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Using Signage to Direct attention May Increase Motivation

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Abstract

Motivation is a complex psychological construct, and one with astoundingly broad applicability. There are likely many underlying components of motivation, including memory, emotion, experience, physiology, talent, and attention. Research by Suri and Gross (2015) provides evidence for the basic hypothesis that attention contributes to motivation. By hanging signs in office cafeterias to draw attention to apples, they were able to demonstrate a significant increase in apple sales. The experiment described in this paper was designed to replicate the effect seen by Suri and Gross, using signs to draw attention to drinking water in order to increase water dispensed in an office setting. The experiment was also designed to test the hypotheses that attention and resulting motivation wane over time as attention habituates to new stimuli, and that a change in stimuli can recapture attention to result in increased motivation. The results of this experiment replicated the effect demonstrated by Suri and Gross, though the additional hypotheses were not supported.

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Using Signage to Direct Attention May Increase Motivation

by

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The current study was designed to explore how directing attention may increase motivation. The research was modeled on an experiment conducted by Suri and Gross (2015), one of a series of studies on the role of attention in motivation. Suri and Gross speculated that attention is critical for valuation processes, and that these valuation processes are responsible for motivation in situations where choice is required. It has been noted, however, that "many motivation theories fail to explain motivational phenomena that are not based on discrete choice processes. Intuitively, however, we all know that sometimes people engage in action first and think or justify it later" (Seo, Barrett, & Bartunek, 2004). Thus, it is not clear specifically what role valuation processes and/or attention may have in motivation

It does seem almost obvious that attention could be integral to, if not be necessary for, energizing, directing, and/or sustaining motivation, and that it would be beneficial for motivation theories to consider explicitly the means by which attention may affect motivated behavior. When researching Self-Determination Theory (Gagné, M. & Deci, E. L., 2005), for instance, it would be of interest to understand how attention may inherently drive and/or result from intrinsic motivation, as well as when and why attention can be directed by extrinsic motivators. When examining discrepancies in motivation between proximal and distal events as described by Temporal Motivation Theory (Steel & Konig, 2006), an understanding of how attentional systems balance (or not) current circumstances with potential future events could help elucidate how temporal discounting occurs. Temporal Motivation Theory may explain why, for instance, people regularly fail to act in accordance with long-term intentions, such as saving for retirement (Akerlof, as cited in Steel & Konig, 2006). When evaluating the concept of Grit (Duckworth,

Peterson, Matthews, & Kelly, 2007), an understanding of when and how attention, specifically, stays focused to enable individuals to persevere could provide insight into how and why distractions and obstacles can sometimes be overcome and other times cannot. The theories mentioned above, however, do not explain if or how attention could be important for motivation; even the Integrated Model of Work Motivation proposed by Locke & Latham (2004), which illustrates the relationships between twenty motivation theories, neglects to include the very basic contribution of attention. This is regrettable. A better understanding of attention's function in motivation may help bind these disparate theories into a more organized and robust body of knowledge.

There are some theories that do integrate attention and motivation. Flow (Csikszentmihalyi & Csikszentmihalyi, 1988), a theory from the field of positive psychology, is one such theory. Flow is involvement in activity so intense that "no surplus attention is left to monitor any stimuli irrelevant to the task at hand" (Csikszentmihalyi, 1999). Flow describes a state of complete absorption in one's activity, sometimes to the detriment of other responsibilities, that results from equilibrium between challenge and expectations (Csikszentmihalyi & Csikszentmihalyi, 1988). Flow requires "Goldilocks tasks" that are not so difficult as to be outside one's perceived self-efficacy, and not so easy as to be uninteresting (Csikszentmihalyi & Csikszentmihalyi, 1988). Optimal experience can result from such tasks, leading to feelings of effortlessness where the experience is rewarding regardless of outcome (Nakamura & Csikszentmihalyi, 2003), perhaps because attention is sufficiently consumed so as to resist distraction, but not so effortful as to cause exhaustion or frustration.

Several theories speculate how attentional systems may operate, and thus precipitate potential explanations for how attention may affect motivation. According to Petersen and Posner (2012), there are three attentional systems: an alerting network, an orienting network, and an executive network. As stated by their theory, alerting attention is responsible for attention arousal, orienting attention is responsible for prioritizing and directing attention toward a target, and the executive network is responsible for maintaining attention. Interestingly, these three subsystems seem to align with three operations in the American Psychological Association (APA) definition of motivation: "The process of starting, directing, and maintaining physical and psychological activities; includes mechanisms involved in preferences for one activity over another and the vigor and persistence of responses" (Gerrig, R. J. & Zimbardo, P. G., 2002). It may be that Petersen and Posner's alerting system is key for triggering motivation, the orienting system critical for directing motivation, and the executive network responsible for maintaining attention.

Another theory of attention proposes that there are two attentional systems: a bottom-up, saliency-driven system, and a more intentional top-down system (Khorsand, Moore, & Soltani, 2015). These two systems may be similar to the emotionally-driven "hot" processes and cognitively-driven "cold" processes described by Seo, Barrett, & Bartunek (2004). The bottom-up system is fast and instinctive, and relies on feed forward processing of external stimuli (Khorsand et al., 2015). This system could explain motivation in situations that require quick response, such as flight or fight responses. The top-down system is slower and more intentional, and provides feedback to the bottom-up system (Khorsand et al., 2015). This top-down system could account for the mechanics of

longer-term deliberate motivation described by various motivation theories specific to goal pursuit (Frese & Zapf, 1994; Gollwitzer, 1999; Gollwitzer & Oettengen, 2011, 2012; Lord, Diefendorff, Schmidt, & Hall, 2010), and could be responsible for the value judgments that some psychologists describe as being integral to these goal-driven motivational processes (Arnolds & Boshoff, 2002; Kahneman & Tversky, 1979; Suri & Gross, 2015).

In 2015, Suri and Gross published results from a series of studies designed to observe how orienting attention may trigger valuation processes that affect motivation. In their Study 2, they hypothesized that signs reading “Apple” in office cafeterias would increase orienting attention, and that this would in turn enable motivational processes, resulting in increased apple sales. To study this, they placed “Apple” signs in five office cafeterias on alternating business days for a period of two weeks (Suri and Gross, 2015). Apple sales from sign-present days were compared to sales from sign-absent days. Suri and Gross found a statistically significant increase in apple sales between the two conditions. They also noted that the effect was strongest at the start of the two-week period, hypothesizing that the novelty of the sign was greatest on Day 1, thereby having the greatest effect on orienting attention (Suri and Gross, 2015).

Current Study

The current study was designed to replicate the effect demonstrated by Suri and Gross (2015), and explore whether attention and resulting motivation may wane over time as individuals habituate to new stimuli; the study was also intended to examine if a change in stimuli can recapture lost attention, again resulting in increased motivation. New perceptual stimuli may engage attention through orienting attention (Petersen &

Posner, 2012) or bottom-up attention (Khorsand et al., 2015) mechanisms. Additionally, novel tasks are thought to engage more self-regulatory resources and attention (Kanfer & Ackerman, 1989), thus when novelty subsides attention may not be sufficiently directed to trigger motivational processes. It may be that executive control systems (Petersen & Posner, 2012) or top-down attention (Khorsand et al., 2015) provide feedback that reduces the activity of the other attentional systems in response to familiar stimuli.

The study used signs to draw attention to drinking water in order to increase the amount of drinking water dispensed in an office setting.

Three specific hypotheses were tested:

1. Introducing "Water" signs will draw attention to drinking water, increasing the amount of water dispensed from office water machines.
2. Following the introduction of the "Water" signs (and subsequent increase in water dispensed, as per Hypothesis 1), the amount of water dispensed per day will wane over time as attention habituated to the signs.
3. Changing the color of "Water" signs after the amount of water dispensed per day returns to baseline levels (as per Hypothesis 2) will recapture attention and result in another increase in water dispensed per day.

Two changes in the design of the present study when compared with that of Suri and Gross were introduced. Rather than displaying signs on alternating days, as was done by Suri and Gross, signs were hung for consecutive days and measurements were compared to a Baseline Period that served as a control. This was done to investigate Hypothesis 2, that individuals would habituate to the presence of the signs. The second change was made to address a potential confound in the Suri and Gross experiment. The

published study did not report a control for total customers nor total cafeteria sales, thus it is possible that apple sales were higher in the sign-present condition simply because there were more customers on those days. In fact, the results in the Suri and Gross paper state that "The 5-day sign-present total sales were greater than the 5-day sign-absent total sales in each of the five cafeterias" (Suri and Gross, 2015) though no specific statistics are given and no analysis of total sales to apple sales is mentioned. The present study includes a second site to detect the presence of such confounds.

Method

Participants

Participants were the employees of the office where the research was conducted and any visitors to the office. No individual contact with or observation of participants was necessary for this experiment. The office employed 164 individuals.

It should be noted that although the exact number of participants in the office on any day of the study was not tracked, Suri and Gross's Study 2 similarly did not record the number of customers in office cafeterias.

Location

Research was conducted in a New York City office, occupying two floors of a high-rise office building. One floor was used as the experimental site. The other floor served as a control. There were 56 employees on the experimental floor and 108 employees on the control floor.

The office was selected because of the relatively consistent set of occupants in the office from day to day, as compared with other types of sites, such as medical offices or universities, where the individuals in the building would vary considerably each day.

Equipment

Elkay EZH20 bottle filling stations (see Figure 1) were used. This model of water machine features a water fountain and a sensor-activated dispenser, with a counter that increments after every 20 ounces of water dispensed; the counter shows the number of disposable water bottles that have been eliminated by using the machine from either the water fountain or the dispenser (see Figure 2). Individuals can use their own refillable cups or bottles, or can use the water fountain. There are two such water machines on each floor of the office.

Figure 1. Elkay EZH20 bottle filling station. Machine features a water fountain and sensor-activated dispenser, and a counter at the top right that changes after every 20 ounces of water dispensed.

Figure 2. Counter display on the Elkay EZH20 bottle filling station. Counter is labeled “Helped eliminate waste from [number] disposable plastic bottles.”

For the experimental conditions, 11x17 inch signs were used. Signs were white paper with "WATER" printed in Baskerville 220 point bold font.[1] Signs for Experimental Period 1 were printed in bright turquoise ink and signs for Experimental Period 2 were printed in orange ink.

Procedure

Water machines were observed each business day for a two-week period (the Baseline Period) to understand the typical amount of water dispensed per day on each floor of the office. Measurements were taken daily at approximately 5:00 pm by recording the counts displayed on the individual water filling stations (two on each floor).

Measurements continued for the subsequent two weeks (Experimental Period 1). The period was extended, according to design, by an additional week in an attempt to detect a trend in water dispensed (the design also allowed for the potential of two additional one-week extensions to allow for increases in water dispensed per day to return to baseline levels). When no trend was detected, a decision was made to end Experimental Period 1 at the end of three weeks. Experimental Period 2 was then set to be the same 3-week duration as Experimental Period 1.

During Experimental Period 1, the turquoise "Water" signs were posted on the experimental floor of the office. Signs were hung at eye level on the walls near the water filling stations, positioned where all employees would be sure to pass by the signs several times per day. In one hallway, the water machine was positioned near the center of the floor and the "WATER" sign was placed approximately 8 feet from this machine, across

[1] The signs used in by Suri and Gross used A3 paper, (16.5x11.7 inches) with 300-point Herculaneum font, printed in bright blue ink with a red border.

from doors to the restrooms so that employees were likely to see it. The other machine on the experimental floor was positioned at the far end of a wall in an open office area (with low-walled cubicles). A "Water" sign was placed approximately 15 feet from this machine near another set of restroom doors, again so that employees were most likely to see the sign. No signs were posted on the control floor.[2]

At the end of Experimental Period 1, signs were changed from turquoise to orange and hung in the same position for an additional three weeks (Experimental Period 2). This was done to research the third hypothesis, that the amount of water dispensed would increase again with the introduction of a different sign. Again, no signs were posted on the control floor. Measurements on both floors continued as during previous periods.

Measures

The amount of water dispensed per day by each machine was calculated by comparing the count displayed on the machine at the end of each business day to the count from the prior business day to determine the amount of water that had been dispensed that day. Daily water dispensed on each floor was calculated by adding the amount of water dispensed per day from the two machines on the respective floors.

Daily water dispensed per person was calculated by dividing the daily water dispensed on each floor by the number of employees assigned to each floor.

Two days of the study did not have data. The first day of the study did not have data because the values from the prior day's counters was not available to calculate the

[2] Suri and Gross (2015) explored the possibility that any unexpected sign could potentially attract attention that might subsequently lead to changes in behavior. Namely, their Study 3b (2015) showed evidence that introducing an irrelevant "Have a Good Day!" sign in train stations had no effect on the percent of passengers taking stairs vs escalators. The present study was designed with a control free from any signs. Location and resources permitting, future replication attempts would also include an additional control with an irrelevant sign.

daily amount of water dispensed on Day 1. The office was closed on the 21st business day of the study (the start of Week 3 of Experimental Period 1), and thus no data was reported for that day.

During Period 2, two days of data were lost (Day 32 and Day 37) due to a broken cell phone on which pictures of the counters from the water machine were initially captured. The missing data caused the subsequent days' observations to include two days of data. To adjust for the missing days, the subsequent days daily water dispensed values were divided evenly between the missing days and the days on which the measurements were taken.

Results

Daily water dispensed by floor and day for all periods of the study is shown in Figure 3. The graph[3] indicates noticeable fluctuations in water dispensed, particularly on the control floor, throughout the study. The amount of water dispensed on the experimental floor on the first day of Experimental Period 1 dropped, contrary to expectations, from 45 units of water on the final day of the Baseline Period to 37 on the first day of Experimental Period 1, as well as from the baseline period mean (mean units of water = 43.11, *SD* = 4.4). The water dispensed on the control floor on the same day, however, showed an increase from the prior day. At the start of Experimental Period 2, water dispensed on the experimental floor changed by only one unit (from 54 units on the final day of Period 1 to 55 units on the first day of Period 2). Again, the control floor for the same day showed an increase from the prior day.

[3] All graphs were created using Microsoft Excel for Mac 2011 version 14.7.7.

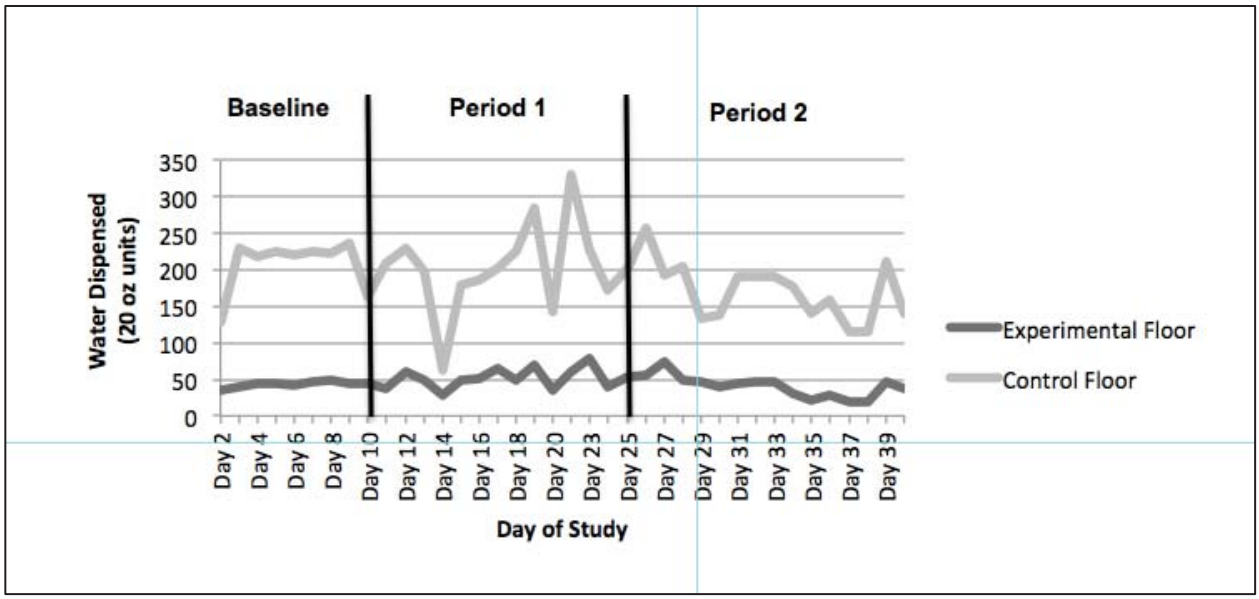

Figure 3. Daily water dispensed by floor and day. Water dispensed on the control floor was much greater than on the experimental floor due to the greater number of employees assigned to that floor (108 on the control floor vs 56 on the experimental floor).

Note the decrease in water dispensed on the experimental floor between the final day of the Baseline Period (Day 10) and the first day of Experimental Period 1 (Day 11), when the first "Water" sign was introduced, while the control floor shows an increase on the same day. Also note that the water dispensed on the experimental floor remained virtually flat from the final day of Experimental Period 1 (Day 25) to the first day of Experimental Period 2 (Day 26), when the new "Water" sign was introduced, while the control floor shows another increase.

A moderately significant correlation ($r = .667$, $p < .01$) in the water dispensed between the two floors was found.

Mean daily water dispensed was calculated by floor (experimental and control) and period (Baseline, Period 1, Period 2)[4], as shown in Table 1.

Table 1
Mean Daily Water Dispensed by Floor and Period

Floor	Period	N	Mean	Std. Deviation
Control	Baseline	9	207.78	35.87
	Period 1	14	203.43	62.06

[4] All statistics were calculated using SPSS for Mac, version 24.

Experimental	Period 2	15	170.40	40.02
	Baseline	9	43.11	4.40
	Period 1	14	52.00	14.33
	Period 2	15	40.13	14.51

A t-test was used, as was done in Suri and Gross's Study 2, to compare mean daily water dispensed on the experimental floor between the Baseline Period and Period 1. Results supporting the hypothesis that "Water" signs had an effect on water dispensed in the office during Experimental Period 1 were significant ($t(16) = 2.167$, $p = .045$). No such statistically significant effect was found for the control floor ($t(21) = .190$, $p = .851$).

Daily water dispensed on the experimental floor for Experimental Period 1 was also graphed with a trend line (see Figure 4) to examine whether the second hypothesis, that the effect of the "Water" sign would decrease over time, was supported. Contrary to the second hypothesis, a slight upward trend was detected.

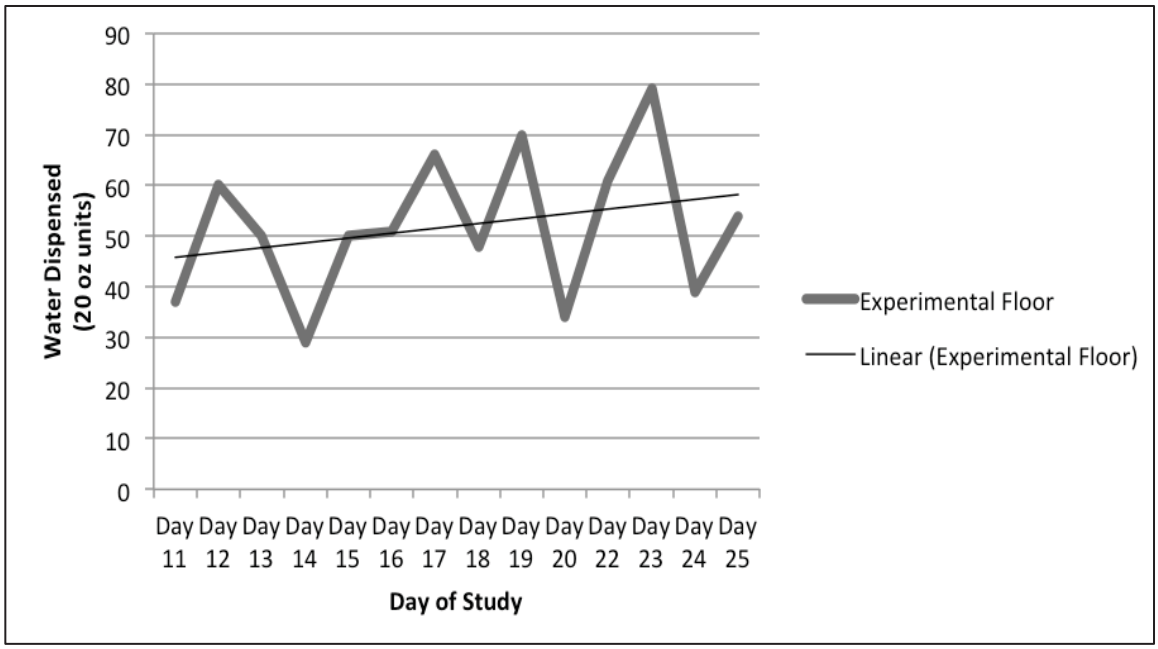

Figure 4. Trend in daily water dispensed on the experimental floor during experimental period 1. An upward trend of water dispensed on the experimental floor during Experimental Period 1 was detected. A downward trend was anticipated, as per Hypothesis 2.

Lastly, a floor by period ANOVA was performed. Given the differences in the number of employees on each floor, water dispensed per person was used to provide a more direct control between the floors. This analysis showed a statistically significant effect by floor (F (1)= 182.587, $p < .001$). The analysis by period (F (2)= 3.541, $p = .035$) was also statistically significant. Floor by period (F (2)= .739, $p = .481$) was not significant. The test of homogeneity, however, was found to violate assumptions of normality ($F(5,66) = 2.775$, $p = .025$) required for the ANOVA results to be considered reliable.

Discussion

The current study was designed to replicate the effect found by Suri and Gross (2015) and examine the effect of using signs to increase attention and motivation over

time. The first hypothesis was supported: introducing "Water" signs to draw attention to drinking water increased the mean amount of water dispensed between the Baseline Period and Experimental Period 1 on the experimental floor, without a corresponding increase on the control floor. Contrary to expectations and to Suri and Gross's findings (2015), however, results actually showed a decrease in water dispensed from the last day of the Baseline Period to the first day of Experimental Period 1; there do not appear to have been any other factors in the building on this day, as the control floor did not show a corresponding drop in water dispensed. This leaves an unanswered question of why the "Water" signs did not increase attention and motivation to use the water filling stations on Day 1 of Experimental Period 1 when the effect was expected to be greatest.

Additionally, the trend of water dispensed on the experimental floor during Experimental Period 1 was the reverse of what was expected by Hypothesis 2, with water dispensed increasing during the period rather than decreasing. The trend was also contrary to the declining effect reported by Suri and Gross (2015).

Several possible explanations for these differences were considered. One possibility is that the "Water" signs may not have been sufficient to capture attention due to the placement and/or design of the signs. There was greater distance between the "Water" signs and the water dispensers than there was between the apples and the "Apple" signs in the original research[5], and the "Water" signs did not have a red border as was used in the original experiment. Inadequate signage could explain the unexpected drop in water dispensed on Day 1 of Experimental Period 1, but not the increase in mean

[5] "Apple" signs were placed at the back of the basket in which apples were displayed for sale.

water dispensed that was found during Experimental Period 1. Given the corresponding increase in daily water dispensed on the control floor, it may be the increase during Period 1 was due to other factors. Future research should consider testing the signage for its ability to capture attention prior to testing its effect on motivation.

Another possibility is that some individuals may have interpreted the “Water” signs as “Save water” rather than as “Drink water.” If this were the case, the mean water dispensed on the experimental floor during experimental period 1 would be expected to be less than that of the Baseline. As this was not the case, it does not seem likely that misinterpretation was a significant issue.

It may be that the population in the office was not as consistent as anticipated, either due to additional visitors or employee absences, and that differences in the population resulted in unanticipated changes to the amount of water dispensed. When there are visitors in the office, it is typically for functions where there are often beverages provided, and thus visitors are not likely to using the water machines. There is some possibility that employees at such functions would consume these beverages instead of using the water machines. Any such functions, however, are unlikely to have been prevalent enough or long enough to significantly change the use of the water machines.

Absences by employees, however, may have been an issue. Attendance was likely to be lower and could have resulted in lower amounts of water dispensed on the first day of Experimental Period 1 as well as on other days during that period, namely the day after Super Bowl, the day of and after a snowstorm, and the Friday before President’s weekend. Additionally, holiday week vacations, illnesses, and other weather-related commuting issues may also have contributed to irregular attendance throughout the

duration of the study. Examination of the water dispensed on the control floor provides some evidence for attendance being a factor, with a moderate correlation found between the two floors (see Figure 3). Attendance data was not available for this experiment, nor was the number of cafeteria customers reported in Suri and Gross's Study 2 (2015). Future replications should more closely monitor the number of participants.

Another possibility considered was whether the counters on the water machines were reliable. According to the manufacturer, counts are incremented after 20 ounces of water are dispensed. To confirm this was the case, the two machines on the control floor were tested following the study:[6] a clear plastic cup was filled with water until the counter on the machine changed. The water level was marked with a permanent marker. The cup was emptied and refilled three more times to confirm that the water level was consistent. While each machine was found to be consistent, there was a difference between the two machines of approximately 2 ounces. Because the counters were reasonably consistent on each machine, they were unlikely to have been a factor in the results. It may be, however, that the amount of water dispensed by a machine between counter increments fluctuated during the duration of the study.

The potential for cross-contamination between the floors was also examined. It is possible that signs on the experimental floor were seen by employees from the control floor and could have influenced the amount of water dispensed on the control floor. If this were the case, an increase in water dispensed on the control floor would be expected

[6] At the time the counters were tested, the experimental floor was no longer available for research due to the space having been sublet.

during Experimental Period 1. A t-test of the control floor did not show significant results.

It is also possible that the second hypothesis, anticipating a downward trend of the effect over time, may have been wrong. It may be that, rather than declining attention as the novelty of the sign dissipates, attention could increase with longer exposure to the signs. This would be consistent with research that has demonstrated that habits are acquired from context cues over time (Wood and Neal, 2007) and that well-practiced, habitual behaviors are likely to occur with minimal attention (Ouellette & Wood, 1998). This was not, however, the effect reported by Suri and Gross (2015).

Lastly, another potential explanation may be that Suri and Gross's results could have appeared significant because of a statistical or sampling error, rather than due to a true effect. As stated above, their experiments do not indicate any control for the number of participants in each condition. Other potential confounds are also possible. Perhaps their results were attributable to the number of apples available for sale (did apples sell out on the days when lower sales were reported?), freshness of the fruit (did apples sell better on days when apples had been freshly delivered?), or other factors. Their design, measuring experimental and control conditions during alternating intervals, seems to have been sound, but the lack of controlling evidence does present the possibility of confounded results.

It should also be noted that Suri and Gross analyzed their data from Study 2 using a t-test to compare mean apple sales between the two conditions (2015). There is some question whether the observations may violate assumptions of independence required for this analysis: the observations represent time series data in which the events from an

individual observation may be influenced by prior events. The present study, similarly, recorded observations on multiple days in the same office, where employees' attention to "Water" signs and the resulting water dispensed on any particular day may not be independent of prior days. The location and design of the experiment were, in fact, meant to detect a trend in behavior of participants over time, implying there is a relationship between the observations. Further investigation of the validity of the t-test and ANOVA statistics is warranted.

Regarding the third hypothesis, that introducing a new "Water" sign after Experimental Period 1 would result in another increase in water dispensed, it is not surprising that this hypothesis was not supported. This hypothesis was contingent on the confirmation of the second hypothesis; because there was no downward trend found during Experimental Period 1 (and, in fact, a slight upward trend was found), it is unlikely the second "Water" sign would have resulted in an increase of water dispensed. It should be noted, however, that the second experimental period suffered from several problems that interfered with data collection. This included a broken water machine on the experimental floor, accidental loss of two day's data (see Measures section above), and most significantly, a reduction in staff of 11 individuals of the office in which the research was conducted which occurred at the end of the second week of Period 2. Though staff reductions were all from the control floor, leaving the staff on the experimental floor intact, general behavior patterns in the office may have been disturbed. Here again, however, examination of the results from the control floor does not provide the expected support. The broken water machine on the experimental floor (causing water to flow more slowly than is typical) resulted in a negligible decrease in

water dispensed on that floor (from 48 units on the day prior to the break to 46 and 40 on the days while the machine was broken) while the control floor had unexplained significant decreases in water dispensed (from 205 to 133 and 137 units). Additionally, during the week following the reduction in force on the control floor, the daily water dispensed noticeably spiked (from 141 units on the day of the staff reduction to a peak of 212 during the subsequent week) despite fewer staff in attendance. These findings call into question any statistical analysis performed on Experimental Period 2.

Conclusion

Future research is warranted. The failure to reproduce the downward trend in the size of the effect that was reported by Suri and Gross remains unexplained. Repeating the experiment with additional tracking for daily office occupation rates, adequacy of signage, and the consistency of water dispensed by each machine is recommended. A control using an irrelevant sign could also be added to replicate Suri and Gross's Study 3c (2015). Since this experiment was conducted, the office location where this study was performed has been reconfigured to a single floor, and many of the employees are now aware of the reason for the "Water" signs, prohibiting a meaningful replication attempt at this location.

More importantly, the question remains: what is the role of attention in motivation? Given so many potential contributors to motivation - individual differences, tasks, motives, social influences, environmental factors, and time - attention may or may not prove to be significant, and so it is important to be able to replicate (or not) Suri and Gross's published experiment. In recent years there has been much scrutiny and skepticism around the reliability of research results from both the press (e.g., The

Economist, 2013; The Guardian, 2015; Nature, 2015, 2017) and critics from the psychology community (e.g., Francis, 2012; Ioannidis, 2005; Nosek, Spies, & Motyl, 2012), and initiatives such as the Reproducibility Project call into question much of what we think we know. The concerns are justified: between-person and within-person variability in motivation is obvious even to a casual observer, making valid and reliable measurement difficult. Measurement limitations may prohibit effective experimentation (Steel & Konig, 2006). Given the obstacles to defining and studying motivation and attention, any answers proposed in the foreseeable future will undoubtedly remain tentative and, perhaps, contentious. Nonetheless, it is important to pursue research if we hope to ever have a respectable, if not perfect, theory. As psychologist Donald Hebb once said “A good theory is one that holds together long enough to get you to a better theory” (cited in Sirota et al., 2005).

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