study

1 revealed. But if the retailer provides a wait time estimate, customers base their wait time expectations on this estimate (external source), and we predict it modifies the asymmetric effect of positive versus negative disconfirmation.

Study design and procedure

We recruited 301 participants from Prolific (49.2% men, 48.5% women, 2.3% other; $M_{\text{age}} = 36.5$ years, $SD = 12.88$) to participate in Study 2, a scenario-based experiment with a 3 (disconfirmation type: negative vs. positive vs. no disconfirmation) \times 2 (expectation source: internal vs. external) between-subjects design. The scenario described a shopping trip to a grocery store, such that participants had to imagine waiting in line to check out (Web Appendix C). The context differs from those in the Pilot Study and Study 1 (coffee shop visit, online customer service) to provide evidence that our results hold across different settings. We manipulated the expectation source by indicating that the grocery store displayed a wait time estimate in the external source condition (no mention of wait time estimates appeared in the internal source condition). To manipulate disconfirmation type, the scenario indicated participants waited 5 min shorter than they expected (positive disconfirmation condition), 5 min longer than they expected (negative disconfirmation condition), or just as long as they expected (no disconfirmation control condition). By specifying an exact, objective disconfirmation size (5 min), we ensure a fair comparison of positive and negative disconfirmation.

After reading the scenario, the participants completed a questionnaire with measures of satisfaction, perceived time value, and the realism of the scenario. As in Study 1, we measured customer satisfaction with the wait time with items adapted from Kumar (2005). However, for satisfaction with the overall experience, rather than a single-item measure as in Study 1, we use a multi-item measure herein, to verify that our findings hold across measurement types. Specifically, we employ three items, averaged to form a satisfaction score (Cronbach's $\alpha = 0.88$), adapted from Mattila and Wirtz (2001): "How satisfied or dissatisfied are you with today's visit at the grocery store?" (1 = "Very dissatisfied," 100 = "Very satisfied"), "I truly enjoyed my visit at the grocery store" (1 = "Strongly disagree," 100 = "Strongly agree"), and "The choice to come to the grocery store was a good one" (1 = "Strongly disagree," 100 = "Strongly agree").

In line with the literature on time value (e.g., Marmorstein, Grewal, and Fische 1992; Spiller 2019) according to which "the value of time can be measured with the concept of opportunity costs" (Schaeffer 2001, para. 16) i.e., the value of time is derived from the alternative uses of time that individuals could have made, we operationalized the perceived time value with a measure adapted from two scales originally designed to measure the opportunity cost of wait times (Demoulin and Djelassi 2013; Houston, Bettencourt, and Wenger 1998). Participants indicated how the wait would impact their schedule on four 7-point scales (1 = "Tighter schedule," 7 = "Looser schedule," 1 = "Would make me

arrive late for an appointment/activity," 7 = "Would make me arrive early for an appointment/activity," 1 = "Would make me postpone the activities I had planned to do next," 7 = "Would make me advance the activities I had planned to do next," and 1 = "Would take up time for doing something else," 7 = "Would free up time for doing something else"); the resulting Cronbach's α of 0.77 indicates good internal consistency among items.

Perceived realism of scenario

We assessed the realism of the scenario with the same items as in the Pilot Study B reported in Web Appendix B. The average realism score ($M = 6.26$, $SD = 1.03$) significantly differed from the midpoint of the scale ($t(300) = 38.021$, $p < .001$). Thus, the grocery shopping scenario was realistic.

Results

Satisfaction with wait time. A two-way ANOVA reveals a significant main effect of disconfirmation type ($F(2, 295) = 87.65$, $p < .001$, $\eta_p^2 = 0.37$), a marginally significant main effect of expectation source ($F(1, 295) = 3.59$, $p = .059$, $\eta_p^2 = 0.01$), and a significant interaction between disconfirmation type and expectation source ($F(2, 295) = 4.31$, $p = .014$, $\eta_p^2 = 0.03$) on satisfaction with wait time, in line with H_{3a} . Follow-up Bonferroni-adjusted contrasts show that when the source of expectation is internal, positive disconfirmation significantly increases satisfaction by 23.43 points compared with the control condition ($M_{\text{Positive}} = 80.41$, $SD = 19.67$; $M_{\text{Control}} = 56.98$, $SD = 22.75$; $p < .001$), whereas negative disconfirmation significantly decreases it, though only by 12.04 points ($M_{\text{Negative}} = 44.94$, $SD = 19.06$; $p = .011$). The magnitude of the effect of positive disconfirmation is significantly greater than the magnitude (absolute value) of the effect of negative disconfirmation ($z = 1.99$, $p < .05$). These results are similar to those revealed in Study 1.

The pattern of results reverses when the expectation source is external. Negative disconfirmation significantly decreases satisfaction by 28.29 points ($M_{\text{Negative}} = 42.39$, $SD = 20.00$; $M_{\text{Control}} = 70.69$, $SD = 21.43$; $p < .001$), whereas positive disconfirmation significantly increases satisfaction, but only by 11.78 points ($M_{\text{Positive}} = 82.47$, $SD = 17.68$; $p = .010$). When the expectation source is external, the magnitude (absolute value) of the effect of negative disconfirmation is significantly greater than that of the effect of positive disconfirmation ($z = -2.92$, $p < .05$). Fig. 3 provides a visual representation of the interaction.

Satisfaction with the overall experience. We replicate this analysis with satisfaction with the overall experience as the dependent variable and uncover a significant main effect of disconfirmation type ($F(2, 295) = 56.10$, $p < .001$, $\eta_p^2 = 0.28$), a nonsignificant main effect of expectation source ($F(1, 295) = 1.65$, $p = .200$, $\eta_p^2 = 0.01$), and

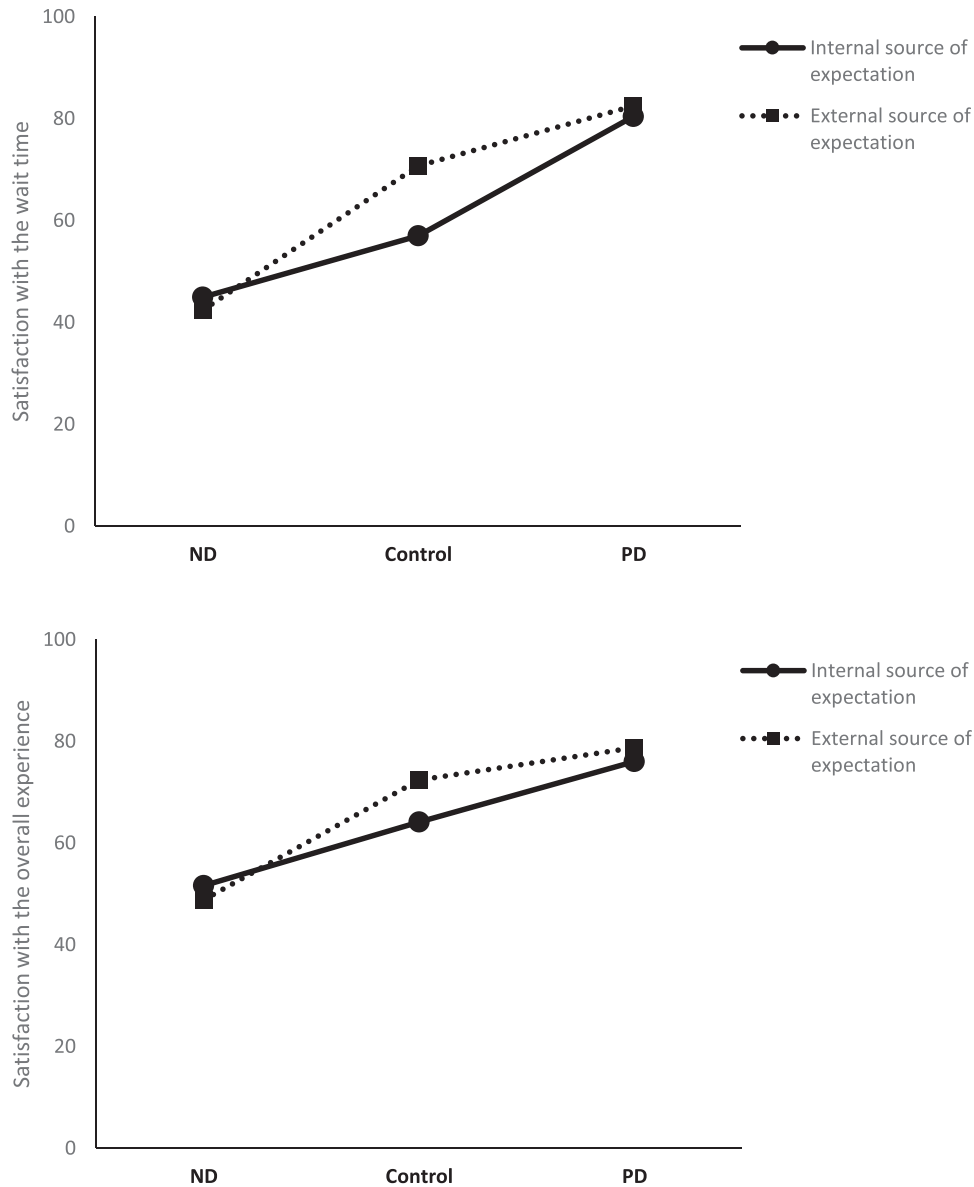


Fig. 3. Interaction between disconfirmation type and expectation source on satisfaction with the (a) wait time and (b) overall experience, Study 2.

Notes: ND = negative disconfirmation of the wait time expectation (i.e., a longer-than-expected wait); PD = positive disconfirmation (i.e., a shorter-than-expected wait); Control = no disconfirmation (i.e., a wait that is as long as expected).

an interaction that approaches marginal significance³ ($F(2, 295) = 2.24, p = .108, \eta_p^2 = 0.02$).

Perceived time value. A two-way ANOVA⁴ reveals a significant main effect of disconfirmation type ($F(2, 295) = 74.55, p < .001, \eta_p^2 = 0.34$), a nonsignificant main effect of expectation source ($F(1, 295) = 0.00, p = .967, \eta_p^2 = 0.00$), and a significant interaction effect between dis-

confirmation type and expectation source ($F(2, 295) = 4.88, p = .008, \eta_p^2 = 0.03$) on perceived time value. When the source of expectation is internal, compared with the control condition ($M_{\text{Control}} = 3.99, SD = 0.94$), participants in the positive disconfirmation condition perceive significantly enhanced opportunities for how to spend their time ($M_{\text{Positive}} = 5.30, SD = 0.81; p < .001$), but negative disconfirmation does not significantly diminish such opportunities ($M_{\text{Negative}} = 3.89, SD = 1.10; p = 1.000$). Thus, participants undervalue what they could have done during the time lost in the longer-than-expected wait, in line with our prediction that the value of time lost in a negative disconfirmation gets discounted. However, when the source of expectation is external, compared with the control condition ($M_{\text{Control}} = 4.42, SD = 1.05$), participants in the positive disconfirmation con-

³ The interaction effect of disconfirmation type and expectation source on satisfaction with the overall experience is not significant at the 95% confidence level in this study, but in three similar experiments (Web Appendix D), the interaction emerges as significant.

⁴ Though we have not hypothesized an interaction effect between disconfirmation type and expectation source on perceived time value, we conduct a two-way ANOVA to account for the 3×2 factorial design of the study.

dition perceive significantly enhanced opportunities for spending their time ($M_{\text{Positive}} = 5.30$, $SD = 0.96$; $p < .001$), whereas in the negative disconfirmation condition, they perceive significantly diminished opportunities ($M_{\text{Negative}} = 3.47$, $SD = 0.87$; $p < .001$).

Mediation analysis. We test for mediation using the PROCESS macro (Hayes 2013). We have proposed that the expectation source moderates the effect of disconfirmation direction on satisfaction, not that it would moderate the effect of disconfirmation direction on the mediator. But the results of the two-way ANOVA on perceived time value reveal this latter moderating effect. To account for both moderating effects—of expectation source on satisfaction, as hypothesized, and on perceived time value, as revealed by the two-way ANOVA—the appropriate PROCESS model is Model 8.

The bootstrap analysis (5000 iterations) indicates that the indirect effect of positive disconfirmation (vs. no disconfirmation) on satisfaction with wait time through perceived time value is significant for both sources of expectation: internal ($b = 4.97$, $SE = 1.36$, 95% CI [2.64, 7.97]) and external ($b = 4.95$, $SE = 1.37$, 95% CI [2.55, 7.87]). The indirect effect of negative disconfirmation (vs. no disconfirmation) on satisfaction with wait time through perceived time value also is significant for both sources of expectation: internal ($b = -2.76$, $SE = 1.01$, 95% CI [-5.03, -1.12]) and external ($b = -5.08$, $SE = 1.31$, 95% CI [-7.80, -2.73]). These results support H_{2a} . Moreover, the index of moderated mediation is nonsignificant for the effect of positive disconfirmation ($b = -0.03$, $SE = 0.83$, 95% CI [-1.73, 1.65]) but significant for the effect of negative disconfirmation ($b = -2.32$, $SE = 1.00$, 95% CI [-4.48, -0.58]).

We replicate this mediation analysis for satisfaction with the overall experience and obtain similar results. The indirect effect of positive disconfirmation through perceived time value is significant for both sources of expectation: internal ($b = 4.13$, $SE = 1.29$, 95% CI [1.95, 6.97]) and external ($b = 4.10$, $SE = 1.26$, 95% CI [1.93, 6.83]). Similarly, the indirect effect of negative disconfirmation is significant for both sources of expectation: internal $b = -2.29$, $SE = 0.88$, 95% CI [-4.26, -0.86]) and external ($b = -4.22$, $SE = 1.25$, 95% CI [-6.85, -2.02]). These results support H_{2b} . The index of moderated mediation is nonsignificant for the effect of positive disconfirmation ($b = -0.02$, $SE = 0.70$, 95% CI [-1.49, 1.36]) but significant for the effect of negative disconfirmation ($b = -1.92$, $SE = 0.90$, 95% CI [-3.89, -0.46]).

Additional analysis. In the conceptual framework, we have based our arguments for H_3 on the assumption that a longer-than-expected wait gets aggravated by the firm's violation of an explicit promise. To verify this assumption, we included a breach of promise measure in the questionnaire, using three items (Cronbach's $\alpha = 0.89$) adapted from Su (2014): "The grocery store broke its promise," "The grocery store failed to meet its commitment," and "The grocery store did an excellent job of fulfilling its promise" (reversed), each measured on a 7-point scale (1 = "Strongly disagree," 7 = "Strongly agree"). Participants in the negative disconfirmation condition perceived a significantly greater breach of promise when the

expectation source was external ($M_{\text{External}} = 4.25$, $SD = 1.24$) than when it was internal ($M_{\text{Internal}} = 3.05$, $SD = 1.13$; $p < .001$), in line with our theorizing that a wait longer than the estimate provided by a retailer is perceived as a breach of promise.

Discussion

In support of H_2 , we find that the effect of disconfirmation direction on satisfaction is mediated by the perceived value of time. A negative disconfirmation is not perceived to diminish opportunities for how time can be spent, but a positive disconfirmation is perceived to enhance such opportunities. Thus, a negative disconfirmation decreases satisfaction to a smaller extent than a positive disconfirmation increases satisfaction. Moreover, our main Study 2 and its three replications (Web Appendix D) support H_3 : The source of expectation moderates the effect of disconfirmation direction on satisfaction. When it is internal, positive disconfirmation increases satisfaction to a greater extent than negative disconfirmation decreases it, as in Study 1. However, when the source of expectation is external, this is no longer the case; the asymmetry even reverses, such that negative disconfirmation decreases satisfaction to a greater extent than positive disconfirmation increases satisfaction.

It should be noted that additional analyses reveal that the interaction effect is mostly due to the fact that satisfaction in the no disconfirmation control condition differs across expectation source conditions (internal vs. external), as depicted in Fig. 3. Participants in the no disconfirmation condition are significantly more satisfied with the wait time when their expectations come from an external source ($M_{\text{external}} = 70.69$, $SD = 21.43$) than an internal one ($M_{\text{internal}} = 56.98$, $SD = 22.75$; $p < .001$). However, satisfaction with the wait time does not differ significantly across expectation source conditions for participants in the positive ($p = .607$) or negative ($p = .533$) disconfirmation conditions. Thus, displaying a wait time estimate does not significantly affect the satisfaction level of customers who wait longer or shorter than expected, but it increases satisfaction among those who wait as long as expected, as promised by the retailer.

Finally, Study 2 reveals that the expectation source moderates the effect of disconfirmation direction on perceived time value, though in our conceptual framework, we only predicted that it would moderate the effect of disconfirmation direction on satisfaction. This finding suggests that when the source of the wait time expectation is external, waiting longer than expected is perceived as a breach of the firm's promise and also may make customers less likely to discount the value of the time they have lost.

Study 3: continuous measure of disconfirmation of the wait time expectation

Study 3 aims to test whether, beyond a certain disconfirmation threshold, negative disconfirmation deteriorates satisfac-

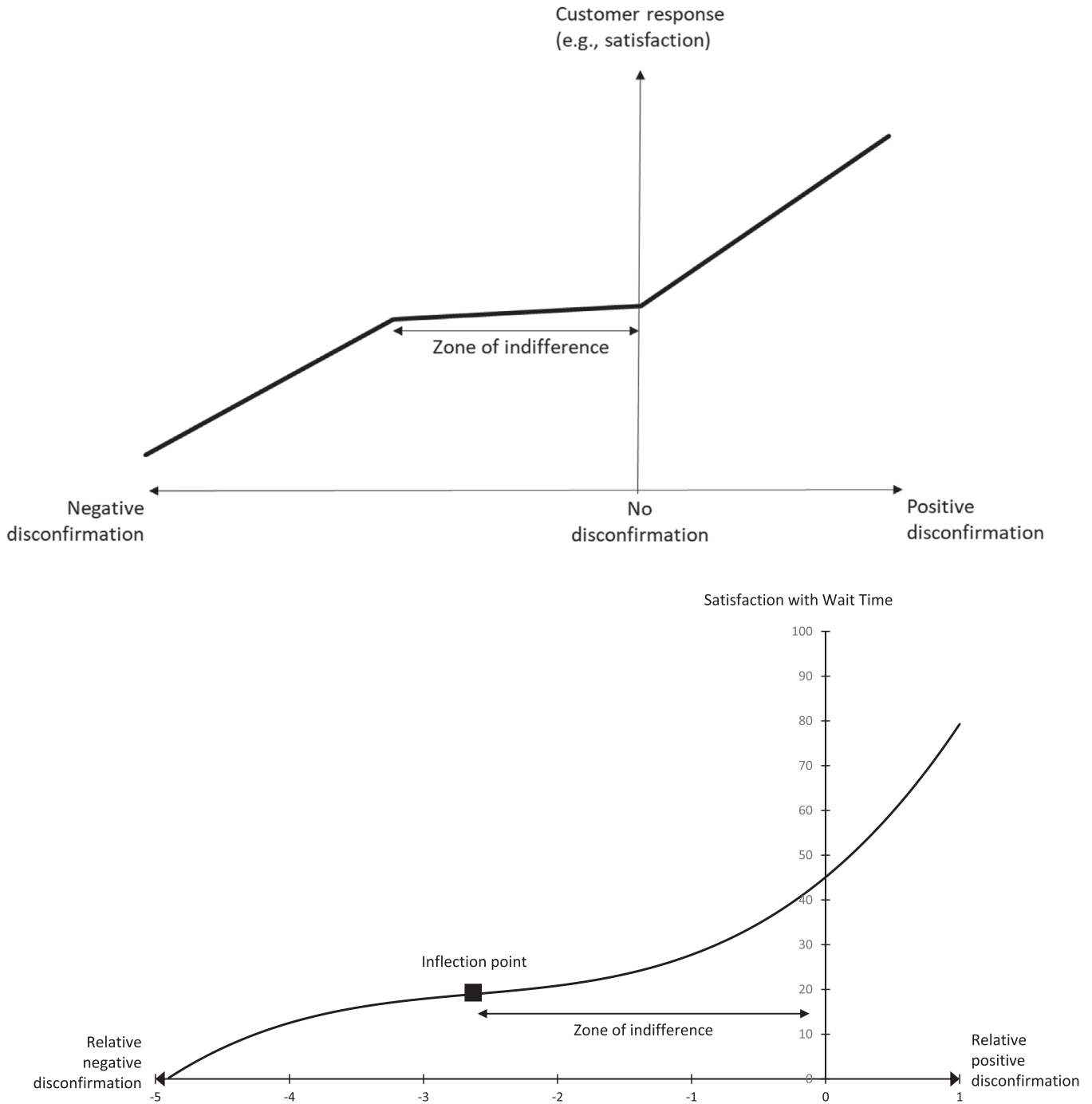


Fig. 4. Satisfaction as a function of the size of positive and negative disconfirmations of the wait time expectation, (a) as predicted by expectancy disconfirmation theory and (b) as estimated in Study 3.

tion at an accelerating rate (H_4). The function that we expect to represent the relationship between disconfirmation and satisfaction is sketched in Fig. 4a. The shape is characterized by a steep effect below a lower threshold (corresponding to a strong decrease in satisfaction generated by large negative disconfirmation), a flat effect between the two thresholds (cor-

responding to ZOI), and another steep effect above the upper threshold (corresponding to a strong increase in satisfaction generated by positive disconfirmation). Given such characteristics, the relationship between disconfirmation and satisfaction needs to be tested using a cubic function (Finn 2012). That is, we test if the relationship between disconfirmation

of the wait time expectation and satisfaction follows a cubic function when a large range of disconfirmation sizes is included.

Study design and procedure

Study 3 was adapted from Study 1 but differs in two important ways. First, we determined expected wait times with a pretest in Study 1, but in Study 3, we ask each participant directly how long they expect to wait, to estimate the size of the disconfirmation precisely for each participant. Second, the wait time manipulation in Study 1 consisted of three wait times; here, we assign each participant to one of 15 possible wait times, to obtain a wider range of disconfirmation sizes.

To start, participants were asked to imagine they had contacted customer service of a popular U.S. fast-food chain through an online chat and encountered the following message on the landing page of this online chat: "All of our agents are currently busy. Please stay in the chat and wait for an agent to be available." Then, we asked participants to indicate how long (minutes and seconds) they expected to wait after reading this message, which establishes their *expected* wait time. Next, participants were told to collect the price of the cheeseburger offered by the fast-food chain, and they again saw the same wait message when landing on the online chat (see panel A in Appendix). We randomly assigned participants to wait 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330, 360, 390, 420, or 450 s. The software platform registered the exact time participants waited at the centisecond level; it represents the *actual* wait time participants experienced. Unlike Study 1, no clock appeared next to the chat window, which helps us provide evidence that the findings hold regardless of whether the passage of time is made salient (as in Study 1, by the displayed clock) or not. Following their imposed wait time, participants encountered a fictitious agent (see panel B in Appendix) and could ask the price of the cheeseburger. They reported this information and indicated, on the same 101-point scales from Study 1, how satisfied they were with the wait time and with the overall experience.

We recruited 750 participants from MTurk, of whom 44 did not report the correct price of the cheeseburger, and 257 (including 8 who did not report the correct price) stated that they performed another activity while waiting. After excluding these participants from the analysis, the sample size comprised 457 participants.

Descriptive statistics and data preparation

On average, participants expected to wait 236.09 s (3 min and 56.09 s). However, the expected wait times varied widely among participants, from 5 to 1805 s, with a standard deviation equal to 226.85 s. For each participant i , we thus calculate the disconfirmation size as follows:

$$\text{Disconfirmation Size}_i = \text{Expected Wait Time}_i - \text{Actual Wait Time}_i.$$

Accordingly, the disconfirmation sizes range from -420 s to 1536 s. Considering the very wide range of expected wait times, we calculated the relative disconfirmation size as:

$$\text{Relative Disconfirmation Size}_i = \text{Disconfirmation Size}_i / \text{Expected Wait Time}_i,$$

such that a relative disconfirmation of 1 indicates that the wait is 100% shorter than expected (i.e., the wait is nonexistent), whereas a relative disconfirmation of -1 indicates that the wait is 100% longer than expected (i.e., the wait lasts twice as long as expected). Prior research shows that customers are sensitive to the relative, rather than absolute, amount of time they save (Leclerc, Schmitt, and Dubé 1995), so waiting 1 min less than expected should be more impactful if the person expected to wait 2 min rather than 30 min. To account for the expected wait time, we use the *relative* disconfirmation size in our analyses.

We checked for outliers, as recommended by Tukey (1977).⁵ Eighteen extreme outliers were excluded (Carter, Schwertman, and Kiser 2009). The resulting sample includes 439 participants (44.6% men, 55.1% women, 0.2% other; $M_{\text{age}} = 36.50$ years, $SD = 10.60$).

Results

To determine if the relationship between relative disconfirmation and satisfaction with wait time follows a cubic function, we estimated an OLS regression model that predicts satisfaction for participant i as follows:

$$\text{SatisfactionWaitTime}_i = b_0 + b_1 \text{RelativeDisconfirmation}_i + b_2 \text{RelativeDisconfirmation}_i^2 + b_3 \text{RelativeDisconfirmation}_i^3 + e_i.$$

As Table 2 indicates, the parameter estimates b_1 , b_2 , and b_3 are all significant (all $p < .01$), so the relationship between relative disconfirmation and satisfaction with the wait time follows a cubic function. We conduct a partial F-test to check that the cubic function, compared with a linear function, improves the fit of the model. The F-test is significant ($F(2, 435) = 15.48$, $p < .001$), indicating this is the case.

Using Desmos software, we calculate the inflection point of the function. The inflection point occurs at -2.62 (see Fig. 4b). Above this inflection point (i.e., for all relative disconfirmations greater than -2.62), the second derivative of the cubic function is positive, indicating that a one-unit increase in relative disconfirmation increases satisfaction to a larger extent than a one-unit decrease in relative disconfirmation decreases satisfaction. For example, waiting 100% shorter than expected (i.e., there is no wait) increases satisfaction with the wait time by 34.20 points (compared with waiting as long as expected); waiting 100% longer than expected (i.e., wait

⁵ While we used the median absolute deviation technique to detect outliers for Study 3's pretest, this technique was not applicable to relative disconfirmation sizes in Study 3 because the rejection criterion would have been all values below and above 0.

Table 2
Parameter estimates for the cubic function of relative disconfirmation sizes.

Parameter	DV: Satisfaction with the wait time			DV: Satisfaction with the overall experience		
	Estimate	<i>t</i>	<i>p</i>	Estimate	<i>t</i>	<i>p</i>
b ₀	45.09	25.81	.000	66.81	40.34	.000
b ₁	24.70	11.07	.000	17.42	8.24	.000
b ₂	8.43	4.06	.000	4.55	2.31	.021
b ₃	1.07	2.69	.007	0.64	1.68	.093

Notes: DV = dependent variable.

time twice as long as expected) decreases it by 17.34 points, in line with the asymmetric effect proposed in H₁. Below the inflection point of -2.62 (i.e., wait time is more than 262% longer than expected), the second derivative of the cubic function is negative, so the marginal negative effect of negative disconfirmation on satisfaction is increasing. Every additional unit of relative negative disconfirmation decreases satisfaction to a greater extent than the preceding unit. In support of H_{4a}, we thus show that past a certain threshold, negative disconfirmations stop leaving customers indifferent, and satisfaction deteriorates at an accelerating rate, indicating that they fall outside the ZOI.

Next, we run the same analysis on satisfaction with the overall experience. The results are similar to those obtained for satisfaction with wait time and in line with H_{4b} (Table 2). Again, a partial F-test indicates that the cubic function, compared with a linear function, improves the fit of the model ($F(2, 435) = 4.07, p = .018$). The inflection point is at -2.38 , that is, when the wait time is more than 238% longer than expected.

Discussion

The results of Study 3 reveal that a cubic function better fits the relationship of a relative disconfirmation of the wait time expectation with satisfaction than a linear function does. For small values of the negative disconfirmation, positive disconfirmation increases satisfaction (with wait time and overall experience) to a greater extent than an equivalent negative disconfirmation decreases it, in line with our prior findings. However, the cubic function is characterized by an inflection signaling an acceleration in the extent to which satisfaction decreases for larger negative disconfirmations (i.e., when waiting *much* longer than expected). These results support H₄ and are in accordance with expectancy disconfirmation theory and the ZOI principle in particular: Customers are relatively indifferent to small negative disconfirmations, but this indifference fades for larger negative disconfirmations.

Conclusion

Across three studies, we reveal an asymmetric effect of negative versus positive disconfirmation on customer satisfaction. Waiting longer than expected decreases satisfaction to a smaller extent than waiting shorter than expected increases satisfaction. To summarize our findings, we conduct a single-paper meta-analysis (Web Appendix E), which reveals that

in aggregate, the increase in satisfaction generated by positive disconfirmation is 1.66 times larger than the decrease in satisfaction generated by negative disconfirmation. We also provide consistent evidence for this asymmetric effect across settings (scenario-based situation in Study 2, real waits in Studies 1 and 3) and contexts (grocery shopping in Study 2, online customer service chats in Studies 1 and 3).

We show that the asymmetric effect of positive versus negative disconfirmation on satisfaction can be explained by the fact that customers discount the value of the time they lose in a longer-than-expected wait but not the value of the time they save in a shorter-than-expected wait. In principle, a shorter-than-expected wait frees up time, whereas a longer-than-expected wait takes up time, but the flexibility of time value enables customers to discount the value of the time lost in a longer-than-expected wait. They think they could not have done much during the few additional minutes spent waiting, so they do not suffer as much from the negative disconfirmation. But when they wait for less time than expected, they enjoy the saved time to the fullest.

With regard to the boundary conditions, we uncover in Study 2 that when the source of expectation is external (e.g., wait time estimate provided by the retailer), the asymmetric effect of negative versus positive disconfirmation reverses: Negative disconfirmation decreases satisfaction to a greater extent than positive disconfirmation increases satisfaction. In addition, in Study 3, we show that past a certain threshold, a longer-than-expected wait is no longer in the ZOI. If customers wait at least 238% longer than expected, their satisfaction with the overall experience drops at an accelerating rate. In sum, these boundary conditions add nuance to our findings: Some waits that are longer than expected—up to a certain point and when the source of expectation is internal—have smaller impacts on satisfaction than shorter-than-expected waits do.

Theoretical contributions

Our research contributes to three streams of research. First, in an extension of wait time literature that tends to focus only on durations, we address the relevance of studying wait times that do not meet customers' expectations (for better or worse). That is, our findings go beyond the well-established insight that shorter waits improve customer experience: They reveal that the beneficial effect of waiting shorter than expected surpasses the detrimental effect of waiting longer than expected. Prior research on wait time has largely focused on delays (e.g., Taylor 1994; Yang, Mattila, and Hou 2013) but

neglected a brighter wait outcome: when the wait is shorter than expected. Our research fills this gap, revealing the positive effect of a shorter-than-expected wait on customer satisfaction. Importantly, while prior research has documented the detrimental consequences of waits (e.g., Grewal et al. 2003; Houston, Bettencourt, and Wenger 1998; van Riel et al. 2012; Voorhees et al. 2009), our research provides nuance, showing that customers are little affected by longer-than-expected waits relative to shorter-than-expected ones, and detrimental consequences arise only for waits that are *much* longer than expected.

Second, our research contributes to the literature on expectancy disconfirmation by investigating the relative impacts of positive and negative disconfirmations of wait time expectations. The relative impacts of positive and negative disconfirmations (i.e., whether customers respond equally strongly to both types of disconfirmations) have been investigated previously for price expectations (Putler 1992), product performance expectations (Anderson and Sullivan 1993), and relational expectations (Harmeling et al. 2015). Our research adds to this stream of research by studying disconfirmations of wait time expectations. Furthermore, the literature on expectancy disconfirmation has proposed a ZOI in which the positive or negative disconfirmation of an expectation has little or no impact on customers. Importantly, the ZOI has been conceived as centered at a no disconfirmation point and symmetrical for positive and negative disconfirmations (Harmeling et al. 2015; Oliver 2010; Woodruff, Cadotte, and Jenkins 1983). Our research challenges this conception. As we show, customers respond strongly to positive disconfirmations but mildly to negative ones, suggesting that the ZOI actually is decentered for disconfirmations of wait time expectations.

Third, our research responds to a call by Gal and Rucker (2018) for further investigations of the loss aversion principle (Kahneman and Tversky 1979) in context, by studying gains and losses of time in the context of customer waits during service encounters.⁶ The loss aversion principle has been largely applied in marketing research (e.g., Mittal, Ross, and Baldasare 1998). However, Gal and Rucker (2018) question the blind application of this principle to all contexts, primarily because the loss aversion principle was developed to predict how individuals respond to monetary gains and losses specifically. Importantly, research has shown that individuals value and respond to time differently than money (Monga and Zor 2019). Thus, principles that apply to money, such as the loss aversion principle, do not necessarily hold true for time. With the present research, we specify a new context in which the loss aversion principle does not hold: waiting during a retail service encounter.

⁶ During a service encounter, a wait that is shorter than expected constitutes a gain (of time) because customers gain discretionary time. Conversely, a wait that is longer than expected constitutes a loss (of time) because customers lose discretionary time. The loss aversion principle (Kahneman and Tversky 1979), according to which losses loom larger than gains, would thus suggest that a longer-than-expected wait (i.e., a loss) has a stronger impact on satisfaction than a shorter-than-expected wait (i.e., a gain) does.

Managerial implications

Wait management has strategic importance for retailers, as indicated by the emergence of multiple wait management solutions (e.g., Qmatic, Qminder, Skiplino, Qless). For retailers using automatic queue management systems (e.g., QueVision by Irisys, Qnomy, V-Count), our research can help managers determine a wait time threshold to be configured (i.e., registered) in the system software. That is, automatic queue management systems provide an alert when a threshold is about to be exceeded, telling managers to send more employees to the frontline to avoid excessive wait times. To determine the wait time threshold to apply, an intuitive approach is to survey customers about their expectations, then use the average expected wait time as a threshold. But our findings suggest that waiting somewhat longer than expected does not necessarily damage customer satisfaction, so retailers can set a threshold that slightly exceeds customers' expected wait time. This flexibility would be especially useful if increasing the threshold helps retailers reduce staffing costs (by sending less often a greater number of employees to the frontline). However, our results also raise the prospect that it might be worth going the extra mile, to not simply meet customers' expectations but exceed them. Waiting shorter than expected leaves customers significantly more satisfied than waiting as long as expected; retailers can thus delight customers by decreasing their wait to shorter than expected.

Another key question for both physical and digital retailers is whether they should offer a wait time estimate. The findings in Study 2 suggest they should: Providing a wait time estimate does not affect satisfaction among customers who wait longer or shorter than expected, but customers who wait as long as expected are more satisfied when they see such an estimate. Provided that the displayed wait time estimate does not discourage customers from joining a queue, we recommend that retailers adopt this practice.

With regard to service recovery management, we also offer some recommendations. If technical or staffing issues (e.g., employee calls in sick) on a given day are going to create wait times that are longer than usual, retail managers may be concerned about customers becoming severely dissatisfied and thus offer compensation. We show that customers are relatively indifferent to waiting longer than expected up to a certain point, so they likely do not require such efforts. Even the assumed benefits of apologizing to customers who wait longer than expected may be questioned. In an additional scenario-based experiment (Web Appendix D), we test the effect of apologizing (vs. not) to customers exposed to a longer-than-expected wait time but find no significant effect of apologizing on customer satisfaction.

However, if the wait is *much* longer than expected, customers are more seriously affected, at which point retailers should offer compensation to recover their satisfaction. In Study 3, we identify that a turning point takes place when the wait is 238% longer than expected. The exact position of such a turning point likely varies across retailing contexts, so

we encourage retailers that seek a precise estimate to replicate our Study 3.

Limitations and directions for future research

We consider the effect of a single disconfirmation of the wait time expectation, but negative and positive disconfirmations might occur multiple times over the course of a customer–firm relationship. More research is needed to determine how customers respond to recurring disconfirmations. Drawing from the service failure literature according to which customers perceive the recurrence of a service failure as a sign of a persistent problem that the firm is responsible for (Maxham and Netemeyer 2002), we can speculate that customers will respond more strongly to recurrent longer-than-expected waits than to a single one. When realizing that they repeatedly wait longer than expected, customers may hold the firm responsible for letting this happen, and such blame attribution would be detrimental to customer satisfaction. On the other hand, drawing from the literature on preferential treatment according to which preferential treatment results in customers feeling entitled to getting it (Polyakova, Estes, and Ordanini 2020; Wetzel, Hammerschmidt, and Zablah 2014), we can speculate that the recurrence of shorter-than-expected waits will result in customers taking for granted such positive wait outcomes. In that case, these multiple positive disconfirmations would not exert equally strong positive impacts on customer satisfaction, compared with a single positive disconfirmation of the wait time expectation. We encourage future research to draw on longitudinal data to examine this more closely.

Furthermore, our research focused on the effect of a negative or positive disconfirmation on the focal retail encounter, but such a disconfirmation may also impact the next encounter, notably by affecting future wait time expectations. Customer expectations are dynamic, evolving in response to prior positive or negative disconfirmations (Bolton 1998). Following an assimilation process, customers tend to adjust their predictive expectations down after a negative disconfirmation and up after a positive disconfirmation (Boulding et al. 1993; Sivakumar, Li, and Dong 2014). Therefore, we speculate that customers might expect, in their next encounter, a longer wait time after a negative disconfirmation and a shorter wait time after a positive disconfirmation (compared with the wait time they expected previously). The weight of a negative or positive disconfirmation in terms of adjusting wait time expectations might be lower if customers have extensive prior experience with the firm (Boulding et al. 1993) or if more time has passed (Sivakumar, Li, and Dong 2014). In the long run, customers may experience both negative and positive disconfirmations, which may result in less precise wait time expectations (Harmeling et al. 2015). That is, customers may perceive a range of wait times as normal, anticipated variations in wait time, not as disconfirmations. More research is needed to specify further how disconfirmations affect future wait time expectations.

We focus on disconfirmations of predictive expectations of wait times; other types of expectations also exist (Zeithaml, Berry, and Parasuraman 1993), such as those based on the desired service (how long customers hope they will wait) or acceptable service (how long customers believe it is acceptable to wait). Antonides, Verhoef, and Van Aalst (2002) explore the effects of positive versus negative disconfirmation of the acceptable wait time on wait evaluation, though they do not obtain conclusive results. Further research is needed to understand how customers respond to positive versus negative disconfirmations, depending on the type of expectation that serves as their reference point.

Finally, we note some limitations specific to our empirical investigation. First, Studies 1 and 3 are behavioral studies featuring actual waiting, but Study 2 and its replications (Web Appendix D) are scenario-based experiments. To increase the ecological validity of the findings related to the expectation source, we encourage continued research that tests our Study 2 findings with a study involving actual waiting. Second, we investigate primarily utilitarian service contexts, which are interesting settings in which to study the disconfirmation of the wait time expectation, because customers experience greater time pressure in such service encounters (Strombeck and Wakefield 2008). It would be instructive though to investigate how customers respond to a disconfirmation of the wait time expectation in hedonic contexts, where time pressure is less salient (e.g., recreational dinner at a restaurant).

Executive summary

A retail service encounter necessarily occurs over time, being typically spread over a few minutes or a few hours. That is, a retail service encounter, from the customer's perspective, is a time expenditure. Part of this time expenditure may be due to customer waits (e.g., queuing to checkout in a brick-and-mortar store; waiting to talk with a customer service agent online or over the phone).

Because waits are ubiquitous in customers' everyday life, it is particularly important to understand how customers respond to waiting during a retailer service encounter. Past research has focused on investigating wait durations and documented that a longer wait duration (e.g., delays) results in a less favorable customer response.

Our research demonstrates the importance of looking beyond mere wait durations: Whether the wait is shorter or longer than expected affects how customers respond to the wait. Our research investigates how time that is saved in a shorter-than-expected-wait or lost in a longer-than-expected wait differentially influences customer satisfaction. We find that the beneficial effect of a shorter-than-expected wait (on customer satisfaction) is greater than the detrimental effect of a longer-than-expected wait. In other words, customers are extremely appreciative when they wait shorter than expected, but barely dissatisfied when they wait longer than expected.

Our research proposes two boundary conditions to this effect. First, we show that the effect is reduced, or even reversed, when customers base their wait time expectations not

on their prior waiting experiences with the focal retailer (or with other retailers), but on a wait time estimate communicated by the retailer. That is, when a wait time estimate is displayed in the retail environment, the beneficial effect of a shorter-than-expected wait is no longer greater than the detrimental effect of a longer-than-expected wait. This can be explained by the fact that when the retailer provides a wait time estimate, a longer-than-expected wait constitutes a violation of the promise made by the retailer, thus aggravating how customers respond to this longer-than-expected wait. By contrast, when no wait time estimate is provided by the retailer, a longer-than-expected wait only consists in waiting a few additional minutes, and the retailer does not violate any explicit promise in that case.

The second boundary condition we identify is for waits that are much longer than expected. We show that past a certain threshold, waiting longer than expected leads to deteriorate the customer response at an accelerating rate. In other words, customers are relatively indifferent to waiting longer than expected, but only up to a certain point. When the wait becomes too long, they are not indifferent anymore and react more and more strongly to this longer-than-expected wait. By investigating this boundary condition, our research helps understand that customers can be very dissatisfied when experiencing long waits though they are relatively indifferent to waiting slightly longer than expected.

Our research has implications for retailers, notably when it comes to what retailers should do when customers wait longer than expected. When some technical or staffing problems lead to wait times that are longer than usual, retailers may be concerned about customers becoming severely dissatisfied. They may thus decide to offer them some compensation, such as a coupon or a free gift, which is a costly practice. Given that customers are barely dissatisfied when waiting longer than expected (up to a certain point), our research questions this practice: Retailers may not need to offer such compensation to customers.

Acknowledgments

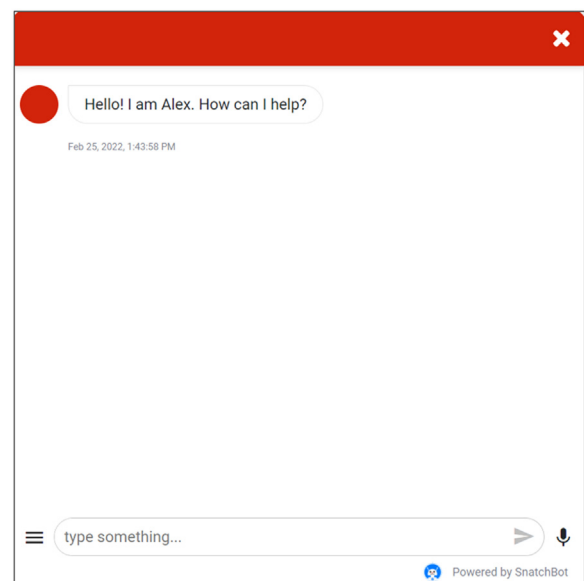
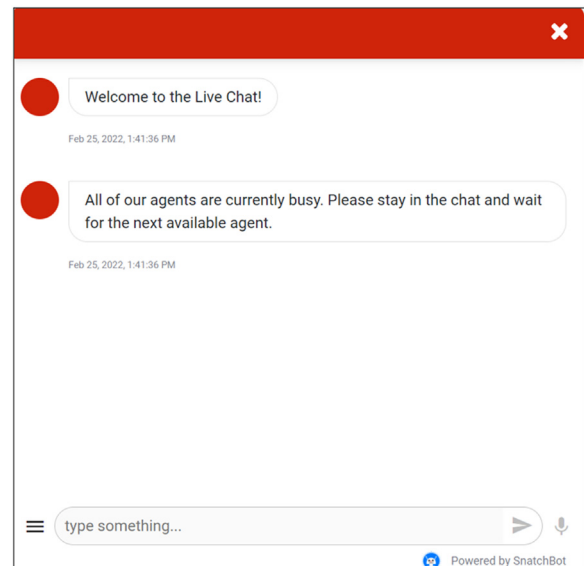
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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.jretai.2023.03.003](https://doi.org/10.1016/j.jretai.2023.03.003).

Appendix. Screenshots of the (a) landing page and (b) page where a fictitious agent greeted the participant for the chats, Studies 1 and 3.

- A.
- B.



Notes: The dates and times displayed in the screenshots are for illustrative purposes only. During the studies, the chat displayed actual dates and times in real time.

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