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Queues and Fairness:

A Multiple Study Experimental Investigation

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Abstract

In four studies we examine perceptions of fairness in queues. The studies experimentally distinguish between a queue with multiple lines to multiple service providers (MQ), one single line to multiple service providers (SQ) and a numbered queue (NQ). Study 1 reveals a ***queue paradox*** where people prefer structures that are perceived as imposing longer waits. Study 2 explains these results by confirming a connection between queue structure and fairness perceptions. Study 3 connects perceptions of fairness to expectations from queue structures, independent of actual fairness violations. Study 4 examines a case of "institutionalized fairness violation," confirming that seeing others wait a shorter line is perceived as unfair even if these others paid for this right. The findings suggest important implications for the management of and research on queues and fairness.

A Multiple Study Investigation of Queues and Fairness

Waiting is an annoying experience that we all seek to avoid. But is it really the waiting that annoys us? Organizations must rely on queues to coordinate the delivery of goods and services and to reduce the costs of service delivery. An expectation that a service agent will be available whenever a customer arrives is unrealistic and unfeasible because of the costs this would impose (Hall, 1991; Saaty, 1961; Schwartz, 1975). So the important question is *how* an organization structures its queues rather than whether or not there is a waiting period. We suggest that decisions about queue structure can be critical in shaping perceptions of the fairness of a waiting line.

The structuring of a queue can be physical, as when people are channeled to or through a specific physical channel, or it can be abstract - as when people are allocated numbers. In both cases a psychological process of waiting is imposed upon customers, which involves delay of need gratification. This process may generate anxiety about when or whether the need will be fulfilled (i.e., will service be received?), and to what extent the wait process is fair (Milgram, Liberty, Toledo, & Wackenhut, 1986; Dube, Leclerc, & Schmitt, 1992). Queues invite fairness evaluations among the people waiting since people are concerned and likely to monitor the extent to which a waiting process is just and unbiased. Fairness in queues is therefore a perceptual issue of the extent to which one feels he or she was not biased by others. Such perceptions are an important goal for service organizations, since perceptions of lack of fairness can create anger and alienation.

Fairness of a queue is typically invisible, however. It becomes visible if some mishap occurs. As Sheppard, Lewicki and Minton (1992) note, one goal of managers of service operations is to try avoiding perceptions of injustice among various constituents (McColl-

Kennedy & Sparks, 2003). This can be an arduous task since fairness and justice are not purely objective notions and may be a product of specific situational parameters. Perceptions of justice can also rely on individual comparisons to some idealized situation, involving counterfactual comparisons (Folger & Cropanzano, 1998; Morris & Moore, 2000; Roese, 1997). Such comparisons can involve cognitive and emotional processing and can lead to multiple conclusions.

In a series of studies we seek to show that technical and physical features of a waiting process can produce perceptions of unfairness, independent of the actual time-waited experience. Through systematic analyses of the properties of waiting queues, we seek to improve the understanding of perceptions of fairness queues produce. We first examine fairness perceptions that ensue before people actually join a queue, documenting assumptions or expectations about a waiting process one is about to join. We then analyze how structural features of a queue lead to fairness perceptions.

We begin, next, with a brief overview of available research on types of queues and fairness in queues. In Study I, we then examine expectations from and preference for alternative queue

a seeming contradiction

between expectations and preferences. Studies II through IV then test hypotheses about the impact of various queue structures and processes on fairness perceptions. These studies rely and extend the experimental paradigm described by Rafaeli, Baron, & Haber (2002) for continued research on queue. The results of the four studies together provide important implications both for management and for future research on queues as well as fairness perceptions.

Types of Queues

A common typology separates between Multiple Queue, Single Queue and Numbered Queue structures (Hall, 1991). In the Multiple Queue (MQ) structure typical of supermarkets for example, individuals entering the queue select the line in which to wait and hence the provider from which they will receive service. What we call a "VIP Queue" is a specific case of the Multiple Queue in which headway in the queue can be purchased, meaning that money can purchase a right to receive service before one's turn has arrived according to pace of arrival. Such queues often exist in the Business Class aisle of airports for example. Regular Multiple Queues do not warrant the FIFO (First-In-First-Out) rule, since variations in processing speed as a result of employee skill or motivation or a result of slow or problematic customers can cause unexpected delays. In other words, the speed of progress through a line in a Multiple Queue cannot be guaranteed to be identical in all lines, suggesting potential lack of fairness.

Other queue types can warrant more fairness of the process. In a Single Queue (SQ) structure used in many amusement parks or Disney attractions for example all arriving individuals are channeled into one single line in which they progress while waiting to receive service from the first service provider who becomes available. In a Numbered Queue (NQ) structure used in many restaurants, health services and government agencies the arriving order of individuals relative to those who arrived before or after them is noted, but individuals are free to roam around or sit somewhere until it is their rightful turn to receive service. Both Single Queue structures and Numbered Queue structures thus hold an implicit promise for fairness. Progress in these structures is disciplined by the FIFO or FCFS (First-Come-First-Serve) rule (Hall, 1991: 417). Figure 1graphically depicts a Multiple Queue, Single Queue and Numbered Queue setup.

[Insert Figure 1 about here]

Study I

Queue Structure, Preferences and Expectations

Since queues serve as entry points into service settings, one of the first questions is what expectations alternative queue types produce. Baker and Cammeron (1996) claim that the spatial layout in a service environment can create perceptions of queuing progress, which can, in turn, lead to lower perceived waiting time. Such perceptions can, however, be biased by the spatial layout of a queue. A Single Queue, for example, makes the total number of people waiting more salient than a Multiple Queue, since in a Multiple Queue a person waiting may take into consideration only the people ahead in a specific line rather than the complete set of people waiting. Because of such biases, Single Queue structures can be expected to produce expectations for a longer waiting period than Multiple Queues.

Additional perceptual biases may further bias expectations of a perceived waiting period. People waiting in line are likely to focus on the people ahead of them in the line (Mann & Taylor, 1969), rather than on people behind them or on the total number of people waiting for service. Moreover, we claim that people tend to focus on other people rather than on the more abstract relationship between the number of people in line and the number of service providers. Thus, in a Multiple Queue structure, individuals are likely to notice a smaller number of people than in a Single Queue structure. In the latter, a person visually sees himself or herself as part of a large number of people waiting for service, without due attention to the fact that multiple service providers pitch in to attend to all these people.

To illustrate, consider a case of 30 people waiting for service and 6 service providers. If the queue is structured as a Multiple Queue (6 lines, one for each service provider with 5 people in

each line), people waiting can be expected to focus on the people ahead of them in the line, which would be 4 people at most. But if the queue is structured as a Single Queue or a Numbered Queue (one line of 30 people), people waiting can be expected to focus on up to 30 people who can be ahead of them in the line. Such biases are particularly likely in first impressions where individuals do not completely process the details of the situation (Asch, 1997). A brief image of a Single Queue and a Numbered Queue can therefore be expected to create expectations for a significantly longer wait than a brief image of a Multiple Queue, even if the total number of people waiting is identical in all cases. Such brief impressions are critical in cases where individuals can make a decision to join or desert a queue.

Another bias that may influence the expected waiting period is the presumed progress in the queue. A picture depicting physical movement is known to produce a greater sense of activity or higher arousal (Takahashi, 1995), which is known to decrease the sense of time loss (Zakay, 1989). Thus, a queue structure that more forcefully conveys movement can be expected to decrease the sense of time wasted in the queue. Rafaeli, Barron, & Haber (2002) show that the sense of progress and the sense of fairness provided by Single Queue structures enhance perceived arousal and improves perceptions of the waiting experience. They argue that Single Queue structures provide more clear evidence of progress than Multiple Queue structures. The Numbered Queue structure provides no clear physical sense of arousal or progress toward the end of the queue. Given the sense of movement and arousal associated with a Single Queue, we therefore expect encounters with a Single Queue structure to produce expectations for a shorter waiting period than encounters with a Numbered Queue structure. Hence our first hypothesis:

Hypothesis 1: With the same total number of people waiting, the expected waiting period will be shortest with a Multiple Queue structure and longest in a Numbered Queue structure.

Queue Types and Preferences

A common assumption about waiting queues is that people are keen to minimize the time they 'waste' waiting (Maister, 1985). It seems therefore that everything else being equal people should prefer queue structures associated with expectations for the shortest waiting period. According to Hypothesis 1, therefore, people can be expected to prefer waiting in a Multiple Queue structure. Yet this prediction does not consider additional expectations that queue structures can inspire. As noted earlier, queues are likely to provoke assessments of fairness and fairness violations. Previous experiences of unfairness are likely to elicit unpleasant emotions and to be recalled each time a similar queue structure is encountered. An encounter with a new queue structure is likely to evoke the emotions experienced in previous encounters with similar structures. However, since negative experiences are likely to be heavily weighed in subjective judgment processes (Baumeister, Bratslavsky, Finkenauer, & Vohs, K.D., 2001; Lewick, Czapinski & Peeters, 1992), an encounter with a new queue structure that produced negative experiences in the past is likely to produce a stronger unpleasant emotion than an encounter with a queue structure that produced a positive experience in the past.

Thus, queue structures that have at some point been experienced as unfair or unpleasant can come to be associated with a general unpleasant feeling associated with the expectation for lack of fairness. Since fairness violations are emotionally charged as negative, we suggest that people will prefer queue structures that reduce the likelihood of such violations even if such structures might entail an additional time in the queue. Since Multiple Queue structures are more

likely to allow violations of fairness than Single Queue structures or Numbered Queue structures, we predict that people will prefer Single Queue and Numbered Queue structures rather than Multiple Queue structures:

Hypothesis 2: Everything else being equal, people will prefer to wait in a Single Queue structure or a Numbered Queue structure rather than in a Multiple Queue structure.

Hypotheses 1 and 2 form the foundation of a series of studies we conducted on the effects of queue structures. We tested Hypotheses 1 and 2 with a paper survey as a lead in to the experimental research program reported in Studies 2, 3 and 4. Given the focus on expectations and initial preferences, a paper and pencil test was assumed as the most efficient and appropriate method for this phase of study.

Study I

Method

Overview

Subjects were shown visual images of three queue structures: Single Queue, Multiple Queue and Numbered Queue, as depicted in Figure 1. The physical layout in which icons are represented in the queues is distinctly different. The number of people shown in the pictures as waiting was intentionally large, to evoke a clear sense of a waiting queue.

Subjects

Respondents (n=100, 46 females and 54 males, average age 23, SD=2.5) were individuals approached by a research assistant in two local malls in Israel. Respondents agreed to complete the brief survey with no external reward.

Variables

The independent variable was ***queue structure***. The Multiple Queue (MQ) condition was subjects' responses to the left hand image in Figure 1, with 6 service stations and six separate lines. The Single Queue condition was responses to the middle image, which has the same six service stations but only one long snake line. The Numbered Queue condition, depicted on the right hand image in Figure 1, also has six service stations, but also included a notation of a 'seating area' (more or less in the middle of the figure), an icon of a desk identifying the subject's number (bottom left), and an icon of a board identifying the number currently receiving service (on the right hand side). A pilot test confirmed that subjects recognized and identified the queues as distinct structures and as representing these types of queue structures.

The dependent variables were ***anticipated waiting time*** and ***queue preference***. Subjects were asked to assume the pictures are all queues for the same service, and to answer the following question about each of the images:

1. Assuming you walked into a service area with each of these queues, how long would you expect to wait?
2. Assuming the pictures are all queues for the same service, in which queue would you prefer to wait?

Study I

Results

Hypothesis 1, which predicted that a Multiple Queue structure will create expectations for the shortest wait, while a Numbered Queue will create expectations for the longest wait was fully confirmed in a repeated measures analysis ($F_{(2, 198)}$=10.028, p=0.000). The average waiting time that people associated with a Multiple Queue was 17 minutes; the average waiting time

associated with the Single Queue was 29 minutes, and the Numbered Queue 39 minutes. Post Hoc tests proved that the estimated waiting time in each queue type is significantly different from both the others ($F_{\text{Multiple Queue - Single Queue}(1, 99)}=18.344$, p=0.000); ($F_{\text{Numbered Queue - Single Queue}(1, 99)}=4.907$, p=0.02); ($F_{\text{Multiple Queue - Numbered Queue}(1, 99)}=11.256$, p=0.01).

Hypothesis 2, which predicted that people would <u>least</u> prefer waiting in a Multiple Queue structure, was also confirmed. A majority of subjects (53%) preferred the Numbered Queue; 25% of subjects preferred the Single Queue; and the smallest proportion of people (22%) preferred the Multiple Queue Structure ($^2_{(2)}=6.16$, p<0.05). While the Numbered Queue was significantly preferred over the Multiple Queue ($^2_{(1)}=4.481$, p<0.05), the Single Queue did not differ significantly from either the Numbered Queue ($^2_{(1)}=3.57$, p=0.059) or the Multiple Queue ($^2_{(1)}=0.59$, n.s.). It appears therefore that the Numbered Queue was clearly preferred by our respondents, although, as documented in Hypothesis 1, this queue structure was also expected to demand the longest wait.

Study 1

Discussion

The results of Study 1 confirm Hypothesis 1 and Hypothesis 2, but together paint a curious picture since respondents seem to prefer the Numbered Queue (Hypothesis 2) while also expecting this queue structure to impose the longest wait (Hypothesis 1). A rational economic assumption, that people seek to reduce their loss of time, is challenged by these findings. Preferences of queue structures appear here as not necessarily correlated with a predicted saving in time. A focus on time estimations and time saving in queue design is the typical premise of

operations researchers (Hall, 1991; Hillier, & Lieberman, 1995) and social psychologists of time (Zakay, 1989). This focus seems to be missing some important aspects of queue dynamics. The findings of Study 1 can be labeled the "*Queue Paradox*" wherein *the queue structure that is preferred is the same one predicted to require a longer wait*. Studies 2, 3 and 4 seek to identify and examine additional parameters that play into people's perceptions of and preferences for queue structures. A prediction developed and tested in Study II, as elaborated next, is that a key parameter of queue structures is the fairness or procedural justice that a queue structure represents.

Study II

Queue Structure and Fairness Perceptions

Two factors play into judgments of whether a decision, action or procedure is fair: balance, or how a given action or situation compares to other actions or situations, and correctness, which

time and place (Sheppard, Lewicki, & Minton, 1992). Perceptions of fairness in queues are likely to rely on social comparisons to other people in the queue terms. Comparisons involve relative position and relative progress in the queue, with fairness being a match between the speed and order of arrival to the queue and the speed and order of service (Larson, 1987).

Procedural justice, or the extent to which the rules and procedures guiding progress through a queue are clear and identical for all the people involved, seems to be a key feature of queue justice (Cropanzano and Greenberg, 1997; Schneider & Bowen, 1999; Sheppard, Lewicki, & Minton, 1992). A First-In-First-Out (FIFO) rule which promises a perfect correlation between the order of arrival and the order of departure from a queue is the manifestation of procedural justice in queues. If FIFO is maintained people are likely to see the situation as fair and to be

content (Larson, 1987; Maister, 1985). Violations of the FIFO rule lead to feelings of relative deprivation (Pettigrew, 1967). In queues as in other settings procedural justice can be a more powerful determinant of reactions than actual distribution of the outcomes (Clemmer and Schneider, 1993; Folger & Cropanzano, 1998). Both Taylor (1995) and Larson (1987) identified perceived procedural justice as a key variable for analyses of waiting.

Queue Structure and Fairness

Study I showed queue structure to lead to both expectations and preferences, revealing a paradox between time expectations and structure preferences. One explanation for the queue paradox may be the different levels of fairness associated with different structures. A queue structure may be preferred over another structure that appears to require less waiting time if the former is perceived as more fair. In particular Multiple Queue structures, in contrast to Single Queue structures and Numbered Queue structures, appear to make it more possible for fairness violations to occur. This is because in a Multiple Queue structure some lines may move faster than other lines, so some people may progress through a waiting period faster than other people, in a process that is not necessarily fair. In contrast, procedural justice seems built into the Single Queue and the Numbered Queue structures making fairness violations appear less likely. It therefore seems that people waiting in a Multiple Queue are more likely to experience fairness violations. One interesting question is whether perceptions of unfairness in a Multiple Queue occur only when there are actual violations of procedural justice. It may be that the mere presence of a Multiple Queue structure produces a sense of fairness violations, even when there are no objective violations.

Two dynamics conspire to improve fairness perceptions in a Single Queue structure and a Numbered Queue structure as opposed to a Multiple Queue structure. First, as noted above,

procedural justice is more clearly apparent in the Single Queue and the Numbered Queue structures, while it is not apparent in the Multiple Queue. The Single Queue and the Numbered Queue structures represent an institutionalized attempt to monitor the order of arrival of patrons and to deliver service in this order (maintaining the FIFO rule). Although violations in this order may still occur, the apparent attempt to maintain a fair order can be expected to lead to perceptions of greater fairness in a Single Queue and a Numbered Queue wait structure than in a Multiple Queue structure.

Second, the Multiple Queue structure makes assessment of fairness more salient than the Single Queue and the Numbered Queue since it provides a clear frame of comparison. The separate lines of the Multiple Queue structure create a frame that invites social comparisons to both people ahead and behind in the same line and to people in other lines who arrived at the same time as them. Additional comparisons are likely to make the existence or nonexistence of justice more salient, and Rafaeli, Barron, & Haber (2002) showed that people waiting are capable of accurate monitoring of the relative fairness of different isles in a Multiple Queue. In contrast, the Single Queue and Numbered Queue invite comparisons primarily to people who arrived either just before or just after a particular patron arrived and not to the whole set of people waiting in line. Together these two dynamics lead to our next hypothesis:

Hypothesis 3: Waiting in a Multiple Queue structure will produce lower perceptions of fairness than waiting in a Single Queue or a Numbered Queue structure.

Hypothesis 3 addresses the effects of the structure of a queue on perceptions of fairness. This hypothesis does not recognize the differences between Single Queue structures and Numbered Queue structures, positioning both these structures as promising more procedural justice and greater perceptions of fairness than Multiple Queue structures. However, Single

Queue structures physically designate a FIFO order and allow visual monitoring that this order is maintained. In contrast Numbered Queue structures imply that FIFO exists but the actual maintenance of procedural justice is not self apparent in the way the queue progresses. A key difference between the Single Queue and Numbered Queue is the ability of the people waiting to fully monitor whether the queue does or does not maintain the FIFO discipline.

In the Single Queue, justice violations are visually apparent. Anyone being served out of line can be seen. In contrast, in a Numbered Queue structure, presumably the FIFO discipline occurs, but people waiting cannot really know if service is delivered in the order in which people arrived. In the Numbered Queue, FIFO is only abstractly represented; violations are difficult to assess since people waiting cannot always know the exact order of arrival of other people. Thus, a comparison of perceptions of fairness in a Single Queue structure versus a Numbered Queue examines the question of whether fairness perceptions are a product of actual monitoring of fairness or a product of a symbolic representation of fairness. If fairness needs to be monitored in order to be reported, Single Queue structures should produce higher perceptions of fairness than Numbered Queue structures. If symbolic representation of FIFO maintenance is enough to produce perceptions of fairness, then there should be no difference between Single Queue structures and Numbered Queue structures in fairness perceptions.

Symbols are known to have powerful effects on perceptions that can equate and override objective assesments (Bushman, 1984; Dandrige, 1983; Gagliardi, 1992; Rafaeli & Worline, 1996). We therefore predict that symbolic representation of fairness should produce similar effect on perceptions of fairness to those produce by physical or visual monitoring of fairness. Hence our next hypothesis:

Hypothesis 4: There will be no difference in the perceived fairness between people waiting in a Numbered Queue and people waiting in a Single Queue.

Study II

Method

Overview

To test Hypotheses 3 and 4 we sought a paradigm that would combine an actual waiting experience with a controlled type of service and reliable measurements. We used an experimental paradigm that builds on the ideas advanced by Rafaeli, Barron, & Haber (2002). The goal was to introduce only minimal intrusion into an actual waiting experience while capturing the essence of the different queue structures. The paradigm manipulated the type of queue structure subjects experienced during an actual waiting period in a university lab (while waiting to participate in an unrelated experiment). Subjects waiting in a lab for studies conducted by other university researchers were randomly assigned to one of the queue conditions. While waiting, subjects saw their assigned queue structure on a computerized screen and used their mouse to progress in this queue.

Subjects

Subjects were students recruited through ads around the campus (n=98, 48 females, 50 males, average age 25.3 years, range 19-31 years).

Research process

Subjects were volunteers who came to a research lab for a paid experiment in person perception. Subjects were told that there was a short delay before their experiment would begin, but that for their convenience there was a computerized representation of their progress in the

wait. Subjects were then informed that for their convenience the wait queue is represented on the screen in front of them, and were instructed about how to move through the queue with their mouse. After preliminary instructions, subjects saw on the screen a visual depiction of the queue in which they were presumably waiting (to which they were randomly assigned).

The images subjects saw were similar to those depicted in Figure 1, but allowed for dynamic progress through the queue until reaching a service agent, at which point another experiment would open up on the screen. The computer screen was gray and dots representing people in line were in red, yellow, green, or blue hues. Subjects selected a color and shape to represent them throughout the study, and the program represented all other individuals in line using a different color and shape from those selected by the subject. The queues in all conditioned proceeded dynamically until the subject reached a service provider. To progress in the queue subjects clicked on their icon. The number of people in each line or queue, the rate of progress of a line, the number of service providers, and other variables could be predetermined through programming, which allowed for the experimental manipulations in this and the next studies.

The computer program was developed in Visual Basic 5, run on Pentium II computers with

included the number of service persons (six), the average number of customers present (54 throughout the wait, including six at clerk stations), the time taken to handle a customer (sampled from a standard gamma distribution, with a mean of 82 seconds) and the pace of arrival of new customers (sampled from a Poisson distribution with a mean of 13.6 seconds). Also identical

icons (0.8 cm in diameter) and the distance between icons.

Subjects used their mouse to join and progress through the queue, waiting and progressing through the queue for approximately 12 minutes. When they reached the service provider a screen asked subjects to respond to a series of questions about their perceptions of the wait (see variables below) before proceeding to the next experiment. This set of questions was introduced as intending to test the 'new way' of informing subjects of unexpected waits for laboratory experiments. After they answered these questions, subjects received instructions and materials for the main experiment for which they had been invited, which was an experiment in person perception. At the end of this second experiment, subjects were paid for their time, debriefed, and released.

Before entering the queue, subjects were told that they could leave at any time, but that only those who completed the experiment (which would start at the end of the queue) would receive payment. Thus, the study involved actual waiting for an outcome sought by the subjects participation in a paid experiment. Debriefing sessions confirmed that subjects saw the depiction on the screen as a representation of the queue in which they were waiting, and that subjects saw the second study (for which they had waited) as the key study. Similar to other waiting situations, therefore, subjects were waiting for a desirable experience; they could leave the queue at anytime but doing so would mean forgoing a sought outcome.

Variables

The independent variable, ***queue structure*** included one of three conditions depicted in Figure 1: (i) Multiple Queue (ii) Single Queue, (iii) Numbered Queue. All queue conditions included 54 icons representing people waiting, but the arrangement of the queue of icons varied, as follows: The Multiple Queue showed six lines with 8, 9, or 10 people with equal probability between subjects. The Single Queue showed one long 'snake' line of 54 people. The Numbered

Queue condition assig

location in the sitting area on the screen, see right hand icon in Figure 1) and wait until their number was called.

In all three conditions, new arrivals were to go to the end of the queue (the shortest line in the Multiple Queue, the end of the line in the Single Queue, the next number in the Numbered Queue). Since in all three conditions subjects saw 54 spots representing people, the variations in the organization on the screen created the different queue structures and experimental conditions. Mathematically all three queue structures imposed a queue with the same number of people, but the discipline of service delivery was systematically varied in a between-subject design.

The dependent variable, ***perceived fairness*** was an index adapted from Greenberg (1993) comprising the following 3 items: (1) to what extent was the wait method fair? (2) To what extent was there an appropriate process for determining the order in which service was received? (3) To what extent was the method of order of receiving service fair to people? (Cronbach's Alpha = 0.93).

Study II

Results

As summarized in Table 2.1, an ANOVA of perceptions of fairness in the different queue conditions supported Hypotheses 3 and 4. Consistent with Hypothesis 3, reported fairness was significantly higher in the Single Queue and Numbered Queue structure condition than in the Multiple Queue condition ($F_{(2,75)}$=7.939, p=0.000). In a post hoc analysis, perceptions of fairness in the Numbered Queue structure were greater than in the Multiple Queue (M_{MQ}=2.65, M_{NQ}=3.41, Scheffe=4.2, p=0.015). Fairness in the Single Queue structure was higher than in the Multiple

Queue structure (M_{MQ}=2.65, M_{SQ}=3.61, Scheffe=5.36, p=0.001). Furthermore, as predicted by Hypothesis 4, there was no significant difference between fairness perceptions in the Single Queue and the Numbered Queue, although perceived fairness in both was significantly higher than in the Multiple Queue condition (M_{NQ}=3.41, M_{SQ}=3.61 Scheffe=1.15, ns).

[Insert Table 2.1. about here]

Study II

Discussion

The results of Study 2 confirm perceived unfairness as a direct result of queue structure. Since everything else was held constant, the research paradigm identifies queue structure as the reason for differences in unfairness perceptions. As predicted by Hypothesis 3, perceived fairness was significantly higher in the Single Queue and Numbered Queue structures than in the Multiple Queue structure. As predicted by Hypothesis 4, there was no significant difference in perceptions of fairness between the Single and the Numbered Queue structures.

A question left open in the design of Study 2, however, is the relative effect of queue structure on fairness perceptions as compared to the effects of actual violations of fairness. In a queue structure in which fairness violations are easily visible, such as a Single Queue structure, actual violations can be expected to lower perceptions of fairness. In a structure where violations are less readily recognized, and fairness is not clearly promised by the structure, such as a Multiple Queue structure, actual fairness violations may exacerbate perceptions of unfairness. The following empirical study examines these two effects.

Study III

Fairness Perceptions in Queues:

A Result of Fairness Violations or Mental Frames?

Separating between the effects of actual violations of fairness and the effects of individual mental frames on fairness perceptions requires one of two settings. First, a comparison is needed between cases where everything else is held constant except for objective violations of fairness. This comparison is the focus of our next hypothesis, which seeks to test the extent to which people are sensitive to actual fairness violations:

Hypothesis 5: Fairness reports in a queue in which fairness is violated will be lower than fairness reports in an identical structure in which fairness is not violated.

Hypothesis 5 examines whether reports or perceptions of fairness recognize and respond to objective FIFO fairness. A second comparison that allows separation between the effects of actual and presumed lack of fairness is between two settings with an identical degree of fairness but a difference in the fairness implied or allowed by the queue structure. Such a comparison can test the effect of the mental frame held by people about fairness in different queue structures. Since mental frames and models are known to influence and bias perceptions even at the cost of distorting an objective situation (Berger, Webster, Ridgeway and Rosenholtz , 1986; Berger & Luckman, 1967), and following the findings of Study 2, we predict that perceptions of fairness can be hampered by expectations from a given queue structure ***even if there are not actual fairness violations***:

Hypothesis 6: Reported fairness in a queue structure that promises FIFO will be greater than in a queue structure in which FIFO might be violated but is not in a particular waiting experience.

Hypotheses 5 and 6 were tested using a paradigm similar to Study 2 but adapted to examine the effects of actual versus presumed violations of fairness.

Study III

Method

Overview and Process

Hypotheses 5 and 6 were tested by comparing responses of people waiting in a Multiple Queue structure that does include fairness violations to responses of people in a Multiple Queue structure that did not include justice violations. The procedure was identical to Study 2, with the following specific elements.

Subjects

Similar to Study 2 subjects were students waiting to participate in an experiment (n=134, 65 females), with an average age of 25.3 years (range 19-31, SD=2.5).

Variables

The independent variables were ***queue structure*** and ***actual fairness violations.*** These variables were combined into one of three experimental conditions: Condition I (Multiple Queue structure without fairness violations), Condition II (Multiple Queue structure with fairness violations) and Condition III (Single Queue structure). Subjects saw themselves as waiting in either a Multiple Queue or a Single Queue. A manipulation not easily visible to subjects further randomly split those in the Multiple Queue condition into two conditions: A Multiple Queue structure where FIFO was maintained, and a Multiple Queue structure where FIFO was not maintained.

All other parameters of the queues were identical to Study 2 (a total of 54 people in the queue, 6 service providers and six lines in the Multiple Queue conditions). In the condition *without fairness violations* (Condition I) the program maintained that no one reached service

before someone else who had arrived earlier. In the condition *with fairness violations* (Condition II) 2 or 3 people (icons) reached the end of the queue before they should have according to their order of arrival.

Thus, similar to Study 2, upon entry subjects in all three conditions saw an identical number of spots representing people ahead of them in the queue; new arrivals went to the end of the shortest line in the Multiple Queue structures and the end of the line in the Single Queue structure. But in contrast to Study 2 variations in the actual fairness of the flow of the queue created a between-subject design where subjects in one condition could clearly see and assume the queue structure as maintaining fairness (Single Queue structure) while subjects in another condition could *not* easily see fairness in their queue structure (Multiple Queue structure without fairness violations).

The dependent variable was ***perceived fairness***, identical to Study 2.

Study III

Results

As summarized in Table 3.1, the results confirmed Hypotheses 5 and 6. As predicted by Hypothesis 5, fairness ratings were significantly higher among subjects who waited in a Multiple Queue that did not allow fairness violations than among subjects who waited in a Multiple Queue that allowed fairness violations ($M_{\text{MQ no violation}}=4.99$, $M_{\text{MQ with violations}}=4.14$; $t_{(67)}=2.42$, $p<0.05$). As predicted by Hypothesis 6, fairness ratings were significantly higher among subjects who waited in a Single Queue than among those who waited in a Multiple Queue without fairness violations ($M_{\text{Single Queue}}=6.1$, $M_{\text{MQ no violation}}=4.99$; $t_{(99)}=4.75$, $p<0.001$). Thus, both actual violations of fairness

and presumed maintenance of queue fairness influenced subjects' perceptions of fairness in a queue.

[Insert Table 3.1 about Here]

Study III

Discussion

Studies 2 and 3 together suggest that Multiple Queue structures produce perceptions of unfairness. Multiple Queue structures are shown to evoke a sense of unfairness whether they do or do not produce objective violations of fairness. A Multiple Queue structure in which there are objective violations of fairness is shown to evoke very strong perceptions of unfairness. However fairness perceptions are shown to stem from two factors: (1) The fairness that a queue structure symbolizes and (2) the fairness that a queue structure actually exercises. The results suggest separate effects of queue process and queue structure. An identical structure (Multiple Queue) was perceived as more or less fair depending on the process it involved (Hypothesis 5). But an identical process (symbolically communicating no fairness violations) holds independent effects on perceptions of fairness (Hypothesis 6).

Thus far our hypotheses examined situations where fairness violations occurred because of the flexibility that a queue structure provides to patrons; employees or customers may move more or less slowly in a Multiple Queue, and these differences can produce variations in the speed of different lines, which can create situations of unfairness. But there are cases of institutionalized fairness violations, for example when organizations offer customers an opportunity to exchange money for time. There are anecdotal reports for example that customers holding Platinum credit cards can progress to the head of a telephone queue to receive immediate service before others who may have called earlier. Similarly, customers can purchase the right to

be channeled into what can be called a VIP Queue or a Business Class queue, which is simply a shorter line in a Multiple Queue.

However, such VIP policies can actually be viewed as institutionalized violations of procedural justice; for a monetary fee, customers arriving later can receive service earlier, clearly violating the FIFO discipline. For example at check-in counters at airports, or designated queues

stand in a short line or to receive immediate service. Our next and final study examines customer perceptions of the fairness such queue structures.

Study IV

Institutionalized Fairness Violations in Queues

customers are categorized into two groups: People willing to wait for service, and people willing to pay in order to avoid a wait. Friedman & Friedman (1997) argue that both organizations and customers benefit from this arrangement: The organization has an opportunity to make more money and to hire additional staff, and customers, for whom time is more valuable than money, can avoid the costly waste of time. In addition, the regular (non-VIP) lines benefit because the VIP line reduces the number of customers the other lines must process (Friedman & Friedman, 1997). However Friedman & Friedman (1997) did not have empirical data for their assertions, and did not address the impact of such procedures on fairness perceptions.

Social comparisons in a VIP Queue structure can create psychological uneasiness. What people in the regular (non-VIP) line see is other people (in the VIP line) receive service in an order that clearly violates the FIFO discipline. The VIP Queue means some of the people in a

Multiple Queue structure wait in a long line while others in the same Multiple Queue structure wait significantly shorter. Obviously there may be an explanation for this difference. But that only some people are allowed to join the shorter line is a clear violation of the First-In-First-Out rule. The rationale for the shorter line (e.g., that these people have paid more) is not always clear and can be viewed as a violation of procedural justice. If people in the VIP queue paid for their access to this benefit, it could be argued that there are fair procedures that apply to all, making the situation procedurally just. But whether people have paid, or how much was paid to purchase this inequality in time in the queue is not always known. Moreover, payment may not be recognized as a legitimate rule for violating the FIFO rule in queues, in which case a VIP queue may be perceived as unfair. Especially in situations where VIP queues are not familiar it seems likely that people will see them as unfair. Hence our next hypothesis:

Hypothesis 6: Reported fairness in a VIP Queue structure will be lower than in a regular Multiple Queue structure.

Study IV

Method

Overview and Process

Hypothesis 7 was tested by comparing responses of subjects waiting in a regular Multiple Queue structure to responses of subjects waiting in a VIP Queue structure. The process was identical to Study 2, with the following specific elements.

Subjects

Similar to Studies 2 and 3, subjects were students waiting to participate in an experiment (n = 38, 17 females, 21 males, average age 24, range 20-28, SD = 2.2). These students participated in the study for monetary compensation.

Variables

The independent variable -- ***queue structure*** -- included two conditions: Condition I was a regular Multiple Queue condition with no fairness violations. Condition II was a VIP Queue structure, which was a Multiple Queue structure in which one of the 6 lines had only 2 icons that represented only 2 people waiting. Subjects were randomly assigned to one of the conditions.

Subjects assigned to the VIP Queue conditions were told as they entered the queue that there is a shorter line that they can move into for a small fee (5 NIS, approximately $1.00). Subjects were told they could pay this fee and move to the shorter queue at any point of their wait until they reached the service provider. Alternately, subjects could stay in the line that they chose.

The amount of money required to move to the shorter line was determined in a preliminary study, using a method known as the BDM mechanism as described by Becker & DeGroot (1964). Using the BDM method, a preliminary experiment identified the median fee that people are willing to pay in order to move to the VIP line as 2.00 NIS (approximately 50 Cents at the time of the study). The goal of the current experiment was to assess perceptions of fairness among people who did *not* move to the VIP line although they had had the option to make this move by paying a fee. Since moves into a VIP Queue are typically associated with a significant expense, the median identified through the BDM method was more than doubled, to create a fee that very few people would likely pay. Payment received from subjects who did move to the VIP queue was donated to charity.

Study IV

Results

Only three subjects (8%) in the VIP Queue structure condition elected to pay and move to the shorter line, a figure that is consistent with the idea that the VIP line is highly selective. Responses of these subjects were excluded from the analysis.

Hypothesis 6, which predicted that fairness perceptions among subjects who waited in a VIP Queue structure would be lower than fairness perceptions of people who waited in a regular Multiple Queue structure, was confirmed. Average fairness was significantly lower in the VIP Queue structure condition than in the Multiple Queue structure condition, as predicted (M_{VIP}=2.7, M_{MQ}=3.44, $t_{(36)} = 2.51$, $p=0.017$).

General Discussion

Our first study identified the queue paradox, which entails a contradiction between the length of time expected to wait in a specific queue and people's preferences regarding queues. The studies that followed verified our hypotheses that fairness is a key variable underlying this paradox. The studies further document various factors that determine the extent to which people see a queue as fair. In general we found that the FIFO discipline is at the heart of fairness assessments. Yet our findings suggest that fairness assessments involve more than the order in which people arrive in a queue. The complications we observed are consistent with the findings reported by Martin (1986), that businessmen waiting for their luggage reported feelings of injustice when they saw people that arrived after them, but had no luggage with them, leave before them.

Multiple Queue structures are perceived as the most unfair as compared to a Single Queue and a Numbered Queue structure. Perceptions of unfairness occurred when a specific Multiple Queue structure involved fairness violations, but also when the same structure did not involve

actual fairness violations. The issue thus appears to be one of past experiences in addition to current experience. Importantly, perceptions of fairness in a queue are shown here to systematically reflect queue structures, as predicted by our various hypotheses.

Observable differences between a Single Queue and the Numbered Queue structures did not produce significant differences in perceived fairness. In contrast, Multiple Queue structures were consistently perceived as less fair than both the Single Queue and the Numbered Queue structures. This pattern occurred with all the variations of a Multiple Queue structure: where the waiting involved fairness violations, where the waiting did not involve fairness violations, and where the waiting allowed for VIP fairness violations. This set of findings explains a common complaint of "I always happen to choose the wrong line." It seems that people feel that they have chosen an unfair line, even if the line did not produce any unfairness.

Our four studies together suggest that people are sensitive to the fairness represented by a certain queue structures in addition to fairness experiences in a particular waiting experience. When a queue structure allows for fairness violations, it brings about a general feeling of unfairness and frustration, even if fairness happened to be maintained in this specific instance.

Of particular interest is our finding concerning the VIP Queue which was perceived as less fair than a regular Multiple Queue. The VIP Queue is not a queue that allows intrusion of the queue flow (Schmitt, Dube, & Leclerc, 1992). The VIP Queue and the regular Multiple Queue have in common a structure that symbolizes an unfair process. Both allow for an unfair process since in both FIFO is not necessarily maintained. Yet our findings report that reported unfairness was stronger in the VIP Queue than in the regular Multiple Queue.

A possible explanation is that the option to pay for FIFO violation in the VIP Queue draws attention and makes more salient the potential lack of FIFO in the queue. Payment issues can

paint social situations in all sorts of ways. Fisk & Coney (1982), for example, who introduced subjects to scenarios in which some people paid less for a flight, found that passengers who paid less expected lower quality service during the flight. Thus, payment is shown to tint the situation. In the study we conducted, it could be that payment produced more focused attention which may make people more aware of their negative feelings about the unfairness, exacerbating reported unfairness (Lewick, Czapinski, & Peeters, 1992; Willemsen, & Keren, 2002).

The overarching message of the four studies together is that fairness in queues involves at least four dimensions. First, fairness is implied by a queue structure, producing expectations about fairness prior to an actual waiting experience. Second, the experience of waiting in a queue produces perceptions of the extent to which the waiting process is fair. Third, fairness assessed because of Queue Structure and underlying discipline affects perceptions of fairness independent of an actual fairness experience. Finally, institutionalized cases of fairness violations, even if they rely on financial mechanisms, do not attenuate but rather strengthen perceptions of unfairness in a queue.

Applied Implications

The series of findings reported provide valuable insights for the design of waiting queues by customer service organizations. Our findings recommend avoiding Multiple Queue structures to the extent possible since they seem to produce the strongest negative reaction. This recommendation is consistent with the claims of Rothkoopf & Rech (1987) that merging several (Multiple Queue) lines into one line has in it more than reducing the waiting time. We suggest that such merging has the important effect of improving perceptions of fairness in the queue.

Our findings further present the Numbered Queue as the most desirable queue structure. Additionally, organizations that embark upon separate VIP Queues should consider structuring

the queue in a way that does not draw attention to the lack of fairness of the process. One option may be to hold the VIP Queue in a completely separate or physically distant location from the other regular queue.

More broadly, our findings reinforce the importance of fairness in considerations of the design of waiting queues. Swan, Sawyer, Van Matre, & McGee (1985) report a relationship between customer satisfaction, customer intention to return and customer perceptions of equity or fairness. It thus appears that a solid understanding of the fairness implications of a waiting queue can be critical to effective service management.

Limitations

There are, of course, constraints and limitations to the findings we report and to the extent to which they can be generalized. First, the reported stream of research is based on survey and computer simulations of waiting queues rather than actual physical queues. Our manipulation checks confirmed that subjects believed they really were waiting for the experiment for which they had signed up, and that they saw themselves as waiting in a queue structured in a fashion presented on the screen. The queue simulation was interactive and, as reported by Rafaeli, Barron, & Haber (2002), was found to give subjects a real sense of progress toward the end of a queue and a desired goal. Nonetheless, additional testing of the hypotheses presented in real-life queues is essential. Groth & Gilliland (2001) provide an illuminating report of a field study of queues. That their findings are completely consistent with our hypotheses bolsters our confidence in the validity of the current findings, though it does not negate the need for additional field studies.

Second, our data was collected using self-report measures of a sample of college students. Additional tests of the generalizability of our findings to other samples and populations are

essential. The experience of waiting in line is not foreign to university students and there is no reason to assume it should be perceived differently by other people. Yet the limitations of studies such as reported here, conducted in controlled environments with college students cannot be ignored. Additional research should examine the effects of differently structured queues in the "real world" on perceptions of fairness.

References

Asch, S. E. (1997). Forming impressions of personality. In: C. E. Hughes, D. Ariely, & D. A. Eckerman (Eds.), *Background Readings for the Joy of Experimental Psychology*, 3rd ed. (pp. 48-72). Kendall/Hunt Publishing Company.

Baker, J., & Cameron, M. (1996). The effects of service environment on affect and consumer perception of waiting tome: An integrative review and research propositions. *Journal of Marketing Science*, *24*(4), 338-349.

Baumeister, R. F., Bratslavsky, E., Finkenauer, C., Vohs, K.D. (2001). Bad is stronger than good. *Review of General Psychology, 5*, 323-370.

Becker, G. M., & DeGroot, M. H. (1964). Measuring utility by a single-response sequential method. *Behavioral Science 9*, 226-232.

Berger, J., M. J. Webster, C. Ridgeway and S. J. Rosenholtz (1986). "Status cues, expectations, and behavior ".*Advances in Group Processes* 3, 1-22

Berger, P. L., & Luckman, T. (1967). *The Social Construction of Reality*. Garden City, NY: Doubleday.

Bowen, D. E., Gilliland, S. W., & Folger, R. (1999). HRM and service fairness: How being fair with employees spills over to customers. *Organizational-Dynamics*; *27*(3), 7-23.

Bushman, B. J. (1984). Perceived symbols of authority and their influence on compliance. *Journal of Applied Social Psychology, 14*(6), 501-508.

Clemmer, E, & Schneider, B. (1993). Managing customer dissatisfaction with waiting: Applying social psychological theory in a service setting. In T. A. Swartz, D. E. Bowen, & S. W. Brown. (Eds.), *Advances in Services Marketing and Management* (pp. 213-231). Greenwich, CT: JAI Press.

Cropanzano, R. and Greenberg, J. (1997). Progress in organizational justice: Tunneling through the maze. In :*International Review of Industrial and Organizational Psychology* .C. L. Cooper and I. T. Robertson. (Eds.) New York: Wiley.372-317:

Dandrige, T. C. (1983). Symbol's function and use. In L. R. Pondy, P. Frost, G. Morgan, & T. Dandridge (Eds.), *Organizational Symbolism* (pp. 69-79). Greenwich, CT: JAI Press.

Dube, L., Leclerc, F., & Schmitt, B. H (1992). Intrusions into waiting lines: Does the queue constitute a social system? *Journal of Personality and Social Psychology*, *63*(5), 806-815.

Fisk, R. P. and Coney, K. A. (1982). Postchoice evaluations: An equity theory analysis of *Conceptual and empirical contributions to customer satisfaction and complaining behavior* consumer satisfaction/dissatisfaction with service choices. In:. H. K. Hunt and R. L. Day (Eds.) Bloomington: Indiana University of Business, 9-16.

Folger, R., & Cropanzano, R. (1998). *Organizational Justice and Human Resource Management*. Thousand Oaks, CA, US: Sage Publications, Inc.

Friedman, H. H., & Friedman L.W. (1997). Reducing the wait in waiting line systems: Waiting line segmentation, *Business Horizons*, July-August.

Gagliardi, P. (Ed.). (1992). *Symbols and Artifacts: View from the Corporate Landscape*. New York: Aldine de Gruyter.

Gilliland, S. W., Groth, M., Baker, R., Dew, A. F., Polly, L. M., & Langdon, J. C. (2001). Improving applicants' reactions to rejection letters: An application of fairness theory. *Personnel Psychology*, *54*(3), 669-703.

Groth, M. and Gilliland, S. W. (2001). "The role of procedural justice in the delivery of services: A study of customers' reactions to waiting ".*Journal of Quality Management*, 6, 77-97.

Hall, R .W. (1991). *Queuing Methods for Service and Manufacturing*. New Jersey: Prentice Hall Inc.

Hillier, S. F. and Lieberman, J. G. (1995). *Introduction to operations research* .Singapore: McGraw Hill.

Larson, C. R. (1987). Perspectives on queues: Social justice and the psychology of queuing. *Operations Research, 35*(6), 895-905.

Lewick, M., Czapinski, J., & Peeters, G. (1992). Positive-negative asymmetry or "when the heart needs a reason". *European Journal of Social Psychology, 22*, 425-434.

Maister, D. H. (1985). The psychology of waiting lines. In J. A. Czepiel, M. R. Solomon, & C. F. Surprenant (Eds.), *The Service Encounter: Managing Employee/Customer Interaction in Service Businesses*. Lexington, MA: Lexington.

Mann, L., & Taylor, K. F. (1969). Queue counting: The effect of motives upon estimates of numbers in waiting lines. *Journal of Personality and Social Psychology, 12*(2), 95-103.

Martin, J. (1986). The tolerance of injustice. In: *Relative deprivation and social comparison: The Ontario Symposium*, 4, 217-242. J. M. Olsen. C. P. Herman, & M. P. Zana (Eds.), Hillsdale, NJ: Lawrence Erlbaum Associates.

McCall-Kennedy, J. R. and Sparks, B. A. (2003). Application of fairness theory to service failure and service recovery. *Journal of Service Research*, 5(3), 251-265.

Milgram, S., Liberty, H. J., Toledo, R., & Wackenhut, J. (1986). Response to intrusion into waiting lines. *Journal of Personality and Social Psychology, 51*(4), 683-689.

Morris, M., & Moore, P. C. (2000). The lessons we (don't) learn: Counterfactual thinking and organizational accountability after a close call. *Administrative Science Quarterly, 45*(4), 737-765.

Pettigrew, T. F. (1967). Social evaluation theory: Convergences and applications. *Nebraska Symposium on Motivation*, *15*, 241-311.

Rafaeli, A., & Worline, M. (2000). Symbols in organizational culture. In N. Ashkenazy, C. Wilderom, & M. Peterson. (Eds.). *Handbook of Organizational Culture and Climate* (pp. 71-84). Thousand Oaks, CA: Sage.

Rafaeli, A., Barron, G., & Haber, K. (2002). The effects of queue structure on attitudes. *Journal of Service Research*, *5*(2), 125-139.

Roese, N. J. (1997). Counterfactual thinking. *Psychological Bulletin*, *121*(1), 133-148.

Rothkopf, M. H. and Rech, P. (1987). Perspectives on queues: Combining queues is not always beneficial. *Operations Research, 35,* 906-909.

Saaty, T. L. (1961). *Elements of Queuing Theory*. New York: McGraw Hill.

Schmitt, B. H., Dube, L. and Leclerc, F (1992). "Intrusions into waiting lines: Does the queue constitute a social system? " *Journal of Personality and Social Psychology, 63(5),* 806-815.

Schneider, B., & Bowen, D. (1999). Understanding customer delight and outrage. *Sloan Management Review,* Fall, 35-45.

Schwartz, B. (1975). *Queuing and Waiting: Studies in the Social Organization of Access and Delay*. Chicago: University of Chicago Press.

Sheppard, B. H., Lewicki,R., & Minton, J. W.(1992). *Organizational Justice: The Search for Fairness in the Workplace*. New York, NY, US: Lexington Books/Macmillan, Inc.

Swan, J.E., Sawyer, J.C., Van Marte, J.G, McGee, G.W. (1985). Deepening the understanding of hospital patient satisfaction: Fulfillment and equity effects. *Journal of health care marketing, 5(3),* 7-18.

Takahashi, S. (1995). Aesthetic properties of pictorial perception. *Psychological Review, 102* (4), 671-683.

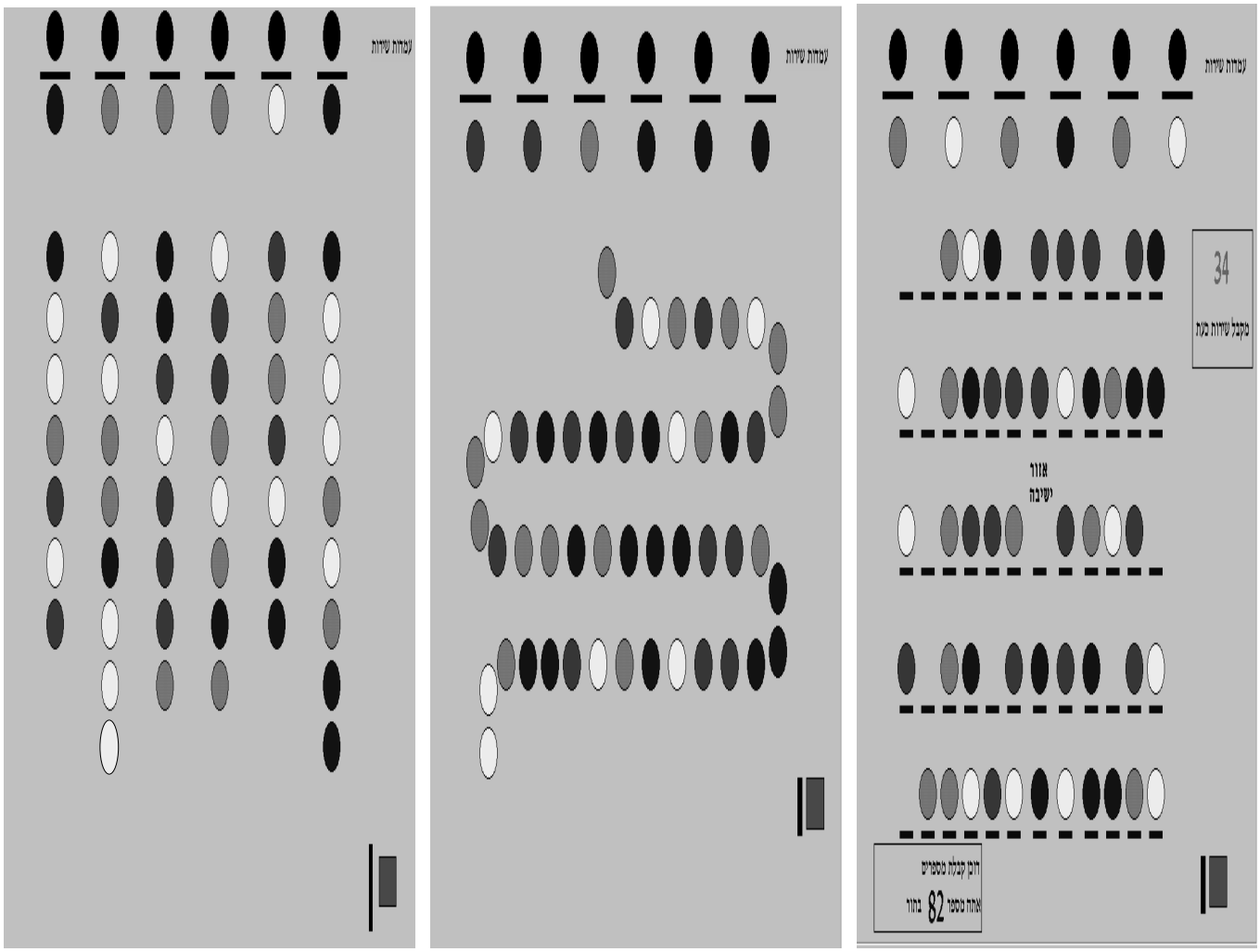
Taylor, S. (1995). The effects of filled waiting time and service provider control over the delay on evaluation of service. *Journal of the Academy of Marketing Science, 23*(1), 38-48.

Willemsen, M. C., & Keren, G. (2002). Negative-based prominence: the role of negative features in matching and choice. *Organizational Behavior and Human Decision Processes*, 88, 643-667

Zakay, D. (1989). Subjective Time and Attention Resource Allocation: An Integrated Model of Time Estimation. North Holland: Elsevier Science Publishers.

Figure 1

Images of Multiple Queue (left), Single Queue (middle) and Numbered Queue (right) shown to subjects[1]



[1] Subjects were told to see themselves as the represented by the square on the bottom ride hand side of each queue. Black ovals on the top are service agents. Subjects were not given any titles for the structures (multiple, single, etc.).

Table 2.1

Means and standard deviations of perceived justice in the different queue types

	Perceived Fairness		
	Mean	S.D.	F
Multiple Queue	2.65	0.986	
Single Queue	3.61	0.888	$F_{(2,75)}$=7.939***
Number Queue	3.41	0.87	

*** p=0.000

Table 3.1

Means and standard deviations of perceived fairness in two queue types and two fairness conditions

Condition	N	Mean	SD	t value	df	Sig.
Multiple Queue with fairness violations	33	4.14	1.68	2.42[2]	67	.018*
Multiple Queue with NO fairness violation	36	4.99	1.22			
Single Queue	65	6.10	1.07	4.75[3]	99	.000**

[2] This t-test compares the justice violation in MQ structure to the No justice violation in MQ structure.
[3] This t-test compares the No justice violation in MQ structure to the No justice violation in SQ structure.