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Automatic Processes, But Not Priming, Affect Selection of Clothing Items During Simulated Online Shopping

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Abstract: Three computer-based experiments were conducted to investigate whether unconscious, implicit memory processes affect consumers' decision processes during simulated online clothes shopping. Implicit prime words were employed to seek evidence of associative, semantic, and repetitive priming. Evidence of automatic selection processes was also sought. Reaction time data and probability of a "buy" decision were the dependent variables. The results indicate that the decision to not buy something is the default option. There are significantly more "not buy" decisions than "buy" decisions. The "buy" decisions take significantly longer than "not buy" decisions. The probability of a "buy" decision is lowest at the fastest reaction times but rises linearly as reaction time increases up to about one second after which the probability remains at about the same level through the longest reaction times. A descriptive model of an automatic filter system is presented that shows how many shopping decisions that mostly result in rejection of an item can occur very rapidly and without conscious involvement or cognitive effort.

Keywords: consumer behavior; automaticity; priming; system 1; reaction time
JEL code: M39

1. Introduction

When consumers shop for clothes typically they quickly reject many items, select a small number for further scrutiny, and purchase one or a few of them. What cognitive processes are involved in those selections? Are unconscious processes involved? Are the processes thought-based (i.e., propositional in character) or perceptually-based? Have years of clothing preferences yielded automatic selection processes?

The current study investigates these questions with computer based experiments. The experiments in this study mimic some of the aspects of online clothes shopping because vision is the only sense used in judging the items displayed. Reaction time and probability of a buy decision are the dependent variables.

Martin and Morich (2011) have theorized that most of the cognitive effort that goes into purchase decisions is not consciousness. They posit that consumer choice begins with automatic processes, especially habits. Daniel Kahneman (2011) describes a similar view in great detail in his book *Thinking Fast and* Slow. Kahneman describes two systems comprising human mental life. System 1 is outside of consciousness and not under voluntary control,

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fast, automatic, and requires very little or no cognitive effort. Most cognitive tasks begin with system 1 activity. System 2 is conscious activity under voluntary control, slow, deliberate, effortful, and what we subjectively experience as "ourselves" thinking, deciding, and acting. Another similar theory is Epstein's cognitive-experiential self theory (Epstein, Lipson, Holstein, & Huh, 1992; Epstein, Deses-Raj, & Pacinini, 1995).

Contrast the two system view of cognition with some common models of consumer choice. Both compensatory models (Fishbein & Ajzen, 1975) and non-compensatory models (Wright, 1975) assume conscious involvement. The contribution of unconscious processes is not considered in these models. Yet it seems likely given the research cited above that system 1 processes would precede, contribute to, or otherwise inform the conscious models. Some research into system 1 effects on consumer behavior have been conducted such as implicit attitudes toward brands (Maison et al., 2004) and the interaction of automatically invoked affect and cognition in consumers (Shiv & Fedorikhin, 1999).

If unconscious processes affect the decision to buy something then we could see effects of priming. Priming is an implicit memory (Schacter, 1987) effect whereby exposure to a stimulus or concept affects responses to subsequent stimuli whether the respondent is consciously aware of the priming stimulus or not. Put another way, it is temporarily easier to retrieve a concept from memory that has been primed whether or not one is consciously aware of the prime. Behavioral measures, such as reaction times, can be used to detect the presence of and measure the extent of such priming (Bargh et al., 1996). Priming can be positive or negative. Positive priming has a facilitative effect on its measure (i.e., faster reaction time) while negative priming has an inhibitory effect on its measure (i.e., slower reaction time). Implicit measures allow inferences about system 1 processes which are thought to underlie the physical responses that are measured (Stacy & Weirs, 2006).

It is possible that some aspects of clothes shopping become automatic. Automaticity is a system 1 phenomenon that occurs when something has become so well-practiced that it no longer requires effortful cognitive processing to be successfully completed (Underwood, 1974). Take for example a skilled transcription typist. Skilled typists can scan the material that needs to be typed and successfully complete the motor movements necessary to type it and have little awareness of what they are typing (Salthouse, 1986). The best typists can hold conversations while transcription typing. Years of experience shopping for, comparing, trying on, buying, and wearing clothes may result in the automatic detection of preferred qualities such as color, pattern, presence or absence of desired quality such as hem length, button down/open collar, straps/strapless, one/two/three/four button jacket, fabric type, and so on.

This study uses an experimental paradigm developed specifically for consumer behavior research involving system 1 processes. This subliminal priming (Strahan et al., 2002) paradigm mimics some of the aspects of online shopping. It is conceptually similar to the lexical decision task (Meyer & Schvanveldt, 1971) in that it is a forced choice task in which the participant quickly classifies a stimulus photo into one of two categories: buy or not buy.

Each of the three experiments reported here used a different type of prime. The first is an associative prime. The word "money" was the masked subliminal prime on half the trials. Money is associated with buying. Vohs et al. (2006) demonstrated that participants primed with money were more self-sufficient than participants primed with neutral concepts. The second experiment uses the word "ugly" as a semantic prime. Semantic priming is conceptually-driven and relies on the organization of memory as a propositional associative network (Smith et al., 1982). Spreading activation (Anderson, 1983) accounts for priming in such models. The third experiment used the word "buy" as a repetition (Jacoby & Dallas, 1981) or identity prime. A prime word primes itself and "buy" is one of the response choices in these tasks.

2. Experiment 1: Money Prime Method

2.1 Participants

Thirty three students at Buffalo State participated. The mean age was 21 years 10 months. All received extra credit for participating. No participants reported having serious vision or manual dexterity problems.

2.2 Materials

Separate stimulus sets were created for male and female participants so that females viewed female models and clothes and males viewed male models and clothes. Two hundred photos (100 male and 100 female) of models wearing spring and summer fashions were downloaded from the website of a regional mid to upscale department store chain that has no stores in the Buffalo area. Each participant viewed 100 photos of same gender models during the experiment.

2.3 Procedure

Participants sat at a table facing a 24 inch flat screen computer display which was at eye level of the participants. A computer keyboard was on the table between the participants and the display. The keyboard was connected to a Dell desktop computer running E-Prime Professional experiment control software (Schneider, Eschman, & Zuccolotto, 2002). Each trial was preceded by a cursor consisting of 5 at symbols (i.e., @@@@@) which was black, 14 point times new roman, on a white background, and centered vertically and horizontally on the display. Participants were instructed to look at the cursor so that their gaze would be centered on the stimulus photo when it appeared. The duration of the cursor was 1 second. It was replaced by a string of letters for 40 milliseconds (ms). The word "money" was the prime that preceded half of the trials and the nonsense word "nebol" preceded the other half of trials. The assignment of prime or nonsense word to stimulus photo was randomized individually for each participant. The string of letters was replaced by the original cursor which acted as a mask. The duration of the mask was 40 ms. The mask was replaced by the stimulus photo which remained on the display until the participant responded with a key press. A key press by the participant ended the trial and the next trial immediately ensued.

The order of presentation of stimulus photos was randomized individually for each participant. During each trial of the experiment one of the photographs of a clothing model appeared on the display. The participants' task was to decide if they would buy the item of clothing or not. If they would buy the item they pressed the "m" key with their right index finger. If they would not buy the item they pressed the "z" key with their left index finger. The participants rested their index fingers on the specified keys during the entire experiment. This was a speeded task. The participants were instructed to respond as quickly and as accurately as possible. Participants were further instructed to make two assumptions for each trial; that they can afford the item and that it will fit well. The dependent variables were reaction time (Rt) to respond and the probability of a "Buy" decision.

2.4 Results of Experiment One

The mean and standard deviation were computed for reaction time for all trials. Responses under 250 ms and over 7000 ms were deemed outliers and removed from the analysis. The new mean was computed and the outliers were replaced with the new mean.

Two paired-samples t-tests were performed on the reaction time data (reaction time on money prime trials versus reaction time on nonword prime trials; Reaction time of buy responses across both primes versus reaction time of not buy responses across both primes) and two on the probability of buy response data (Probability of buy response on money prime trials versus probability of buy response on nonword prime trials; probability of buy response across both primes versus probability of not buy response across both primes).

Reaction time to respond buy across both primes was significantly slower than reaction time to respond not buy across both primes (t = 2.815, df = 32, p = 0.008, two-tailed). The mean reaction time to respond buy was 1136 ms while the mean reaction time to respond not buy was 916 ms (see Figure 1).

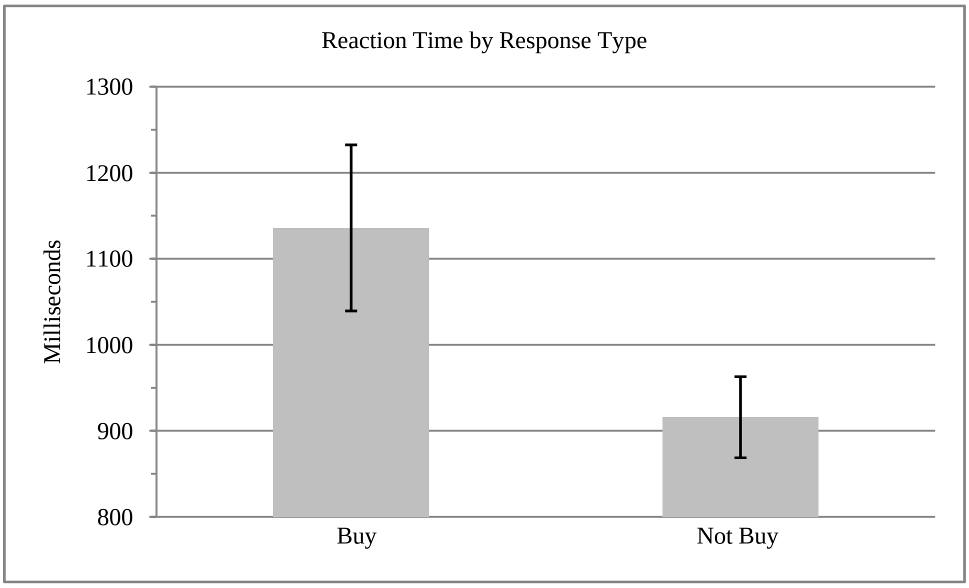

Figure 1 Reaction Times for "Buy" Responses Were Significantly Longer than "Not Buy" Responses for the Money Prime Experiment

The probability of a buy response across both primes was significantly lower than the probability to respond not buy across both primes (t = -6.326, df = 32, p < 0.001, two-tailed). The mean probability of a buy response was 0.328 while the mean probability of a not buy response was 0.672 (see Figure 2).

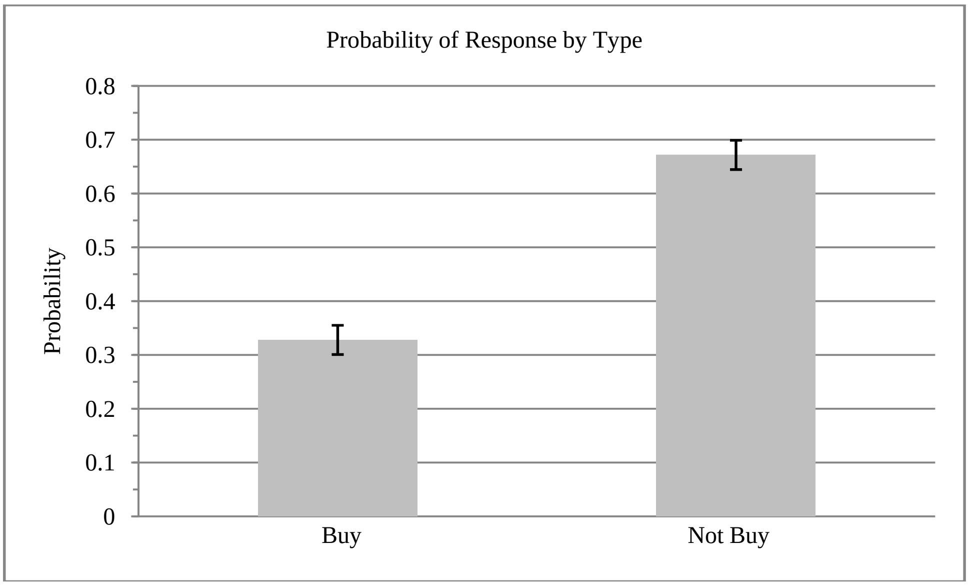

Figure 2 There Was a Significantly Higher Probability of a "Not Buy" Decision than a "Buy" Decision for the Money Prime Experiment

To further investigate the time course of buy decisions all responses were rank-ordered by reaction time and grouped by decile. The probability of a buy decision was computed for each decile (see Figure 3). The probability of a buy decision is lowest for the fastest responses. The probability of a buy decision rises steadily until about 1 second then the probability flattens for the rest of the responses. The highest probability of a buy decision is at the longest reaction times but the probability remains steady from about 1 second through the longest responses.

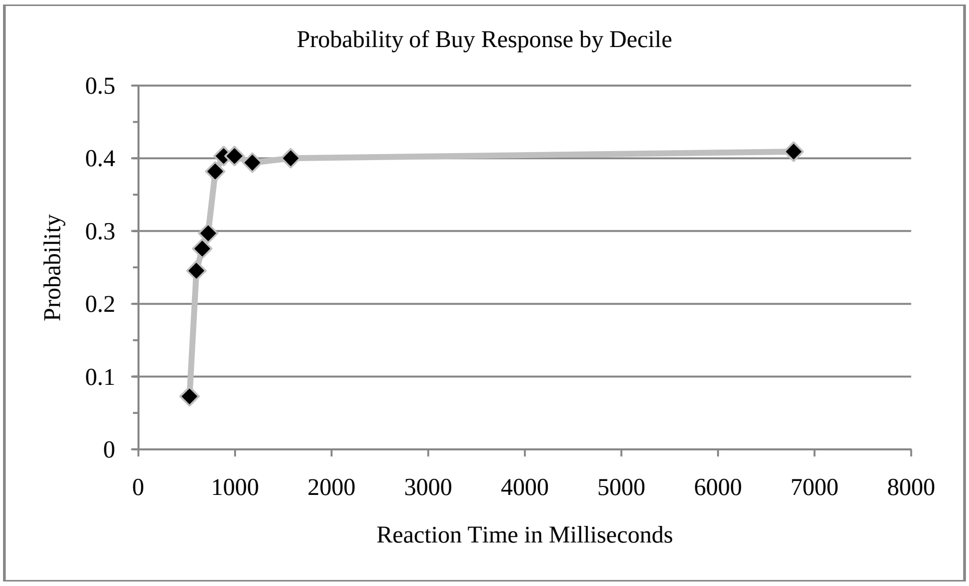

Figure 3 Probability of "Buy" Decision per Decile of Rank-ordered Reaction Times of "Buy" Decisions for the Money Prime Experiment

3. Experiment 2: Ugly Prime Method

3.1 Participants

Thirty one students, all different from experiment one, at Buffalo State participated. The mean age was 21 years 7 months. All received extra credit for participating. No participants reported having serious vision or manual dexterity problems.

3.2 Materials

The materials were the same as experiment one.

3.3 Procedure

The procedure was the same as experiment one with one exception: the word "ugly" was used as the prime word.

3.4 Results of Experiment 2

The mean and standard deviation were computed for reaction time for all trials. Responses under 250 ms and over 7000 ms were deemed outliers and removed from the analysis. The new mean was computed and the outliers were replaced with the new mean.

Two paired-samples t-tests were performed on the reaction time data (reaction time on ugly prime trials versus reaction time on nonword prime trials; Reaction time of buy responses across both primes versus reaction time of not buy responses across both primes) and two on the probability of buy response data (Probability of buy response on ugly prime trials versus probability of buy response on nonword prime trials; probability of buy response across both primes versus probability of not buy response across both primes).

As in experiment one reaction time to respond buy across both primes was significantly slower than reaction time to respond not buy across both primes (t = 3.674, df = 30, p = 0.001, two-tailed). The mean reaction time to respond buy was 1004 ms while the mean reaction time to respond not buy was 864 ms (see Figure 4).

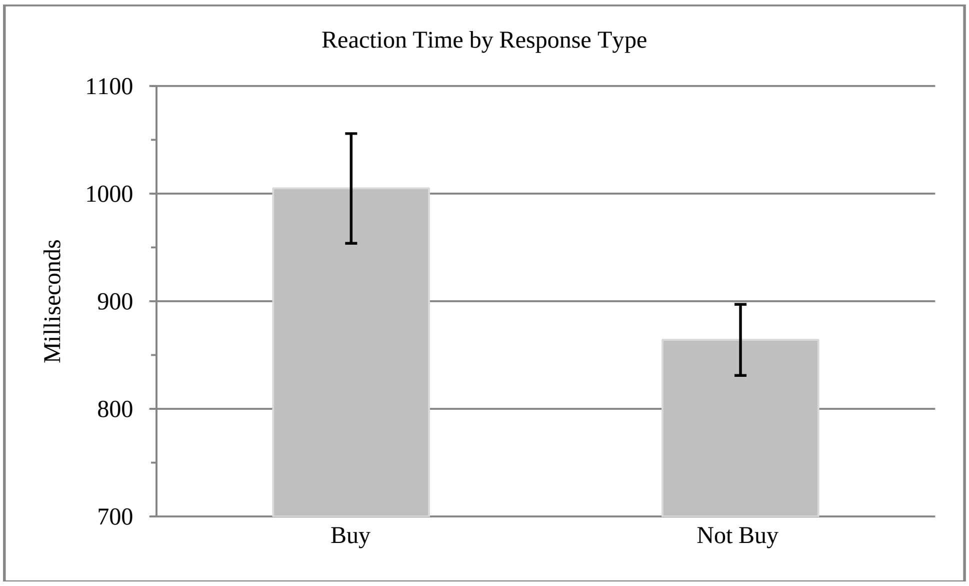

Figure 4 Reaction Times for "Buy" Responses Were Significantly Longer than "Not Buy" Responses for the Ugly Prime Experiment

As in experiment one probability of a buy response across both primes was significantly lower than probability of a not buy response across both trials (t = -3.271, df = 30, p = 0.003, two-tailed). The mean probability of a buy response was 0.391 while the mean probability of a not buy response was 0.61 (see Figure 5). As in experiment one no other significant results were obtained.

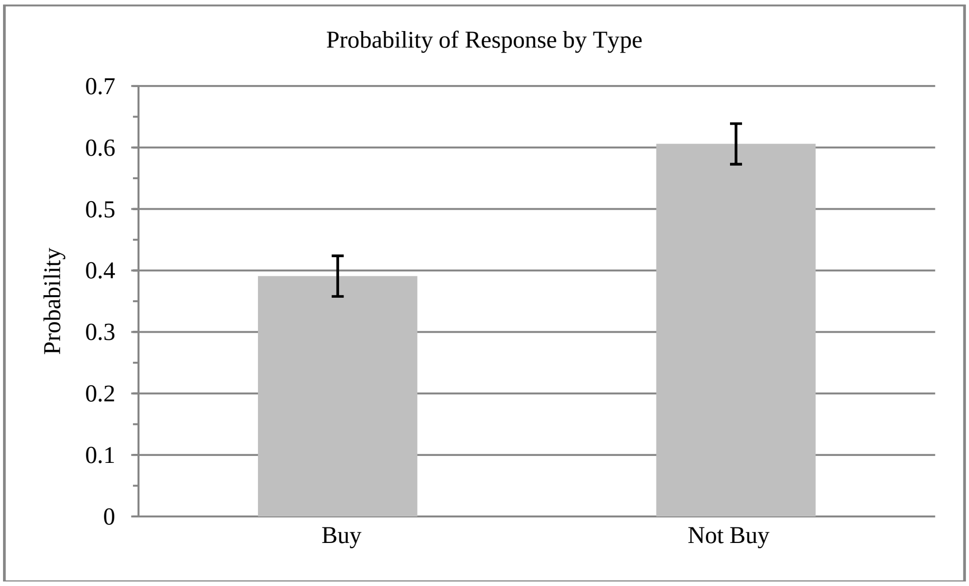

Figure 5 There Was a Significantly Higher Probability of a "Not Buy" Decision than a "Buy" Decision for the Ugly Prime Experiment

To further investigate the time course of buy decisions all responses were rank-ordered by reaction time and grouped by decile. The probability of a buy decision was computed for each decile (see Figure 6). As in experiment one the probability of a buy decision is lowest for the fastest responses. The probability of a buy decision rises steadily until about 1000 ms then the probability flattens for the rest of the responses. The highest probability of a buy decision is at the longest reaction times but the probability remains about the same from about 1000 ms through the longest responses.

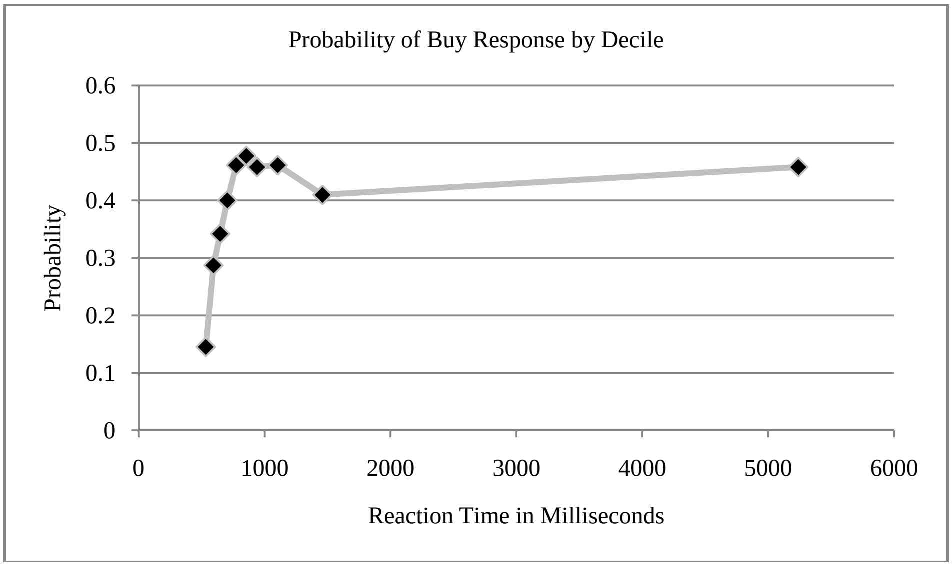

Figure 6 Probability of "Buy" Decision Per Decile of Rank-ordered Reaction Times of "Buy" Decisions for the Ugly Prime Experiment

4. Experiment 3: Buy Prime Method

4.1 Participants

Twenty five students, all different from experiments one and two, at Buffalo State participated. The mean age was 21 years 9 months. All received extra credit for participating. No participants reported having serious vision or manual dexterity problems.

4.2 Materials

The materials were the same as experiments one and two.

4.3 Procedure

The procedure was the same as experiments one and two with one exception: the word "buy" was used as the prime word and "neb" was used as the nonword prime.

4.4 Results of Experiment 3

The mean and standard deviation were computed for reaction time for all trials. Responses under 250 ms and over 7000 ms were deemed outliers and removed from the analysis. The new mean was computed and the outliers were replaced with the new mean.

Two paired-samples t-tests were performed on the reaction time data (reaction time on buy prime trials versus reaction time on nonword prime trials; Reaction time of buy responses across both primes versus reaction time of not buy responses across both primes) and two on the probability of buy response data (Probability of buy response on buy prime trials versus probability of buy response on nonword prime trials; probability of buy response across both primes versus probability of not buy response across both primes). As in experiments one and two the reaction time to respond buy across both primes was significantly slower than the reaction time to respond not buy across both primes (t = 4.355, df = 24, p < 0.001, two-tailed). The mean reaction time to respond buy was 1026 ms while the mean reaction time to respond not buy was 847 ms (see Figure 7).

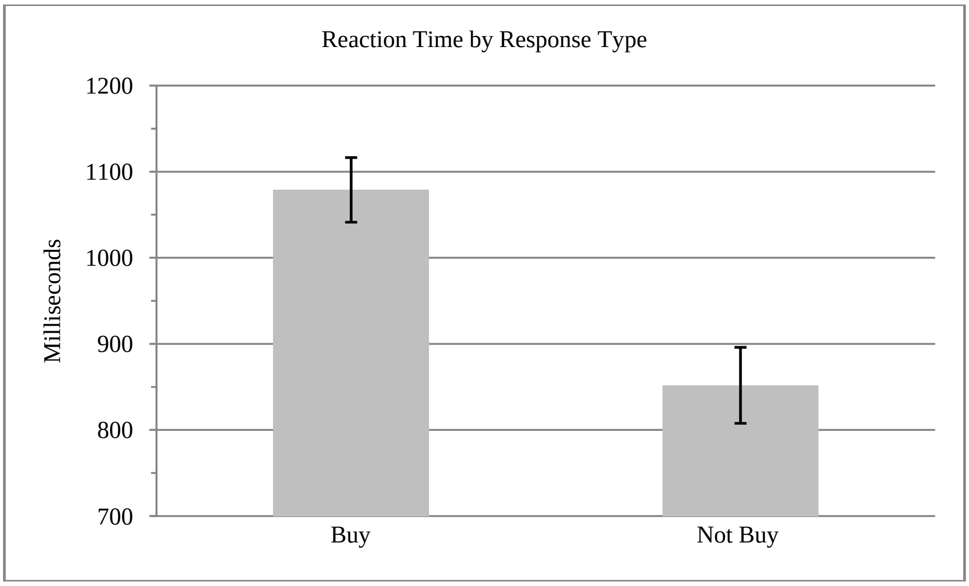

Figure 7 Reaction Times for "Buy" Responses Were Significantly Longer than "Not Buy" Responses for the Buy Prime Experiment

As in experiments one and two the mean probability of responding buy across both primes was significantly lower than the probability of responding not buy across both primes (t = -5.314, df = 24, p < 0.001, two-tailed). The mean probability of a buy response was 0.327 while the mean probability of a not buy response was 0.673 (see Figure 8).

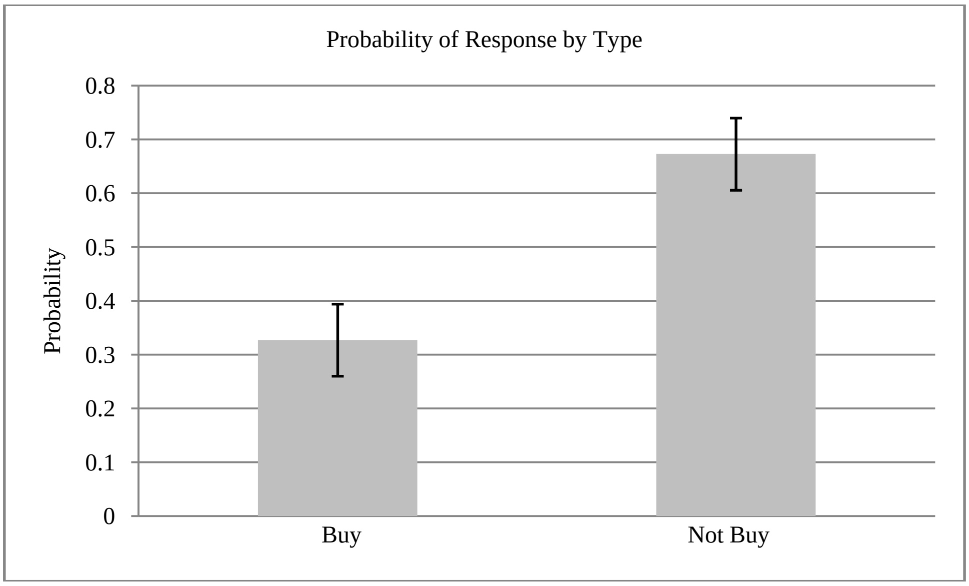

Figure 8 There Was a Significantly Higher Probability of a "Not Buy" Decision than a "Buy" Decision for the Buy Prime Experiment

To further investigate the time course of buy decisions all responses were rank-ordered by reaction time and grouped by decile. The probability of a buy decision was computed for each decile (see Figure 9). As in experiments one and two the probability of a buy decision is lowest for the fastest responses. The probability of a buy decision rises steadily until about 1 second then the probability flattens for the rest of the responses. The highest probability of a buy decision is at the longest reaction times but the probability remains steady from about 1 second through the longest responses.

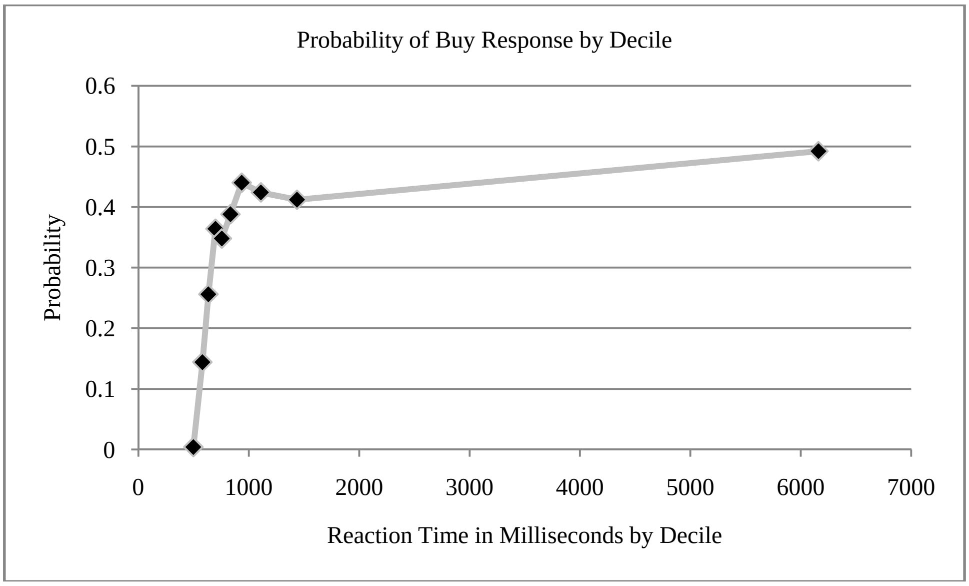

Figure 9 Probability of "Buy" Decision per Decile of Rank-ordered Reaction Times of "Buy" Decisions for the Buy Prime Experiment

5. General Discussion

The purpose of this study was to investigate whether system 1 processes (fast, unconscious, automatic) affect the selection of clothing items for purchase. Three computer-based experiments were conducted that simulated some aspects of online shopping. Each experiment used a different masked subliminal word prime that tested for different types of priming (associative, semantic, and repetition priming). The data from each experiment was also analyzed to find evidence of automaticity in the selection process.

Each experiment gave indications that automatic processes were present during the selection process. No evidence of priming was found, however. The following discussion will center on automaticity in online browsing and shopping.

Three patterns of results obtained in all three experiments. The first pattern was that there were significantly more "not buy" responses than "buy" responses. Roughly one third of responses were "buy" responses. Remember that this was simulated purchasing so no money changed hands. Thus there were no budgetary constraints on participants. Yet two thirds of items were rejected on average. An items analysis showed that "buy" and "not buy" decisions were spread pretty evenly among the 100 stimulus items. Remember that the order of presentation of stimulus items was randomized individually for each participant. The second pattern was that reaction times for "buy" responses were significantly longer than reaction times for "not buy" responses. Reaction time for "buy" responses averaged over 1 second while reaction times for "not buy" responses averaged about 180 fewer milliseconds. The decision to buy something takes more time and more cognitive effort than to reject or not buy something. The third pattern found in each experiment is that the probability of a "buy" decision is a straight-line function of reaction time up to about one second. The lowest probability of a "buy" decision occurs at the fastest reaction times. The probability of a "buy" decision climbs steadily through the longer reaction times until about 1 second. After one second the probability of a buy decision remains flat up through the longest reaction times.

Clearly the "not buy" decision is the default decision. It takes the least time and the least cognitive effort. The average reaction time for a "not buy" decision was about 875 ms. When you consider that the button press took about 200-250 ms to accomplish the "not buy" decision was reached in just over 6 tenths of a second. It took about one third longer to reach a "buy" decision. It seems very unlikely that much conscious cognitive activity can be experienced in such a short time and so unconscious processes must be doing the bulk of the decision work for "not buy" decisions.

What follows is a proposed model of how automatic (system 1) processes are contributing to the buy/not buy decision. Automatic processes are not built-in but are acquired over time. The more an activity is practiced the less cognitive effort and time it takes to accomplish (Schiffren & Schneider, 1977). This process can be applied to clothes shopping activities.

Over years of practice people develop several types of preferences for clothing items. People know what colors they like best or what colors compliment them for example. The same is true for patterns. People develop preferences for features such as hem length, neckline, collar type, number of buttons on a jacket, straps/strapless, and many more.

I propose that these preferences become so well practiced that they become automatic. They form a sort of filter system that people use when browsing clothes. The filter system allows people to very quickly classify an item with no conscious cognitive effort into two categories: reject or scrutinize further. Most items, as we saw in the three experiments, are rejected and rejected very quickly. Those categorized for further scrutiny are considered for a longer time and have a higher probability of being bought.

The function of the system 1 filter process, therefore, is to effortlessly reject those items that experience has shown would not be valued. Those that pass through all the unconscious filters enter into system 2 conscious deliberation. The fact that they have already cleared various automatic filters means that they are worthy of the conscious cognitive effort necessary to make the final decision to perhaps risk resources in an exchange. That conscious cognitive effort may very well entail the compensatory, non-compensatory, or other models of consumer decision making that have gotten most of the attention from researchers and theorists for decades but it would be stage two of the process.

Are the filters processed serially or in parallel? The linear function of "buy" probability up to about 1 second may seem to indicate serial processing of filters. That is, as a stimulus photo is processed if it doesn't pass the first filter it is rejected quickly but if it passes that filter it goes on to the next and the next until it is either rejected at one of them or passes them all and enters conscious processing. It is possible, however, that all filters are processed in parallel. Some perceptual information is processed more quickly than others. Color information is processed quickly (Amano et al., 2006). Thus if a stimulus item is not an acceptable color it would be rejected quickly. Pattern or form information takes longer to process perceptually and so an item of acceptable color but unacceptable form would be rejected more slowly than one of unacceptable color even though all filters are being processed in parallel. The parallel processing of filters would be in keeping with system 1 characteristics (Kahneman, 2011).

The overall function of the filter system appears to be finding and submitting to consciousness items that are very similar to items you already own. It is up to conscious processing then to determine that an item is not identical to what one already owns (desirable in most cases) but just different enough to be a valuable new addition to your closet.

What practical implications does this research suggest for marketers? Most online browsers choose a category of clothing (pants, dresses, etc.) and then serially search an array of thumbnail images in search of something interesting. Apparently what is interesting is something similar on several dimensions to what they already own. So it may be best to put like things together. However, what those dimension are and how they are ranked and valued differs from consumer to consumer. So what exactly constitutes "like things" is a problematic concept.

An array of thumbnail images of clothing items within a category that is dynamically arranged and individualized for each viewer would be ideal. An algorithm would need to be developed that considers a consumers previous purchases but also considers and weights which thumbnail images that consumer selects, how long they are viewed, and how each item can be scored on which dimensions. Over time such a system would learn to show a consumer an array of items within a category that have the highest probability of purchase by that consumer increasing efficiency for consumer and marketer alike.

Managers should be cautioned not to conclude that endeavoring to extend viewing time of photos would increase the probability of buying those items because such a conclusion is not warranted from the evidence in this study. Participants were not more likely to "buy" an item because they viewed it longer. Instead they viewed it longer because it was an item that was more likely to be acceptable for purchase because it passed the system 1 filtering process.

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