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Routine and the Perception of Time

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The authors investigated the influence of routine on people's estimation of time, testing the hypothesis that duration is remembered as being shorter when time is spent in a routine activity. In 4 experiments and 2 field studies, the authors compared time estimations in routine and nonroutine conditions. Routine was established by a sequence of markers (Study 1), variation of the task (Studies 2 and 3), or the number of repetitive blocks (Study 4). As hypothesized, the duration of the task was remembered as being shorter in routine conditions than in nonroutine ones. This trend was reversed in experienced (prospective) judgments when participants were informed beforehand of the duration-judgment task (Study 3). In Studies 5 and 6, the authors examined remembered duration judgments of vacationers and kibbutz members, which provided further support for the main hypothesis.

> The same space of time seems shorter as we grow older. . . . In youth we may have an absolutely new experience, subjective or objective, every hour of the day. Apprehension is vivid, retentiveness strong, and our recollections of that time, like those of a time spent in rapid and interesting travel, are of something intricate, multitudinous, and long-drawn-out. But as each passing year converts some of this experience into automatic routine which we hardly note at all, the days and the weeks smooth themselves out in recollection to contentless units, and the years grow hollow and collapse. (James, 1890, p. 625)

In this work, we examine the influence of routine on people's estimations of time. A previous (unpublished) study found that people who routinely fly on planes felt safer and more secure and reported swifter passage of time during flights than did people who fly less often (Avni-Babad, 2001). With the current investigation, we attempt to gain a better understanding of the power of routine and its influence on time perception.

In research on time and duration judgments, a distinction is made between prospective and retrospective judgments. In prospective paradigms, the experimenter informs participants beforehand that they will be asked to judge time duration. In retrospective paradigms, participants are not aware of the time-judging task, and they are asked to judge event duration only after the time period has elapsed. Block (1978, 1989) called the first *experienced duration* and the second *remembered duration*. People tend to underestimate duration in prospective and retrospective judgments, but prospective judgments are longer than remembered judgments and therefore usually more accurate (Block & Zakay, 1997). The present work is focused mainly on retrospective estimations of time.

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Evidence shows that people perceive inaction as normal and action as abnormal (Kahneman & Miller, 1986; Landman, 1987). Actions are regretted more than inaction (Gleicher et al., 1990; Kahneman & Tversky, 1982; Ritov & Baron, 1995) in the short term and the long term (Byrne & McEleney, 2000), even when people do not know the counterfactual alternative to their action or their failure to act (Avni-Babad, 2003). It is unlikely that people would regret an act committed on a routine basis because routines are people's normal activities. Thus, even though a routine day of work might have been very busy, people may think that they did not do much and time flew. Most people are familiar with the experience of thinking, after looking at their watch at the end of the routine day, that time passed and they do not know where it went.

The remembered duration of a time period is not simply a reflection of its actual duration. Early models proposed that retrospective evaluation is based on retrieval of information from long-term memory (Ornstein, 1969). Events that occurred during the remembered period serve as markers for reconstructing duration: the more events remembered, the longer the judged duration. However, the storage-size model did not account for data showing discrepancies between content memory and evaluated duration (Block & Reed, 1978). It appeared that the most important factor in assessing duration was not just the number of recalled events but the extent to which those events constituted a contextual change (Block, 1985).

This is consistent with James's (1890) statement that "awareness of change is thus the condition on which our perception of time's flow depends" (p. 620) and with Fraisse's (1963) claim that "psychological duration is composed of psychological changes" (p. 216). Cognitive research on the psychology of time showed that changes introduced during a time period influenced its remembered duration (Block & Reed, 1978). Time duration seemed longer when subjects used different kinds of cognitive processes.

The contextual change hypothesis was further supported by Poynter's work on segmentation (Poynter, 1983). Poynter showed that events that are used as segmentation markers serve as scaffolding for reconstructing duration. He found that the time it took to go through a word list was remembered as being longer when markers were distributed throughout the list than when the same markers were clustered together. Zakay, Tsal, Moses, and Shahar

(1994) used the names of politicians as markers and inserted them in a list of nouns. The markers were called *high-priority events* (HPEs). Zakay et al. replicated Poynter's findings, showing a positive relationship between segmentation level and estimated duration, although segmentation did not significantly affect overall memory. Thus, it appears that the impact of segmentation on retrospective duration estimation is mostly due to its role in creating contextual changes within the evaluated interval.

Webster's New Collegiate Dictionary (1980) defines *routine* as "habitual or mechanical performance of an established procedure" (p. 509). The essence of a routine is its repetitive pattern of highly predictable actions and events. This implies diminished salience of the various objects, actions, and events that make up an established routine. Thus, contextual change (in the sense used by Block, 1985) is unlikely to occur in the midst of a routine. In contrast, unexpected or nonroutine occurrences are likely to attract attention when they occur, give rise to contextual change, and be relatively memorable (Ritov, 2000). It follows that retrospective estimates of the duration of nonroutine periods should tend to be longer than retrospective estimates of the duration of routine periods.

In the first experiment, we followed procedures used by Zakay et al. (1994) to investigate segmentation processes, but the segments were set up into a routine order. In the second experiment, we controlled for the number of segments but varied the degree of contextual change between segments. In a third experiment, we compared prospective and retrospective duration estimations of routine and nonroutine equal-length experiences. With the fourth and fifth studies, we examined the positive time-order error as a characteristic of routine. The positive time-order error is the finding that people remember the first of two equal periods as being longer than the second. The contextual change model proposes that subjects encode more changes during a new experience and this lengthens remembered duration (Block, 1985). The positive time-order error was examined in the fourth study as a characteristic of a routine's evolution in a lab experiment, in which participants watched teachers' video clips in three parts and became familiar with the procedures. They were consequently asked about the remembered comparative duration of the parts and their interest in them. Participants' memory of the different parts was measured as well. The fifth study was conducted at a vacation resort and tested the idea that time is remembered as having passed faster as people became involved in their vacation routine. Vacationers were asked to judge the duration of time passage at the beginning, middle, and end of their vacation. In the sixth study, kibbutz members were interviewed about their retrospective judgment of time at their regular routine job versus nonroutine jobs.

Experimental Studies

Study 1: Routine Segments

This experiment was designed to test the hypothesis that increasing the number of markers (HPEs) that create segments would not result in more perceived changes if they were presented in a routine sequence. A routine sequence maintains a rhythmical pattern that may ameliorate the effect of the HPEs as markers that create contextual changes. As Poynter (1989) pointed out, "Not only the number of events in an interval, but also the degree of contextual change each event produces should affect perceived duration" (p. 309). Therefore, it was expected that in the high-segmentation–routine condition, time duration would be judged to be shorter than in the low-segmentation conditions and also shorter than in the high-segmentation–nonroutine condition.

Method

Participants. Participants were four groups of undergraduate students (with 35, 28, 32, and 45 students in each group, for a total of 140) who took part in a memory experiment for credit in a psychology course. All groups were run in parallel sessions during a single week.

Materials and procedure. Four tapes were prepared with two recordings on each. The first recording was identical in the four tapes. It consisted of a 15-s silent interval starting with the word "start" and ending with the word "end." The second recording, 60 s in length, contained a list of 20 Hebrew nouns and the last names of 10 Israeli politicians (the HPEs). The list was read aloud in a monotonous voice. The duration of each word was approximately 1 s and the pause between the words was also 1 s long.

On the first tape (high-segmentation–routine condition), the HPEs were spread evenly among the nouns (in Positions 3, 6, 9, etc.). On the second tape (low-segmentation–HPEs-last condition), the 20 nouns were read first, then the HPEs were read in the same monotone voice. On the third tape (the low-segmentation–HPEs-first condition), the HPEs were read first, followed by the 20 nouns. On the fourth tape (the high-segmentation–nonroutine condition), the HPEs were spread in a nonroutine way (as determined by two judges) amongst the nouns, in Positions 2, 3, 4, 8, 10, 12, 18, 19, 23, and 29.

The experiment was presented as a memory task. Participants were told that they would hear a silent interval starting with the word "start" and ending with the word "end," followed by a list of nouns and politicians' names. They were asked to remember as many words as they could and to pay special attention to the politicians' names. After listening to the tape, participants were asked to estimate the length of the tape containing the list of words (nouns and HPEs).

The perceived duration of the second tape was measured by a comparative estimation method: Participants were given a page with two horizontal lines that started from a common left-hand margin. The upper line was short and represented the silent interval. The bottom line continued to the right-hand end margin of the page, and participants were asked to mark their evaluation of the recorded tape length in comparison to the silent interval. As in Zakay et al.'s (1994) study, the participants were then asked to report their estimate of the overall number of words in the list (the recalled number of events). This measure was used to examine the relationship between time estimation and the remembered number of stimuli separately from the specific retrieval of words from memory. After making an overall estimate of the number of words, participants were asked to recall as many words as possible from the list of nouns and HPEs (as did Zakay et al., 1994, with some of their subjects).

Results and Discussion

As expected, participants in the high-segmentation–routine condition remembered the duration of the second tape as being shorter than did the participants in all other conditions. The mean duration estimates were represented by lines averaging 83.27 mm (SD = 36.17) for the high-segmentation–routine condition, 104.96 mm (SD = 42.86) for the low-segmentation–HPEs-last condition, 104.88 mm (SD = 43.00) for the low-segmentation–HPEs-first condition, and 118.11 mm (SD = 31.28) for the high-segmentation–nonroutine condition. The one-way analysis of variance (ANOVA) yielded a significant effect, $F(3, 134) = 5.40$, $MSE = 1{,}431.79$, $p < .005$, $\eta^2 = .108$. Post hoc contrasts indicated that the mean of the high-segmentation–routine condition was smaller than the mean of the high-segmentation–nonroutine condition, $F(1, 134) = 16.14$, $p < .001$, $\eta^2 = .107$, and also that the mean for the high-segmentation–routine condition was smaller than the means of the other three conditions, $F(1, 134) = 11.78$, $p = .001$, $\eta^2 = .081$.

Free recall of politicians' names also yielded a significant difference. Participants in all conditions other than the high-segmentation–routine condition recalled more politicians' names than did participants in the high-segmentation–routine condition. The mean numbers of HPEs recalled (out of 10 politician names) were 6.07 ($SD = 1.78$) for the low-segmentation–HPEs-last condition, 5.69 ($SD = 1.45$) for the low-segmentation–HPEs-first condition, 5.87 ($SD = 1.79$) for the high-segmentation–nonroutine condition, and 4.51 ($SD = 1.74$) for the high-segmentation–routine condition, $F(3, 136) = 5.77$, $MSE = 2.902$, $p = .001$, $\eta^2 = .113$. Post hoc contrasts showed again that the mean of the high-segmentation–routine condition was smaller than the mean of the high-segmentation–nonroutine condition, $F(1, 136) = 12.41$, $p = .001$, $\eta^2 = .084$, and that the mean of the high-segmentation–routine condition was smaller than the means of the other three conditions, $F(1, 134) = 16.58$, $p < .001$, $\eta^2 = .109$.

Because the high-segmentation–nonroutine condition included more HPEs in the primacy portion, which might account for the difference in recall, we further compared the recall of HPEs in the routine and nonroutine high-segmentation conditions while omitting the first 3 HPEs on the list (out of 10). The participants in the nonroutine condition recalled significantly more HPEs ($M = 3.64$, $SD = 1.52$) than did the participants in the routine condition ($M = 2.78$, $SD = 1.39$), $t(71) = 2.41$, $p < .05$.[1] No significant difference was found for the estimations of overall number of words (all Fs $<$ 0.15, all ps $>$ .8) or for the number of nouns recalled (all Fs $<$ 1.5, all ps $>$ .25), indicating that participants had indeed concentrated on the HPEs, and those functioned as markers that were later retrieved from memory.

Thus, the even sequence of a high number of segments probably created the sense of automatism that characterizes routine. The repetitiveness of the markers might have influenced the participants to perceive duration as shorter in the high-segmentation–routine condition than in the other three conditions.

The routine sequence also might have hindered the memory of the markers, which were remembered less well in the high-segmentation–routine condition. The better memory of the HPEs in the low-segmentation conditions could also be due to their being read last or first, adding a potential recency and primacy effect, but the difference in memory between the high-segmentation conditions can only be explained by the routine order. Consequently, in the high-segmentation–routine condition, memory was poor and time estimations were shorter.

In past research on retrospective time estimations, a higher level of segmentation led to longer judgments of duration (Poynter, 1983; Poynter & Homa, 1983; Zakay & Feldman, 1993). Block (1978, 1989) related duration estimates with the number of changes. In their contextual change model, Block and Reed (1978) suggested that varying the levels of processing context increases the time judgments of the interval. These contextual changes apparently do not occur when the number of changes increases if they are part of a repetitive routine. It is suggested that when changes become routinized, they do not operate as changes anymore; rather, the opposite effect occurs. Perhaps people do not perceive them as changes because of their predictable nature, and therefore, in the last experiment, the politicians' names may have been stored in memory in a rather shallow way. Thus, people remembered durations as being shorter and the HPEs were remembered less.

In the next two experiments, we investigated whether a routine task would result in shorter time estimations than nonroutine (changing) tasks. In both experiments, we kept the number of segments equal, consequently isolating the influence of the routine or nonroutine task. The nonroutine task we used was very similar to the routine one, thus ensuring that the tasks would not differ significantly in complexity.

Study 2: Routine and Nonroutine Tasks

Method

Participants. Thirty-eight male and female undergraduate students, 19 to 25 years of age, participated for credit in a psychology course. They were randomly assigned to either the routine condition or the nonroutine condition ($n = 19$ in each condition).

Materials and procedure. The experiment was presented as a memory task. Participants were given a list with 20 rows of numbers. Each row consisted of 38 digits from 0 to 9, which appeared randomly. The lists of digits, except for underlining, were identical in both conditions. Each row ended with a blank space to be filled in so that each row constituted a segment. The number of rows or segments was identical for both conditions. Early in each segment (but not necessarily in the first place), one digit was underlined. Participants were asked to count the number of times the underlined digit appeared in the segment and to write their answer at the end, in the blank space. In the routine condition, the underlined digit was always *5*. In the nonroutine condition, the underlined digit was different in each segment, but the number of times it appeared was identical to the number of times the digit *5* appeared in that same row of the routine condition. For instance, if the digit *8* was underlined in the 10th segment of the nonroutine condition and appeared six times in that segment, number *5* would be underlined in the 10th segment in the routine condition, and it would also appear six times. In that way, the two tasks differed in their routine nature but did not differ in complexity. Both were very simple tasks, and counting the number of times *5* appeared in a segment was as simple as counting the number of times the digit *8* appeared in its equivalent segment.

The task was explained to the participants by an experimenter, who then completed the first row of numbers as an example. They were then told that they would be given time to practice in the next two segments (described as "practice time") and were asked to start when they heard the word "start" and to stop when they heard the word "stop." The time given for the practice phase in those two segments was 20 s. After that, they were asked to move on to the experiment itself and to begin counting again (for the 17 segments that were left) when they heard the word "start" and to stop when they heard the word "stop." The time assigned for the experimental part was 120 s. After the 2 min, participants were asked to estimate the time of the experimental part, as in Study 1, by marking a line in comparison to a given short line that represented the practice time (20 s). The line that participants marked was later measured in millimeters and served as the dependent variable representing time estimation.

Results and Discussion

As predicted, participants in the nonroutine condition made longer retrospective estimations of time ($M = 168.10$ mm, $SD =$

[1] We are grateful to an anonymous reviewer who raised this potential confound.

44.80) than did participants in the routine condition ($M = 128.89$ mm, $SD = 29.62$). The difference between the means of the routine and nonroutine conditions was statistically significant, $t(36) = 3.18$, $p < .01$, $\eta^2 = .22$.

The groups performed the same kind of task in both conditions. The number of segments was equal; only the nature of the task—routine versus nonroutine—was different. Thus, the results indicate that retrospective duration estimation was affected by routine, even when the number of segments was kept constant. Presumably, the contextual change occurring at the beginning of each segment in the nonroutine task increased the salience of the segmentation. The hypothesis that routine would result in a shorter time estimation than would nonroutine was confirmed.

Study 3: Prospective and Retrospective Time Estimations in Routine and Nonroutine Tasks

Wood, Quinn, and Kashy (2002), in two recent diary studies, showed that when participants were engaged in habitual behavior, their thoughts drifted to issues unrelated to the behavior. When they were involved in nonhabitual behavior, participants' thoughts corresponded to their behavior. The authors suggested that thought is necessary to guide a nonhabitual action but is less necessary when one is performing a habitual action. Because attentional resources are limited, a nonroutine task will demand more attention than a routine task, thus leaving less attention available to keep track of time. We suggest that when using the retrospective paradigm of time estimation on routine activities, people go back to the remembered elapsed period and remember it as being shorter, possibly because of the lack of change.

People may think intuitively that because routine tasks are sometimes very boring and hence seem to take "forever," time would not appear to pass quickly. We believe that this intuition can be proved right if people keep thinking about time while they are performing a routine task. However, different processes characterize prospective and retrospective judgments. Prospective estimation involves attention to time. In routine tasks, more processing capacity is available for attending to time (Block & Zakay, 1997; Zakay, 1993; Zakay, Block, & Tsal, 1998).

It follows that routine may have opposite effects on prospective and retrospective time estimation tasks. The same period of time that people remember in a retrospective method as being shorter in the routine condition would be estimated to be longer when assessed prospectively because of the routine. This prediction was tested in the present study.

Method

Participants. Ninety-three male and female undergraduate students between 20 and 25 years of age volunteered to participate in a memory experiment. They were randomly assigned to one of four conditions: prospective–routine condition (20 participants), prospective–nonroutine condition (19 participants), retrospective–routine condition (27 participants), and retrospective–nonroutine condition (27 participants). Participants in the prospective conditions were told that they would be asked to estimate the duration of the experiment.

Materials and procedure. In a procedure similar to that of Experiment 2, participants were given a list of 20 rows with 38 symbols each. The lists, except for underlining, were identical in all conditions. In the routine conditions, the underlined symbol was always *X* in all segments. In the nonroutine conditions, the underlined symbols were different in each segment, but the number of times they appeared was the same as the number of times the symbol *X* appeared in the equivalent segment of the routine conditions. The procedure differed from Study 2 only in that participants in the prospective conditions were told that they would be asked to estimate the time duration of the experiment.

Results and Discussion

As hypothesized, people remembered the time spent as being shorter in the routine condition only when looking back (retrospective time estimation) but not when looking ahead at the time (prospective time estimation). Table 1 presents the mean time estimations of the four groups in the 2×2 design.

In the 2×2 ANOVA, none of the main effects (for the prospective and retrospective and the routine and nonroutine conditions) were significant, with Fs < 1. As predicted, the interaction effect was highly significant, $F(1, 89) = 12.73$, $MSE = 2{,}366$, $p = .001$, $\eta^2 = .125$. Routine resulted in shorter time judgments than did nonroutine in the remembered conditions, replicating the findings of Study 2 above, $F(1, 89) = 4.96$, $p = .03$, $\eta^2 = .053$, for the comparison of the two retrospective conditions. The pattern was reversed in the prospective conditions where, as hypothesized, routine resulted in longer time estimations than did nonroutine, $F(1, 89) = 7.79$, $p = .006$, $\eta^2 = .080$, for the comparison of the two prospective conditions. Apparently, when one thinks about the clock while on a routine job, time is perceived as being longer than it is perceived as being in a nonroutine job. This result is compatible with the assumption that on a changing, nonroutine job, less attention is focused on temporal information and people experience time as passing relatively quickly.

Study 4: Routine—The Positive Time-Order Error

The positive time-order error was examined in a lab experiment along with other effects of repetition that are typical of a routine. While conducting another study, Babad, Avni-Babad, and Rosenthal (2003) observed participants viewing a set of video clips depicting teachers' nonverbal behavior, and it became apparent that the participants' behavior changed as the viewing advanced. As soon as the participants became familiar with the procedure, they developed a "professional routine" that was evident in the shorter time needed for writing their ratings and the greater confidence of their decisions.

The same set of teachers' video clips was used in the present study, but participants were instructed "to remember as much as possible" because it was a memory experiment. It was hypothesized that the duration judgments of different parts would be

Table 1
Means and Standard Deviations of Time Estimations (in Millimeters)

Condition	Prospective *M*	Prospective *SD*	Retrospective *M*	Retrospective *SD*	Total *M*
Routine	161.7	63.3	118.3	43.0	136.7
Nonroutine	118.2	48.3	147.7	41.1	135.5
Total *M*	140.5		133.0		136.1

influenced by their position in the presentation and that the first part would be remembered as being longer than the last. It was also hypothesized that the memory of the number of teachers in each part would be influenced by their order. The first part presented would be remembered as having included more video clips of teachers.

Method

Participants. Sixty-one undergraduate students participated for credit in a psychology course. They were randomly divided into three groups: two with 20 participants each and one with 21 participants.

Materials and procedure. Participants viewed 18 video clips depicting 18 different teachers in classrooms teaching subjects like math, French, literature, and English. Each clip was 9 s long, with a break of 5 s between clips. The 18 clips were divided into three parts of 6 clips each by introducing a longer break (12 s) between the parts than the usual 5-s break between the clips and also by announcing the beginning of each part. The total duration of the viewing was 4 min 21 s. The tape parts were counterbalanced in three orders, with each group of participants viewing a different order of parts.

Participants were told that they were taking part in a memory experiment, that they would be shown video clips depicting teachers in classrooms, and that they would later be asked to answer a few questions about what they watched. Before each part was shown, the experimenter announced its number (i.e., "Part 1," "Part 2," "Part 3"). Participants were not told that there were 6 clips in each part. After watching all 18 video clips, participants were presented with the following questions:

How many teachers were shown?

Which one of the three parts seemed shorter?

Which of the three parts seemed longer?

Which part had the least math teaching?

Which part had the least French teaching?

Which part was the most interesting?

Which part was the most boring?

How many teachers were shown in the first part?

How many teachers were shown in the second part?

How many teachers were shown in the third part?

Results and Discussion

Chi-square tests examining the counterbalance effect for the questions "Which part was the most interesting?" and "Which part was the more boring?" yielded values indicating that one specific part (showing one particular group of teachers) was considered more interesting and another part was considered more boring regardless of their position, $\chi^2(4, N = 61) = 28.11$, $p < .001$, and $\chi^2(4, N = 61) = 22.45$, $p < .001$, for the former and the latter questions, respectively.

Thus, participants were aware of differences in content. However, the chi-square tests comparing the counterbalanced conditions for judgments of duration for the questions "Which one of the three parts seemed shorter?" and "Which one of the three parts seemed longer?" yielded nonsignificant results, $\chi^2(4, N = 61) = 3.22$, $p = .52$, and $\chi^2(4, N = 61) = 2.27$, $p = .69$, respectively. Therefore, the results of all participants in the three conditions were combined.

As hypothesized, time duration of the first part was judged longest by 33 people (54.1%); followed by the second, which was chosen by 20 people (32.8%); whereas the third part was judged to be the longest by only 8 people (13.1%), $\chi^2(2, N = 61) = 15.40$, $p < .001$, Kullbuck–Leibler divergence (relative entropy) = .56. The duration of the last part was remembered as shortest by 29 people (47.5%), followed by the second part, chosen by 19 people (31%). Only 13 people (21%) thought that the duration of the first part was shortest, $\chi^2(2, N = 61) = 6.10$, $p < .05$, Kullbuck–Leibler divergence = .46.

A repeated measures one-way ANOVA was computed to compare participants' estimations of the number of teachers in each part. The three parts were of the same length and included six teachers each, but participants did not think this was the case. The means were 6.25 teachers for the first part, 5.83 for the second, and 5.44 for the third, $F(2, 116) = 7.63$, $MSE = 1.28$, $p < .001$, $\eta^2 = .116$. Subsequent comparisons between the parts yielded significant effects: $t(58) = 2.19$, $p < .05$, for estimation of number of teachers in the first part compared with the second part; $t(58) = 2.08$, $p < .05$, for the second part compared with the third; and $t(58) = 3.39$, $p < .001$, for the first part compared with the last.

Thus, the first part was remembered as being longer in time duration than the other two, and it was judged to contain more teachers' clips. The same process occurred in a reversed manner for the last part, which was remembered as being shortest and including fewer teachers. According to Ornstein's (1969) model, if a person can retrieve more information, duration is remembered as being longer.

A possible explanation for the overestimated number of teachers in the first part is that the positive time-order error extended its influence on the memory for amount of stimuli. When a part was remembered as being longer, it was attributed more information. Alternatively, it could be the other way around: The first, preroutine part was new and remembered as containing more information, and, therefore, it influenced the memory of time duration, which was judged in retrospect to be longer. When participants became familiar with the routine of the experiment, time durations shortened and less content was attributed to the task. To conclude, the major finding of this study was that getting into the routine of the experiment influenced people's memory regarding the passage of time. A similar effect can take place in real-life situations where the first part of an experience is remembered as being longer and the last as being shorter.

Field Studies

Study 5: The Passage of Time on a Club Med Vacation

When asked, most people can recall routine actions in their normal schedules and can think of routine as part of their everyday life. However, a different kind of routine may develop in other settings over shorter periods of time, which would probably have similar effects to those of routines in everyday life. The contextual change model (Block & Reed, 1978) predicts a positive time-order error, that is, the first of two equal time periods is remembered as being longer than the second. Block (1982) showed that performing a second experiment in the same room made the second experiment seem shorter if nothing had changed in the room from the first experiment. It was hypothesized here that a similar process would occur in real life.

When people take a break from their normal routine and go on vacation, they often comment about how quickly time passes, especially toward the end of their holiday. Although each day of the vacation is not necessarily different in activities than another, they may get the feeling that the first days were longer and the rest of the days flew by. It is suggested that after the first period (which may consist of a day or days) of becoming familiar with the new environment, the vacation routine sets in and time then seems to be shorter.

Club Med Coral Beach in Eilat, Israel, offers 3- or 4-day vacation packages. Guests eat three huge meals a day, served at the same time every day. Sports activities are free and optional, and people enjoy the coral beach, the pool, the evening shows, and dancing every night (also at set hours). Organized activities and daily routine do not differ greatly from one day to another, therefore eliminating the possibility that differences in schedule would dictate choices of recreation, thus influencing the perception of time.

Method

Participants. Forty-one male and female guests of Club Med Coral Beach, Eilat, who completed a 3- or 4-day vacation, volunteered to answer a short questionnaire at the end of their holiday. Participants completed their 3- or 4-day stay on different days over a period of several weeks.

Materials and procedure. On leaving the village, while waiting at the check-out desk, participants received a short questionnaire describing the study as an investigation of subjective memory of the passage of time. Participants were requested to mentally divide their vacation time into three equal parts (beginning, middle, and end) and to assess which of these periods had seemed shorter. They were then asked to rate each period on a 5-point scale representing their sense of the passage of time (1 = *slow*, 5 = *fast*).

Results and Discussion

Most people (21, or 51%) reported that the last part of their vacation seemed the shortest, 15 people (37%) remembered the middle part as being shorter than the other two, and only 5 people (12%) thought that time seemed shortest in the first part, $\chi^2(2, N = 41) = 9.56$, $p < .01$. A one-way repeated measures ANOVA was conducted for the ratings of the three periods (*M*s = 3.54, 4.10, and 4.37 for the first, second, and third periods, respectively), $F(2, 80) = 14.45$, $MSE = 0.508$, $p < .001$, $\eta^2 = .265$. Subsequent *t* tests showed that the second period was remembered as being shorter than the first, $t(40) = 5.07$, $p < .001$; the last period was also remembered as being shorter than the first, $t(40) = 4.20$, $p < .001$; and the shorter duration of the third period as compared with the second period was nearly significant, $t(40) = 1.76$, $p = .086$.

It seems that even on a short vacation, there are differences in time judgments, the first part being remembered as longer than the others. When considering the notion of routine, people would naturally think of actions performed every day, but there could be some common features with a vacation routine. For example, on entering the dining room for their second meal, people might try to go back to the table they sat at for their first meal. A vacation routine can be formed in many other details. Vacationers probably encode more information and changes during the first part of their vacation because it is a novel experience. Hence, as predicted by the contextual change model (Block, 1982; Block & Reed, 1978), the first period would be remembered as being longer.

Study 6: Time Passing on a Routine Job on a Kibbutz

This study investigated people's judgments of time duration in a routine versus a nonroutine job in their work environment. It was hypothesized that time is remembered as being relatively shorter on a regular routine job compared with a nonroutine job. In the regular routine job, the sequence of actions can be expected and the acts can be known and anticipated, therefore providing fewer anchors for retrospective memory to retrieve. This study was conducted in a kibbutz environment because it offers many instances of job changes. It is quite normal for kibbutz members to be required at times to switch from their routine jobs to help out in other needed jobs that cannot be postponed. One job is not necessarily more or less interesting than the other. For instance, a person working in the kibbutz industrial plant might be called in as a temporary replacement for an absent worker in the children's house, or vice versa.

Method

Participants. Forty-four members of a kibbutz in Upper Galilee in Israel agreed to answer a few questions about their remembered duration of time at work.

Materials and procedure. Participants were approached, mostly at work, and were interviewed individually. The questions were as follows:

> What is your usual routine job?
>
> How interesting is it (rating on a scale from 1 = *not interesting* to 10 = *very interesting*)?
>
> Did you work temporarily on another job in the last 2 years?
>
> How interesting was this other job (rating on a scale from 1 = *not interesting* to 10 = *very interesting*)?
>
> How fast do you remember time passing in your regular job (rating on a scale from 1 = *very slow* to 10 = *very fast*)?
>
> How fast do you remember time passing in the other job (rating on a scale from 1 = *very slow* to 10 = *very fast*)?

Results and Discussion

Preliminary examination of the specific jobs in the routine and nonroutine reports showed that jobs listed as routine by some respondents were mentioned as nonroutine jobs by others. Paired samples *t* tests were conducted for the ratings of interest and time passage and compared the ratings for routine and nonroutine work. As expected, remembered durations differed significantly in the two situations. Time was remembered as being shorter on the routine job than on the nonroutine job (*M*s = 8.61 and 7.64, respectively), $t(43) = 2.40$, $p < .05$. It could be argued that people find their regular jobs more interesting and therefore report that time seemed shorter, but this was not the case. Both routine and nonroutine jobs were rated rather high on the interest scale but were not rated differently from each other ($M = 8.19$, $SD = 1.84$, for routine jobs; $M = 8.03$, $SD = 2.01$, for nonroutine jobs). Thus, the hypothesis was confirmed: Time was reported to seem shorter on routine jobs compared with nonroutine jobs, although both jobs were considered equally interesting.

General Discussion

The six studies reported in this article compared people's judgments of time in a routine versus nonroutine situation. In all studies, we found that durations differed between routine and nonroutine situations. People remember duration as being shorter on a routine activity than on a nonroutine activity. Routine was investigated in two real-life (field) situations and four experimental (lab) situations. In Study 6, routine was self-defined by the respondents. In all other studies, routine was inherent in the characteristics of the situation explored: naturally occurring (Study 5, Club Med) or experimentally created (Studies 1, 2, 3, and 4).

Study 1 followed previous studies (Poynter, 1983; Zakay et al., 1994) that showed how segmentation of an interval produced longer judgments of duration. However, Study 1 demonstrated that when the number of segments was augmented and repeated evenly, creating a routine, automatic feeling, the opposite occurred. Thus, whereas Poynter (1983) and Zakay et al. (1994) found that the high-segmentation condition yielded longer time duration judgments than the low-segmentation condition in a nonroutine order of the segments, here the high-segmentation–routine condition yielded shorter time duration judgments than the high-segmentation–nonroutine condition and also the shortest time estimations of all the conditions.

Hence, instead of the segments creating a change and becoming anchors to retrieve from memory, thus making duration seem longer, their automatic nature apparently created a unity that made time duration seem shorter. Fraisse (1963) emphasized that the unity of a task is a major factor in a person's judgments of time. The more united a task is, the shorter it seems. Harton (1939) showed that given the same length of time to complete a task, people who were involved in one united task estimated the task duration to be shorter than did people performing several tasks.

In the second and third studies, we further examined the effect of a routine task while controlling for the externally imposed segmentation. The findings of these studies are compatible with Harton's (1939) claim that although segmentation increases time duration judgments, routinized segmentation apparently ties the segments together as a unit so that switches from segment to segment are not perceived as changes. Therefore, this process has the opposite effect, decreasing duration judgments rather than increasing them.

The findings of Study 3 highlight the distinction between prospective and retrospective time estimation, where routine produced opposite effects on duration estimation under prospective and retrospective conditions. As suggested in previous research (reviewed by Block & Zakay, 1997), prospective estimation involves allocation of attentional resources to temporal aspects of the experience. Naturally, the automatic nature of the routine leaves substantial attentional resources available for monitoring time (the watched pot effect). Hence, a routine experience results in longer duration estimation than does a nonroutine one. However, retrospective estimation is a largely constructive process involving recall of change points, the encoding of which is weakened by routine. As expected, this process results in shorter duration estimation for routine as related to nonroutine experiences.

In Study 4, we examined the positive time-order error in the routine created in a lab experiment. Participants watched groupings of teachers' video clips that were divided into three equal parts, and although the order of the parts (i.e., specific content) changed in the three conditions, the first part presented was always estimated to be longer than the other parts. Also, the first part was consistently remembered as having included more teachers' video clips. It seems that as participants became acquainted with the procedures of the experiment, the remembered duration was influenced by the experimental routine. They judged the first part of the experiment to be longer than the others, a pattern similar to that of the people in the vacation study (Study 5). The remembered number of teachers included in each part also varied as a function of order. Apparently routine and familiarity influenced not only the duration judgments but also the memory of information, because the first part was attributed more teachers than the second, and the second part was thought to include more teachers than the third. Thus, as routine increased, the amount of information attributed decreased.

In Study 5, the positive time-order error (Block, 1982; Block & Reed, 1978) was examined in the routine created during a vacation. Vacationers were asked to judge which part of their vacation was shorter and which part was longer. As hypothesized, the first part seemed longer than the second or the last parts. It could be expected that toward the end of the vacation, people would tend to think more about the passage of time. Normally, people do not want a vacation to end. Thus, time duration estimations could turn into prospective judgments and become longer, but this did not happen. Once people became familiar with the holiday routine, time duration seemed shorter and shorter. This may explain the phenomenon of the weeks getting shorter as the years go by, as described by James (1890). Unless people experience major changes that break the routine in their lives and provide them with anchors to retrieve from memory, life can become one short, timeless sequence of routine inaction.

Study 6 was based on interviews with kibbutz members who judged the remembered durations of a routine job and a nonroutine job. Again, it was found that time durations were remembered as being shorter during routine activities. The automatism of routine may project a sense of inertia. The acts people perform as part of a routine are not novel performances and therefore do not require attention as new experiences do. Consequently, there are fewer stimuli to remember. This results in shorter estimations of time duration. Routines are relaxing, like a state of inaction, because the routine acts are performed automatically with little or no learning involved.

This research was an attempt to explore further the influence of routine on remembered time estimations in both experimental lab settings and natural environments. The results were consistent across contexts. More research is needed that will combine lab and field experiments to investigate effects of routine on the perception of time, as well as other influences of routine on different psychological aspects of this phenomenon.

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