CONSUMER PERCEPTION AND EVALUATION OF WAITING TIME: A FIELD EXPERIMENT

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Consumer Perception and Evaluation of Waiting Time: A Field Experiment

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ABSTRACT

Telephone waiting times for a commercial service were varied in two different experiments. In the first experiment, the telephone rate was either zero or fixed at Dfl.1.- (approx. $0.40) per minute. Consumer perceptions of waiting times could be described best by a psychophysical power function. Furthermore, wait evaluations were mainly influenced by the difference between the consumers' acceptable and perceived waiting times. The negative effect of perceived waiting time on wait evaluations was increased by the monetary costs of waiting.

In the second experiment, the waiting times were filled in different ways: music, queue information, and information about expected waiting time. Information about the expected waiting time significantly reduced the consumer's overestimation of waiting time, whereas information about wait duration and queue increased the negative effect of perceived waiting time on wait evaluations.

Keywords: telephone waiting times, psychophysics, customer satisfaction, experiment

In the marketing and consumer research literature a number of studies have investigated waiting times for services, such as hospitals and banking (e.g., Hui and Tse, 1996, Katz, Larson, & Larson, 1991; Pruyn & Smidts, 1998). In these studies researchers generally are interested in the relationship between objective and perceived waiting times and the effect of (perceived) waiting time on the consumer's evaluation of the waiting time and/or service (that is, customer satisfaction). In general, a negative relationship between wait evaluation and perceived waiting time was found. Furthermore, studies have investigated the effects of waiting time fillers on consumer perception and evaluation of waiting time (e.g., Katz et al., 1991; Pruyn & Smidts, 1998; Taylor, 1994; Tom, Burns, & Zeng, 1997). The latter is based on the idea of changing waiting time into experienced time by "entertaining, enlightening and engaging" the consumer (Katz et al., 1991).

We aim at extending the research on waiting time as follows. First, our study focuses on the psychophysics of telephone waiting time. All studies reviewed assume an ordinary linear relationship between objective waiting time and perceived waiting time. However, psychophysical studies suggest that the relationship between "physical" stimuli (i.e., waiting time) and their subjective counterparts should have the form of a power function (e.g., Stevens, 1957). Second, several means of influencing consumer perception and evaluation of waiting time are studied. Previously, most researchers have investigated only one or two fillers at a time, whereas here the consequences of providing information on waiting time, queue information, music and silence are compared in one experiment.[2] Furthermore, we study whether the fillers moderate the effect of perceived duration on wait evaluations. Third, we investigate whether monetary costs moderate the effect of perceived duration on the evaluation of waiting time. Fourth, we explicitly model an asymmetric effect of positive and negative differences between expected waiting time and actually perceived time on wait evaluation (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991). Finally, the context of this study is commercial telephone communications (that is: 800 and 900 numbers), which is widely used both in the US and in Europe (The Henley Center, 1997). For example, Morrow and Tankersley (1994) report that 44% of US consumers call 800 and/or 900 numbers over ten times per half year.

[2] This study relates waiting time and fillers to consumer wait evaluations. Subsequently, wait evaluation positively affects customer satisfaction (Hui & Tse, 1996; Pruyn & Smidts, 1998). We do not take the latter relationship into account, as it has been reported widely.

The above-mentioned issues are addressed in two experiments, in which the participants called an information phone number. Waiting times were varied systematically in both experiments. The first experiment examined the psychophysical relationship between objective and perceived time and the effect of monetary costs of waiting on wait evaluations. In the second experiment, the effects of music, information on expected waiting time and queue on both perceived waiting time and wait evaluation were examined.

The estimated effect of objective waiting time on the consumer's perceived wait was marginally decreasing, as predicted by psychophysical theory. Furthermore, wait evaluations were influenced by the difference between the stated acceptability of the waiting time and the actual perceived waiting time. Moreover, the monetary costs of waiting increased the negative effect of perceived waiting time on the consumer's evaluation of the wait. Information about expected waiting time had a significantly negative effect on perceived waiting time. Furthermore, waiting time and queue information moderated the effect of perceived waiting time on wait evaluation.

The structure of this paper is as follows. First, we will discuss the literature on the psychophysics of waiting time, waiting time fillers, the costs of waiting and the resulting hypotheses. Next, the experimental procedures and the results of each experiment are discussed separately. Finally, we end with a discussion.

LITERATURE AND HYPOTHESES

Consumer reactions to waiting will be considered as a two-step process (e.g., Hui & Tse, 1996; Pruyn & Smidts, 1998). In the first step, objective waiting time is psychologically transformed into perceived waiting time. Psychophysical functions should be appropriate to describe this process. Furthermore, time perceptions may be influenced by several waiting time fillers, such as repeated information about wait duration and length of queue, and music. In the second step, it is assumed that the wait is evaluated with respect to a reference point. The monetary costs of waiting and waiting time fillers may influence wait evaluations further.

Objective and Perceived Waiting Time

Psychophysical functions have been used to describe a variety of relationships between objective stimuli and sensations. (See, for example, Galanter, 1990.) For sensory stimuli (e.g., taste, brightness) but also for monetary losses and gains, marginally decreasing sensations have been found, at least in a large range of the stimulus scale (Christensen, 1989; Galanter, 1990; Price, Harkins, & Baker, 1987). Moreover, exponential functions were found to be superior to both single-logarithmic and linear functions in describing psychophysical relationships (Stevens, 1957). Psychophysical functions might also be relevant for describing the relationship between objective and perceived waiting time. In this respect, Fraisse (1984) reports that, in general, exponential relationships (power functions) for duration have yielded coefficients around one, implying linearity. However, the studies reported mainly included durations less than one second. Eisler (1976), also including durations of several minutes in his overview of experiments, reports an average coefficient around 0.90, implying marginally decreasing sensations. However, despite the extensive literature on psychophysical functions, consumer and marketing researchers predominantly have used linear specifications relating objective and subjective time scales (Hornik, 1984; Taylor, 1994; Pruyn & Smidts, 1998).

Following the psychophysical literature, we assume that the relationship between objective and perceived waiting time is best described by an exponential function. This amounts to the double-logarithmic specification:

(1) $$\ln y_i = \alpha_1 + \beta_1 \ln t_i + \gamma_1 X_i + e_{1i}$$

In equation (1), the objective waiting time of consumer i (t_i) is related to perceived waiting time (y_i) using the double-logarithmic specification according to Stevens' law (Stevens, 1957). The matrix X_i contains the effect of other experimental variables, such as waiting time fillers. The coefficients α_1, β_1, and the vector γ_1 capture the effect sizes of the variables, e_{1i} is a normal error term. Since we expect a marginally decreasing effect of objective waiting time on time perception, β_1 should be smaller than 1. Given the above assumptions, H1 is stated as follows:

H1: The relationship between objective and perceived waiting time is described by a marginally decreasing psychophysical function (that is: $0 < \beta_1 < 1$).

Waiting Time Fillers

Waiting time fillers are generally assumed to affect both perceived waiting time and the evaluation of the wait, depending on the type of filler used (e.g., Hui & Tse, 1996; Taylor, 1994). Several ways of filling waiting time intervals have been investigated. Table 1 provides a summary of the literature on the effect of fillers on both perceived waiting time and wait evaluation, to be discussed below.

< Insert Table 1 about here >

Fillers and Perceived Waiting Time. In the psychophysical literature, Ornstein (1969) argues that perceived duration increases with the complexity of stimuli presented during a time interval. Fraisse (1984) assumes that the number of stimulus changes affects time perception in a similar way. Hogan (1978) assumes that there exists an optimal level of complexity, implying that simple stimuli (for example, easy-listening music) may reduce perceived duration but complex stimuli (for example, subjects performing a difficult task during the wait) might increase it.

Research in the services marketing literature[3] shows that the effect of time fillers on perceived waiting time is generally small (Durrande-Moreau, 1999) and seems to depend on the context studied and the type of experiment used (that is: laboratory or field experiment). Note, however that all studies in her overview used linear relationships between perceived and objective waiting times, which might be inappropriate as argued in the previous section. Katz et al. (1991) report a negative effect of duration information on perceived waiting time, which can be explained by the fact that information about the expected wait duration reduces uncertainty (Kumar, Kalwani, & Dada, 1997). Pruyn and Smidts (1998) report that entertainment during the wait extends the perceived waiting time. In contrast with the latter study, Tom et al. (1997) show that musical entertainment shortens perceived waiting time in one of their experiments.

Based on the above overview, there is evidence for waiting time information to shorten perceived waiting time. Analogous to this, we expect information about the length of the queue also to reduce perceived waiting time. With regard to the other type of fillers no conclusive evidence has been found. From this, H2 follows:

H2: Information on wait duration and/or queue length reduces perceived waiting time.

Fillers and Evaluation of Waiting Time. Table 1 shows that time fillers may positively affect waiting time evaluation. Two studies (Hui et al., 1997; Pruyn & Smidts, 1998) report positive effects of entertainment, such as television programs and music. Both Hui and Tse (1996) and Hui and Zhou (1996) show positive effects of information about expected duration on wait evaluations. The latter result may be explained by the fact that people feel less stressed due to this information (Osuna, 1985; Unzicker, 1999). Hui and Tse (1996) also report a positive effect of information about the length of the queue in a long-wait condition (10–15 minutes).

This study focuses on how fillers might moderate the effect of perceived duration on consumer wait evaluation. Recent research shows duration neglect for time spent on activities and experiences (Kahneman, 1994). Rather, the quality of one's experiences affects the evaluation of an episode. This is consistent with the idea of changing waiting time into experienced waiting time by "entertaining, enlightening and engaging" the consumer (Katz et al., 1991). We thus expect that music during the wait reduces the effect of perceived duration on wait evaluation.

In contrast, the effect of information about expected waiting time and the queue length may increase the negative effect of perceived duration on wait evaluation. The rationale for this lies in the notion that the information provided affects the consumer's way of processing stimuli. In particular, consumers are more aware about the fact that they are waiting. Hence, the negative effect of perceived duration on wait evaluation increases. From this, H3 and H4 follow.

H3: Information on wait duration and queue length increases the negative effect of perceived duration on wait evaluation.

H4: Music during waiting reduces the negative effect of perceived duration on wait evaluation.

Acceptable Waiting Time and Wait Evaluation. There is considerable evidence of a negative effect of perceived waiting time on the consumer's wait evaluation (Pruyn & Smidts, 1998). Besides this direct effect it is important to notice that both expectations and outcomes influence customer evaluations (Anderson & Sullivan, 1993; Oliver, 1980). Kumar, Kalwani and Dada (1997) offered their subjects waiting time guarantees. They find that satisfaction with the wait was relatively positive if the waiting time was actually shorter than the guaranteed time limit. This result points to the asymmetry in evaluating positive and negative outcomes with respect to a certain reference point. The evaluation of negative outcomes with

[3] For an extensive overview, see Durrande-Moreau (1999).

respect to a reference point is generally convex and relatively steep, whereas for positive outcomes it is concave and relatively flat (e.g., Anderson & Sullivan, 1993; Kahneman & Tversky, 1979). Expectations may further depend on the consumer's experience with the service and situational circumstances, for example, busyness, and time of the day. However, rather than expectations, it may be people's aspirations that serve as reference points in evaluating outcomes. For example, one may expect to wait for one minute although one would find a three-minute wait still acceptable. In this case, a two-minutes wait would result in dissatisfaction if it were to be compared with one's expectation but it would result in satisfaction if it were to be compared with one's aspiration, or acceptable wait length. In accordance with this idea, we expect waiting times taking longer than what people find acceptable to be evaluated lower as compared with waiting times shorter than the acceptable waiting time. Both Houston, Bettencourt and Wenger (1998) and Pruyn and Smidts (1998) consider the difference between acceptable waiting time and perceived waiting time (that is, disconfirmation). However, neither of these studies considers the asymmetry of positive and negative differences. In line with Tversky and Kahneman (1991) we allow for marginally decreasing evaluations. Hence a single-logarithmic specification is used (Tversky & Kahneman, 1991). H5 is stated as follows:

H5: The effect of a negative difference between (the logarithms of) acceptable and perceived waiting time on wait evaluation will be larger in an absolute sense than the effect of a positive difference.

Cost of Waiting and Wait Evaluation. We assume that the cost of waiting has similar effects on consumer behavior as search costs (cf. Ratchford, 1982). That is, higher monetary waiting cost should result in lower willingness to wait (e.g., Urbany, 1986). Houston et al. (1998) report that waiting costs negatively affect consumer wait evaluations. Hence, since the cost of waiting generally increases with wait duration, monetary waiting costs moderate the effect of perceived waiting time on wait evaluations. Monetary waiting costs will increase the consumer's attention to waiting time. The increased attention leads to higher involvement, which subsequently increases the negative effect on evaluation (Petty & Cacioppo, 1986). This leads to H6:

H6: Monetary waiting costs will increase the negative effect of perceived duration on wait evaluation.

Evaluation Model. Equation (2) relates the evaluation of individual *i* (u_i) to perceived waiting time (ψ_{i},) and the difference of the logarithms of acceptable waiting time (?$_i$) and perceived time. The dummy τ_{1i} equals 1 if acceptable time exceeds perceived waiting time, and 0 elsewhere. The dummy τ_{2i} equals 1 if perceived waiting time exceeds acceptable time, and 0 elsewhere. We include τ_1 to capture a constant effect of disconfirmation sign (Galanter, 1990). The effect of the difference between (the logarithms of) acceptable and perceived time is assumed to be asymmetric for positive and negative disconfirmation. Hence, these differences have different coefficients in each case.

(2) $$u_i = a_2 + b_2 \ln y_i + b_3 t_{1i} + b_4 t_{1i} (\ln z_i - \ln y_i) + b_5 t_{2i} (\ln z_i - \ln y_i) + e_{2i}$$

The β coefficients capture the effect sizes of the variables, e_{2i} is a normal error term. The fillers and waiting costs affect the shape of these coefficients according to the hypotheses in a straightforward way.

EXPERIMENTS

Overview of Experiments

Two experiments were conducted to test the hypotheses. H1, H5 and H6 are tested in experiment 1. H2, H3, H4, and again H5 are tested in experiment 2. Hence, experiment 2 mainly focuses on the effect of waiting time fillers. Both experiments took place in several medium-sized and large cities in the Netherlands in a field laboratory setting. A quota sampling procedure was used in both experiments. In a busy shopping area participants who had some experience with information requests by telephone were asked to join the researcher in a mobile office, to call a phone number and then requesting an information brochure from a financial institution. The participants were told that they would receive a monetary reward of Dfl. 5.- (approx. $2.-). After completing the task respondents were presented a questionnaire about their perception of wait duration and evaluation of the wait. The experiment lasted about 15 minutes on average.

The measures of perceived waiting time, expected waiting time and evaluation of the wait were the same in the two experiments. Perceived waiting time was measured by asking the subjects to estimate in retrospect the waiting time in seconds (Pruyn & Smidts, 1998). Acceptable waiting time was measured by asking the participants to provide the maximum acceptable waiting time for this telephone service in retrospect. The evaluation of the wait was measured using six items adapted from Hui and Tse (1996) on a seven-point bi-polar scale with polars such as "very short vs. very long" and "irritating vs. not irritating." The specific procedures and the results of the two experiments will be discussed separately.

Experiment 1

Procedures. The first study included 179 participants. A 6 × 2 complete factorial design was employed, including 10, 20, 30, 60, 120 and 180 seconds waits, and either a toll-free 800 number or a 900 number, costing Dfl.1.- (approx. $0.40) per minute. Participants in the 900 condition were told that their promised monetary reward would be reduced by the telephone rate (at the end of the experiment, they received the reward anyway). A manipulation check showed that 88% of participants in the 800 condition considered the (zero) cost in agreement with the service provided, whereas only 21% of the participants calling the 900 number did so ($p<0.05$).

The coefficient alpha of the evaluation scale was 0.90, which is considered reliable (Nunnally, 1978). Results of an exploratory factor analysis provided evidence for a unidimensional scale with roughly equal component scores. Hence, the scores of the multiple-item scales were summed to form a wait evaluation index.

Estimation. OLS was used to estimate (1) and (2). To control for the effect of monetary costs a dummy for the type of number called was included (Toll number = 1 if the subject called a toll number; 0 if subject called a toll-free number). The moderating effect of waiting costs was tested by using the Chow test (Pindyck & Rubinfeld, 1998), after estimating (2) separately for the toll-free condition and the toll condition.

Results. Table 2 shows the average perceived waiting times and wait evaluations in each waiting time condition. It appeared that waiting times up to 30" were overestimated by about 100%. For longer waits, the overestimation appeared to be relatively small. Furthermore, waits were evaluated as more negative the longer the waiting time. The main effects of wait duration on both perceived waiting time ($F=75.76$, $p<0.01$) and wait evaluation ($F=16.10$, $p<0.01$) were significant. Neither the main effects of toll versus toll-free numbers nor the interaction effects were significant. Note, however that the hypotheses deal with the effect of perceived waiting time on wait evaluation.

The estimation results of (1) are shown in columns 2 and 3 of Table 3. The double-logarithmic specification was compared with a double-linear function, using a Box–Cox transformation. The Box–Cox transformation amounts to dividing each dependent variable by its geometric mean and estimating the two equations again (Maddala, 1977). The residual variance of the double-logarithmic specification was 53.33, whereas for the double-linear specification, it was 89.92. Since the residual variance of the double-logarithmic specification was the smallest, this specification is clearly preferred. The regression coefficient for waiting time was 0.84, indicating a marginally decreasing psychophysical function for time. A Wald test for restricting the waiting time coefficient to the unit value yielded a ?^{2} of 14.16 (p<0.01), implying rejection of this restriction (Davidson & MacKinnon, 1993). Hence, we find support for H1. Notice that since the coefficient can be interpreted as an elasticity, it appears that 100 percent increase in objective duration corresponds to 84 percent increase in subjective waiting time.

< Insert Table 3 about here >

The estimated coefficients of (2) are reported in columns 4 and 5 of Table 3. Perceived waiting time was not significantly related to wait evaluation directly (p>0.10). However, when perceived time was taken as the deviation from the reference point (acceptable time), it turned out to be significant. Relatively negative outcomes (logarithm of actual perceived time larger than the logarithm of acceptable time) had a large negative effect on wait evaluations (–1.07; p<0.01), whereas relatively positive outcomes had a smaller, positive, effect (0.40, p<0.05). According to the Wald test the absolute effect of relatively negative outcomes appeared to be significantly larger (?^{2}=5.11, p<0.05) than for relatively positive outcomes, supporting H5. These findings are in agreement with Galanter's results (1990). He found exponents of –0.55 and 0.45, respectively for monetary losses and gains. Furthermore, the dummy for positive outcomes had a positive coefficient, which is consistent with Galanter's finding (1990) of a higher constant term for monetary gains than for losses.

The Chow test for the moderating effect of monetary waiting costs revealed significant differences between the model for the toll-free condition and the model for the toll condition (F-value = 2.78; p<0.05). With regard to the coefficients, the effect of perceived waiting time in the toll condition was significantly larger than in the toll-free condition (–0.37 vs. 0.14;

t-value=2.37, p<0.01, not reported in table 3). Also, the effect of positive disconfirmation was larger in the toll condition than in the toll-free condition (1.10 vs. 0.00; t-value=3.04, p<0.01). These findings both support H6.

Experiment 2

Procedure. In the second experiment, 236 consumers participated. This study employed a 3×4 complete factorial design, including 40, 80 and 120 seconds waits, and several fillers of the waiting time, i.e., a music theme from Titanic by Celine Dion, wait duration information, queue information, and absolute silence. Only a toll-free 800 number was provided.

The wait duration information differed for different wait lengths but otherwise remained constant. For 40" waits, subjects repeatedly (at fixed time points during the wait) heard a message that the average waiting time was about one minute. For 80" and 120" waits, the announced average waiting time was two, respectively three minutes.

The queue information was adjusted to the remaining actual length of the wait. At the beginning of the wait, subjects were told that they were *n*-th in line. At variable time points during the wait, *n* was reduced. At the beginning of the 40, 80 and 120 seconds waits, *n* was 3, 6 and 9, respectively.

The wait evaluation scale was again reliable with a coefficient alpha of 0.90. Also, a factor analysis provided evidence for a unidimensional scale.

Estimation. OLS regression was used again to estimate both (1) and (2). Dummies were included to assess the effects of the different fillers on subjective waiting time. To assess the moderating effect of the fillers, the dummies were used in interaction with perceived waiting time.

Results. The results of experiment 2 showed overestimation of telephone waiting times (Table 4, columns 2–4). Information about the expected waiting time tended to reduce the overestimation effect. An ANOVA showed a large main effect of objective time (F=43, p<0.01), a small effect of waiting time fillers (F=3.00, p<0.05) and no interaction effect.

< Insert Table 4 about here >

Table 5 shows the results of the double-logarithmic regression of perceived waiting time on objective waiting time and waiting time fillers. The coefficient of objective waiting time was 0.84, which is identical with the result obtained in experiment 1. A Wald test for the restriction of this coefficient to the unit value yielded a ?^{2} of 4.57 (p<0.05), implying the rejection of this restriction. Information about expected waiting time was the only waiting time filler that significantly reduced perceived waiting time. Hence, H2 is partially supported.

< Inset Table 5 about here >

The last three columns of Table 4 show the evaluations of waiting times filled in different ways. An ANOVA resulted in a significant main effect of objective waiting time (F=20.09, p<0.01), no significant effect of fillers (F=1.23, p>0.10) and no significant interaction effect (F=0.46, p>0.10).

The last two columns of Table 5 show the multivariate effects of waiting time fillers and other variables on the evaluation of the wait. In addition to a significant negative effect of perceived waiting time on wait evaluation, the asymmetric effect of perceived waiting time, taken as the deviation from acceptable waiting time, was replicated. The absolute coefficient of negative disconfirmation was larger (0.73) than the effect of positive disconfirmation (0.59). However, this result was not statistically significant (χ^2=0.10, p>0.10), Hence, H5 is not supported in experiment 2.

Table 5 also shows the main effects of waiting time fillers on wait evaluation. Music had a significant positive effect on wait evaluation, the other two fillers were not significant. Rather than main effects, our hypotheses pertained to moderating effects of the fillers which are reported in Table 6.

< Insert Table 6 about here >

Table 6 shows significant interaction effects of perceived duration with both information on wait duration and queue information at respectively the 5% and 10% level. The effects of perceived duration were significantly more negative than for the no-filling condition, supporting H3. For both types of information, the constant terms were also significantly higher than zero, at respectively the 5% and 10% level. . For music, the constant term was higher, whereas the effect of perceived duration was almost equal to that in the no-filling condition. Although the latter two effects were significant jointly at the 10% level according to an F-test (F=2.63, p = 0.07), the interaction effect with perceived duration was not significant. Thus, H4 was not supported. Figure 1 graphically shows how the fillers influence the effect of perceived waiting time on wait evaluation, given the effects of disconfirmation.

< Insert Figure 1 about here >

DISCUSSION, LIMITATIONS AND FUTURE RESEARCH

Discussion

The correct specification of perceived waiting time is important, both for research and for marketing practice. For research, the true differences between the effects of different fillers on the perceived waiting time may be wrongly detected when the empirical model for time perception is misspecified. For practice, it makes a difference whether the marginal perception of time is increasing or decreasing. In both experiments the marginal perception was decreasing with a coefficient of 0.84. Hence, efforts to <u>reduce</u> nominal waiting time will have a marginally <u>in</u>creasing effect on length perception. That is, any further decrease of nominal waiting will be perceived as larger than the previous decrease of the same size.

Furthermore, fillers of the waiting time had different effects on time perception and wait evaluation. Information about the expected waiting time reduced the overestimation effect. Since perceived waiting time had a negative effect on wait evaluation, the indirect effect of duration information on wait evaluation was positive. However, there might be possible negative side effects of fillers. Both queue information and duration information increased the negative effect of perceived waiting time on wait evaluation. On average, however, the effect of information on wait evaluation did not differ from the control condition. As figure 1 shows, the effect of information is relatively positive for perceived waiting times shorter than approximately 20". However, for waiting times longer than 90" the effect of information becomes more negative than the control condition.

With regard to the effect of music, the possibility of duration neglect was investigated. No strong evidence was found for duration neglect, as music did not reduce the negative effect of perceived waiting time on wait evaluation. However, apart from duration effects, the distribution of experiences during the wait might affect wait evaluations. In particular, a peak-and-end rule for wait evaluations might be assumed (Kahneman, 1994). The peak-and-end rule assumes that people evaluate their experiences on the basis of both the most extreme and the final episodes. A happy ending of the waiting time, for example, a very nice musical theme, may lead to even better wait evaluations, even if it takes a few extra seconds to listen to this happy end. Also, the end of the waiting time itself may cause a happy ending, although alternatively one might consider this the beginning of a new episode (service time).

Finally, the monetary costs of waiting increased the negative effect of perceived waiting time on wait evaluations. If consumers have to pay for a service, they will be more involved with the quality of the service provided. This result is consistent with Rappoport and Taylor (1998), who found negative own-price elasticities with respect to the total toll minutes called. That is, demand for toll calls is negatively related to price.

Research Limitations

We note two limitations. The first deals with the experimental design. We have controlled our manipulations as far as possible. However, with respect to the external validity of our study, the usual arguments apply. First, (1) the participants were not intrinsically interested in calling the service number, (2) there was no possibility of distraction, whereas in actual practice consumers may perform other tasks during the call, (3) after they decided to participate in the experiment, their waiting time may not have been as important as under natural conditions, and (4) they made only one call (there was no possibility of a second attempt when waiting time was considered too long). On the other hand, the experimental method has yielded data about the psychological processes taking place during telephone waits. This data is difficult to obtain by using other methods. Second, our study is limited to the context of telephone communication, where waiting times usually are short compared with, for example, waiting times in hospitals (e.g., Pruyn & Smidts, 1998). Hence, our study might be extended to other waiting contexts. This would also provide a test of whether psychophysical relationships also hold for longer waiting times (i.e., 10–20 minutes).

Future Research

The following issues for further research may be considered. First, research might focus on actual behaviour. By using data from telephone companies, researchers may investigate behavioral responses, such as quitting, in a real-life setting. In real life, involvement will be higher than in an experiment, possibly resulting in more dramatic effects, for example with respect to price. Second, future research might study the effect of filler combinations, e.g., music combined with duration information, and new types of fillers, for example commercials or comic pieces. Also, freedom of choosing the type of filler should result in information about consumer preferences with respect to filler types. Third, although we did not find duration neglect for waits filled with music, it might be worthwhile to study the effect of the distribution of experiences during the wait.

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TABLE 1
Overview of Studies on Waiting Time Fillers

Study	*Context*	*Type of Experiment*	*Waiting Time Fillers*	*Perceived Waiting Time*[1]	*Wait Evaluation*[1]
Hui and Tse (1996)	Signing up for university courses	Laboratory	- Information on waiting times	0	+
			- Queue information	0	+
Hui and Zhou (1996)	Signing up for university courses	Laboratory	- Information on waiting times	0	+
Hui et al. (1997)	Signing up for university courses	Laboratory	- Music	N.A.	+
Katz et al. (1991)	Banking	Field	- News	0	0
			- Information on waiting times	-	0
Pruyn and Smidts (1998)	Hospitals	Field	- Entertainment	+	+
Tom et al. (1997)	Telephone communication	Laboratory	- Music	-/0	N.A.

[1] 0 = no filler effect found, + = positive effect found, - = negative effect found, N.A. = effect not available

TABLE 2

Perceived Waiting Times and Wait Evaluations by Objective Waiting Time in Experiment 1

Objective Waiting Time (Seconds)	*Perceived Waiting Time (Seconds) (Toll-free Condition)*	*Perceived Waiting Time (Seconds) (Toll Condition)*	*Wait Evaluation (Toll-free Condition)*	*Wait Evaluation (Toll Condition)*
10	28.57	20.93	5.80	5.51
20	39.17	35.36	5.35	6.11
30	55.33	64.33	5.41	4.85
60	93.57	94.00	4.79	4.08
120	143.93	171.18	3.79	2.88
180	212.00	248.00	2.87	3.15

TABLE 3
Regressions of Subjective Waiting Time and Wait Evaluation in Experiment 1

	Subjective Waiting Time		*Wait Evaluation*	
	Coefficient	*Absolute t-value*[1]	*Coefficient*	*Absolute t-value*[1]
Constant	1.00	5.23**	4.40	8.23**
Log of objective waiting time	0.84	19.74**		
Toll number (dummy)	0.01	0.13		
Log of perceived waiting time			–0.12	1.04
Acceptable waiting time higher than perceived waiting time (dummy)			0.81	2.85**
Positive difference between Log of acceptable waiting time and log of perceived wait			0.40	1.99*
Negative difference between Log of acceptable waiting time and log of perceived wait			1.07	6.28**
Model evaluation	Adj. $R^2 = 0.69$	F = 198**	Adj. $R^2 = 0.60$	F =60 **

Notes:

[1] **p < 0.01; * p <0.05

TABLE 4
Perceived Duration and Wait Evaluation by Filling of the Waiting Time and by Actual Duration in Experiment 2

	Perceived Waiting Time (Seconds)			*Evaluation of Waiting Time*		
Filling of the Waiting Time	40	80	120	40"	80"	120"
No filling (silence)	83	153	207	4.14	3.15	2.83
Music	75	139	195	4.39	3.72	3.29
Queue information	87	123	207	4.90	3.65	2.91
Information about expected waiting time	67	120	140	4.53	3.37	3.28

TABLE 5
Regressions of Subjective Waiting Time and Wait Evaluation in Experiment 2

	Subjective Waiting Time		*Wait Evaluation*	
	Coefficient	*Absolute t-value*[1]	*Coefficient*	*Absolute t-value*[1]
Constant	1.22	3.68**	5.42	7.47**
Log of objective waiting time	0.84	11.24**		
Log of perceived waiting time			–0.43	2.99**
Acceptable waiting time higher than perceived waiting time (dummy)			0.31	0.96
Positive difference between Log of acceptable waiting time and log of perceived wait			0.59	2.06*
Negative difference between Log of acceptable waiting time and log of perceived wait			0.73	4.06**
Music during waiting	–0.08	0.88	0.47	2.03*
Queu information	–0.01	0.12	0.34	1.56
Information about expected waiting time	–0.27	2.85**	0.15	0.70
Model evaluation	Adj. $R^2 = 0.38$	F = 35**	Adj. $R^2 = 0.44$	F = 24**

Notes: [1] **p < 0.01; * p <0.05

TABLE 6

Wait Evaluation Regression with Interaction Effects of Fillers and Perceived Waiting Time in Experiment 2

	Coefficient	*Absolute t-value*[1]
Constant	3.95	2.95**
Log of perceived waiting time	–0.12	0.44
Acceptable waiting time higher than perceived waiting time (dummy)	0.36	1.09
Positive difference between Log of acceptable waiting time and log of perceived wait	0.50	1.70
Negative difference between Log of acceptable waiting time and log of perceived wait	0.72**	3.89***
Duration information	3.51	2.22**
Queue information	2.89	1.86*
Music	1.16	0.68
Duration information * Log of perceived waiting time	–0.72	2.17**
Queue information * Log of perceived waiting time	–0.54	1.67*
Music * Log of perceived waiting time	–0.14	0.39
Model evaluation	Adj. R^2 0.45	F = 17.81***

Notes: [1] ***p < 0.01; ** p <0.05; * p < 0.10

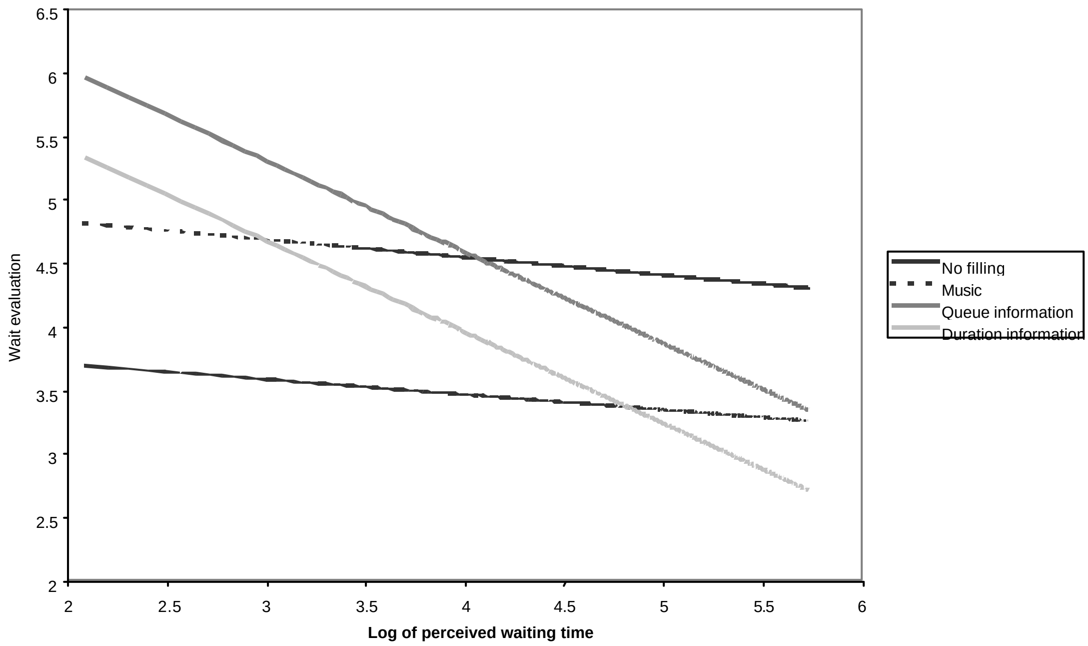

FIGURE 1 Moderating Effects of Fillers on Wait Evaluation

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