

Fear and Marketing: How Does the Feature of Voice and Speed at Which Side Effects are Read in Direct to Consumer Advertising (DTCA) of Pharmaceuticals Affect Consumers' Willingness to Pay?

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I. Introduction

In this age of mass media, consumers are constantly bombarded with advertisements. Television, radio, newspapers, magazines, billboards, and now the internet present advertisements along with their scheduled programming (Yuan, Abidin, Sloan, & Wang, 2012). United States citizens currently watch about 5.1 hours of television per person per day (Joo, Wilbur, Cowgill, & Zhu, 2013). About eleven minutes of each hour of television watched are paid advertising. Shopping channels have arisen which solely broadcast paid advertising. While advertising is omnipresent in modern society, not everyone agrees on what it is appropriate to advertise. One topic in particular, direct to consumer advertising (DTCA) of pharmaceuticals, is a hot button issue. Most countries have deemed this type of advertising inappropriate and have outlawed it. The United States and New Zealand are currently the only nations worldwide that allow DTCA (Biegler, et al., 2015). This paper does not join the debate of whether DTCA is ethical. We instead seek to understand how the presentation of side effects affects consumers' willingness to pay for pharmaceutical products. We ask two major questions in order to understand this phenomenon. The first is how much the inclusion of side effects in DTCA decreases willingness to pay. The second is whether the tone of voice and speed at which side effects are read can offset this decrease.

II. Literature Review

It is important to first understand the controversy around DTCA and what strategies pharmaceutical companies currently employ. Biegler, et al. (2015) conduct a review of this topic. There is currently no vetting process for DTCA to be released, and ads are only evaluated if someone files a complaint after the ad is broadcast. DTCA often results from in depth psychological studies conducted by pharmaceutical marketing departments. These studies have led to the use of implicit persuasion in DTCA, but the formal reports are rarely released to the public. Priming effects, framing effects, and evaluative conditioning are jointly utilized in DTCA in order to improve customer perception of the drug. These behavioral changes induced by implicit persuasion are often inconsistent with rationality and lead to questions about what degree of autonomy consumers actually possess. DTCA successfully motivates patients to request specific drug prescriptions. Opponents argue that this can lead to excessive drug taking, takes advantage of consumers' lack of information, and delivers facts in a way that lacks integrity.

Ross and Kravitz (2013) conduct a review of the legal landscape surrounding DTCA. They claim that DTCA is here to stay due to the First Amendment protections on commercial speech. Since banning DTCA is an unlikely prospect, they seek to better understand regulations and DTCA efficacy. Their commentary on the 1997 U.S. Food and Drug Administration (FDA) Modernization Act (FDAMA) partially serves to motivate our paper. We had anecdotal observations about changes in the way side effects were presented in DTCA around 2000. We noted that pharmaceutical commercials prior to 2000 typically presented a long list of side effects at a fast pace. Modern commercials typically present fewer side effects and present them slowly in a pleasant voice (Ross & Kravitz, 2013). This change is due to the fact that the FDAMA changed the requirements for how side effects must be presented. Before 1997, marketers were required to include information on side effects, contraindications, and efficacy. This was too much information for marketers to present in a cost effective manner so the negative information such as side effects was read very quickly. After the FDAMA was passed, pharmaceutical companies were allowed to generate a shorter summary of the major risks and

direct consumers to their websites for the rest of the information. The structure of commercials changed rapidly and DTCA spending rose by almost 800% from 1996 to 2006.

The current DTCA regulation allows lots of freedom in how to present products. The FDA Division of Drug Marketing, Advertising, and Communications (DDMAC) is in charge of finding false or misleading claims in DTCA (Liang & Mackey, 2011). Companies are not currently required to get their ads preapproved by the DDMAC. They are currently allowed to publish any commercial they see fit. It is then up to the viewer to write a complaint to the DDMAC if anything seems inappropriate or untrue. Limited institutional capacity means complaints often get overlooked or stuck in the pipeline. Pharmaceutical companies therefore have a large amount of leeway in how they present risk information.

The goal of this term paper is to study how the method of presenting side effects in DTCA affects consumers' perceived risk of and willingness to pay for the advertised drug. Warren (2014) of the Washington Post notes that many people discount warning labels and side effects and observes that the FDA recently launched an investigation of how to emphasize more serious warnings. He presents findings that say that reading side effects more slowly increases comprehension, but no research has been done on how this affects the consumers' purchasing decision. We hope to determine how the tone of voice and speed at which the side effects are presented affect willingness to pay.

Ho-Young Ahn, et al. (2014) test consumers' perception of risk information. The FDA requires pharmaceutical companies to keep a fair balance of risks and benefits in DTCA. Investigations of fair balance assume that consumers take time to fully understand and consider all risk information provided before making their decisions. Complex terminologies and other forms of manipulation in ads, however, can lead consumers to underweight risk information. The paper finds that the degree to which consumers are misled relates to their level of optimism bias and health literacy. Consumers with high optimism bias and low health literacy level are less likely to understand complicated side effects information and are prone to be swayed by DTCA. Based on survey data from the Institute of Educational Sciences in 2006, about one third of U.S. adults have low health literacy. Therefore, a large percentage of possible consumers could be affected by effective DTCA.

Research on rates of speech shows several competing beliefs. MacLachlan & Dean (1980) suggest that people prefer information read with moderately faster than normal speed and devote greater attention to process the message. The argument aligns with what Kahneman (2013) describes about the two systems of mind. People will try to think with the slow and effortful System 2 if they cannot complete the task intuitively. This is directly opposed by more recent papers that show decreased motivation and memory of the message. Motivation and ability to understand the message also affect people's allocation of attention. Moore et al. (1986) argue that time compressed speech (faster speech rate) lowers the audience's opportunity to comprehend. The increased difficulty in listening also decreases the motivation to process. Skinner et al. (1999) further confirms this result and finds participants subjected to ads with fast speech rates are worse at recognition and rate the product higher. It reasons that rapid speech rates allow listeners to focus more on global impressions, whereas slow rates direct attention to details and facts. These results support the idea that presenting side effects with an increased speech rate in DTCA discourages consumers from processing risk information and therefore they mainly perceive the benefits.

Chattonadhyay et al. (2003) contribute to research on information speed and consumer attitudes toward advertisements. They find that increases in speed (measured by syllables per

unit of time) and low pitch reduce negative attitudes towards advertisements. They find that advertisement response is more sensitive to change in syllable speed than interphase pausation. The study further concludes from this that the decrease in comprehension from time compression results more from the lack of motivation to a difficult task than the reduced opportunity and time to understand. It also shows that tone of voice matters in addition to speed. Low pitch signals truthfulness, strength and calmness. The interpretation is similar to Kahneman's (2013) description of the representativeness heuristic, which states that people base judgments on stereotypes rather than science or statistics. A stereotype for fast speech rate is that the reader is more intelligent and confident (Skinner et al., 1999). As DTCA ads generally present the side effects information with increased reading speeds and pleasant and soothing tones, they potentially lead consumers to act on heuristic rather than logic. Although previous experiments did not find a significant relationship between people's impression of the speaker and rapid speech rate, no study has looked at a combined effect from a pleasant and rapid voice (Skinner et al., 1999).

Speaking more quickly is more persuasive (Miller, Maruyama, Beaber, & Valone, 1976). Comprehension improves with lower rates of speech (Zhao, 1997). This could mean that increased rates of speech make it easier to persuade people because they do not comprehend the argument well enough to envision the drawbacks. This research is directly applicable to research in DTCA. It stands to reason that quickly reading side effects should decrease comprehension, persuade consumers that the drug is less dangerous, and increase consumer willingness to pay.

Decreased comprehension could play a significant role in risk assessment. If people fail to understand the side effects as they're presented, they will most likely perceive the drug as less risky. Perception of safety is directly linked to willingness to pay (Angulo & Gil, 2007). Increases in risk were found to be inversely correlated with consumption and willingness to pay. One interesting finding is that people live in a native state in which they assume that everything is safe unless they have recently been primed by a story about specific bad outcomes. These findings suggest two possible outcomes for our study. It could be that reading side effects more quickly decreases comprehension and increases consumer willingness to pay. People could also be overexposed to side effects on a daily basis so that they are insensitive to their method of presentation.

The alteration of side effect presentation can also affect willingness to pay through inducing a state of relaxation or duress. States of relaxation cause consumers to overvalue goods (Tuan Pham, Hung, & Gorn, 2011). If a slow rate of speech allows consumers to better understand risks and lowers willingness to pay, this effect might be counterbalanced by a soothing voice that facilitates relaxation. This same line of reasoning suggests that reading side effects at a faster pace in a soothing voice should even further increase willingness to pay. It is uncertain, however, whether combining these methods should have an additive effect or whether the combined effect will be different from the sum of the two halves.

This literature review has mainly focused on the effect of reading speed on comprehension and perception of the speaker or idea presented. No research currently directly links reading speed to willingness to pay. Very little published research examines consumers' perceptions based on the tone of voice used. Most research in this area is still attempting to characterize how certain emotions are conveyed through vocal cues. Brazeal (2001), for example, notes that joy can be conveyed by a faster or slower rate of speech, higher pitch, higher intensity, breathy voice, with upward inflections. These findings are typically applied to voices for robots and artificial intelligence constructions as opposed to marketing.

III. Theory

We base our analysis on prospect theory. Kahneman and Tversky (1979) note that expected utility theory is imperfect because it is systematically violated in several major ways. People do not weigh the utility of possible outcomes by their probability as predicted. They overweight events that will occur with certainty. People actually become less risk averse when considering losses, which also violates expected utility theory. Kahneman and Tversky note several more violations before coming to the major conclusion that people make decisions based on changes in wealth rather than the current level of wealth or the final level after a decision is made. This conclusion is used as the foundation for prospect theory.

Kahneman and Tversky (1979) claim that decision making is broken into two phases. In the editing phase, people evaluate the prospects and simplify the decision to be made. They then move into the evaluation phase in which they choose one of the prospects.

The first stage, editing, can be further broken down into several smaller stages. The first stage of editing is coding in which people note whether prospects are gains or losses compared to their current position. They then combine any probabilities associated with identical outcomes and segregate riskless components from those that have uncertainty. They also cancel out the expected outcomes that are shared by possible prospects and focus on the differences among outcomes. People take time to simplify outcomes by rounding and discarding highly unlikely values when making their decisions. Prospects that are dominated by other options are immediately rejected. It is important to note that these editing operations are not necessarily carried out in this order. The order in which individuals perform these editing stages can affect decision outcomes. One good example is that simplifying values can cause one prospect to dominate the other when it was not dominant before the simplification step.

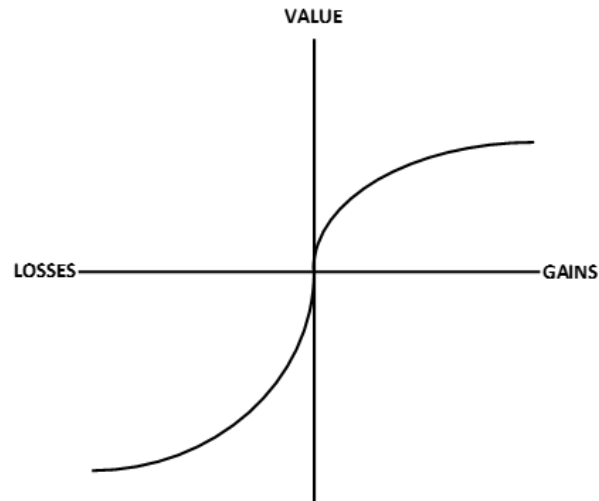
Once the individual completes editing, they are assumed to choose the prospect that has the highest value. This value is determined through two modes. The first is a decision weight (π) which differs from the probability but relates the probability of an outcome and its value. In the second mode, a subjective value (v) is assigned to each possible outcome. Everything is compared to a reference point and therefore the subjective values measure the value of positive and negative deviations from that reference point. π and v are then combined to determine the value of a prospect.

In the most basic form of this model, an individual faces the prospect $(x, p; y, q)$ where they receive x with probability p and y with probability q and $p+q \leq 1$. It is possible to receive nothing with probability $1-p-q$. These factors lead to the following equation for the value of a prospect:

$$V(x, p; y, q) = \pi(p)v(x) + \pi(q)v(y) \dots \dots \dots (1)$$

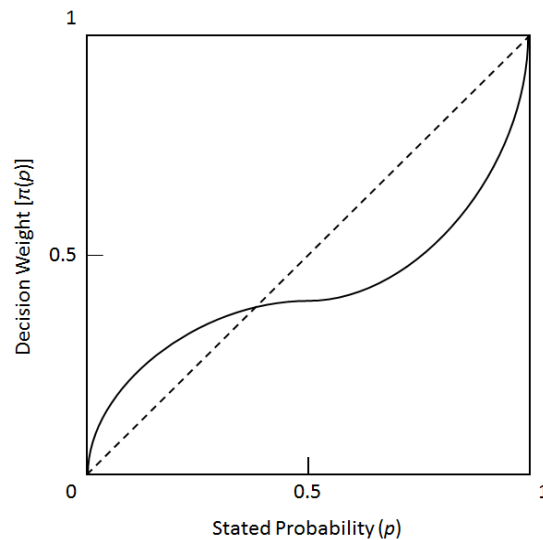
Here $v(0)=0$, $\pi(0)=0$, and $\pi(1)=1$. The main implication of this function is that prospect theory deviates from expected utility theory by assuming values are attached to changes and that decision weights differ from probabilities. The function is assumed to be concave above the reference point (gain domain) and convex below (loss domain) due to observed psychological behaviors. The observation that individuals fear losses more than they enjoy gains leads to the additional assumption that the value function is steeper in the loss domain than the value function for gains. These assumptions result in a value function of the form observed in Figure 1:

Figure 1. Value function.



The concept of decision weights is important for prospect theory. These decision weights are not probabilities. They are influenced by probabilities but measure the impact of outcomes on desire for prospect choices. $\pi(p)$ is an increasing function of p normalized to the weight associated with the certain event $\pi(1)$. People ignore impossible events ($\pi(0)=0$) and place high value on certain events ($\pi(1)=1$). It has been observed that people tend to overweight outcomes with low probabilities and underweight prospects with high probabilities. Hope tends to lead people to overweight these low probability prospects while doubt dominates and leads people to underweight high probability prospects. These issues lead to a decision weight function of the form observed in Figure 2:

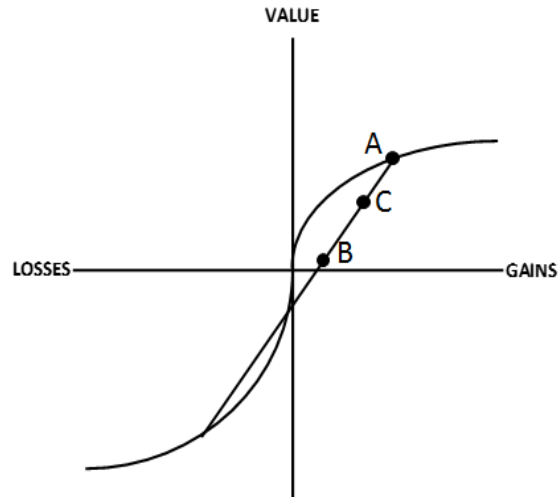
Figure 2. Decision weights in prospect theory.



Prospect theory can be applied to the decision to utilize a drug seen in a DTCA commercial. When only the benefits of the drug are presented, individuals see all possible outcomes as being in the gain domain. They should be willing to pay up to the perceived value of

these gains for the drug. This situation is shown as point A in Figure 3 where the individual perceives a gain as a certain event.

Figure 3. Varying decision weights and consumers' valuation of medicines.



The introduction of possible side effects creates uncertainty. Individuals now face several possibilities. They could receive the benefits and avoid all side effects. They could also end up with a mix of benefits and side effects. Another possibility is that the drug is ineffective in providing relief and only results in detrimental side effects. To simplify analysis, we break these possibilities into two major prospects. The first is the possibility that benefits from taking the medicine outweigh the risks. The second is the possibility that risks outweigh the benefits. Commercials do not traditionally provide consumers with the probability of either outcome. This leaves consumers to make their own predictions about the probability of ending up at either outcome using decision weights. The possibility of ending up in the loss domain should cause consumers to place a lower value on the medicine than in the scenario without risk. This could be seen as a shift from point A to point B in Figure 3. By increasing the speed in which side effects are read or reading them in a pleasant tone, we hope to shift decision weights to make a net gain more prominent and decrease the overall shift in expected value from point B to point C in Figure 3.

Based on prospect theory, we expect consumer willingness to pay to decrease when side effects are introduced. We also expect tactics such as reading speed and tone of voice to offset this decrease to a certain extent. The question we seek to answer is what the magnitude of these expected changes will be and whether there is a synergistic interaction between reading speed and tone of voice when used simultaneously.

IV. Experimental Design

We designed our experiment to utilize both a within subject and between subject methodology. We created an online survey using Qualtrics software to measure several outcomes. We first required participants to consent to participate in the survey before the survey would advance past the consent form. After consent was obtained, we informed the participants that they would need access to headphones or some other means of listening to an audio clip during the survey. Once they confirmed their ability to do so, they were primed with a written story about insomnia. The text of this story is as follows:

“Imagine you can't sleep. It is 2:30am and you keep tossing and turning. During the day, you can't focus. You have to miss school or work and never feel rested. Your body feels weak, but your mind just won't let you rest.”

After reading this story, participants were asked how much they were willing to pay for a one month supply of a prescription sleep aid in United States Dollars (USD). The patients were then presented with a link to an audio recording containing one of the following treatment conditions.

Treatment 1: This is the control group. Participants are directed to an audio recording of a fake drug commercial that we constructed. We looked at common sleep aids such as Intermezzo, Lunesta, and Rozerem and created a list of benefits and side effects that all drugs had in common. We watched commercials on their websites and created an audio commercial that mimics these commercials but is more generic to sleep aids in general. We also invented the drug name Advidol to give listeners the sense that this is a real commercial. The text of the commercial is as follows:

“Advidol is a non-habit forming, effective sleep medicine to treat insomnia. It works with your body's chemistry to help you fall asleep and stay asleep for a full seven hours. Take it as needed, and wake up feeling refreshed and ready to take on the day.

Allergic reaction such as swelling of your tongue or throat may occur. Advidol should not be mixed with other sleep aids or alcohol. Avoid driving or operating heavy machinery until fully awake. Serious but rare side effects such as daytime sleepiness, confusion, and sleepwalking have been reported. Other abnormal behaviors include increased aggression, hallucinations, and confusion. In depressed patients, deepening of depression may occur. Common side effects are headache, nausea, and fatigue.

If you suffer from insomnia, ask your doctor about Advidol and return to sleep again.”

We enlisted the help of a Macalester College senior pursuing a career in voice and speech to record the commercial. For this first treatment, the reading speed is consistent for both promotional (benefit) and risk (side-effect) sections. The audio is read in a neutral, monotonic tone and lasts approximately one minute.

Treatment 2: This treatment includes the same commercial as Treatment 1. The second paragraph (side effects), however, is sped up to 1.5 times the speed of the rest of the commercial using computer editing software. Pitch and tone of the voice are preserved. The speed is measured by syllables per second.

Treatment 3: This treatment is the same as Treatment 1 except the side effects are read in a more pleasant voice. A more pleasant voice here means resonant and trustworthy. The Macalester College senior provided two recordings of pleasant commercials. We then conducted a preliminary survey with ten Macalester College seniors to assess which recording people perceive as the most pleasant. 7 out of 10 people surveyed preferred one recording over the other, so we used this recording as the most pleasant voice. The reading of side effects in the original commercial was edited out and they were replaced with the more pleasant version. This ensured that the only change was the tone of the side effects.

Treatment 4: This is a combination of Treatment 2 and Treatment 3. Side effects are read at 1.5 times the speed of Treatment 1 and a pleasant voice is used. The speed is measured by syllables per second. The audio file from Treatment 3 was adjusted using computer software to consistently increase the speed at which side effects were read.

The survey software randomly presented one and only one of the four possible audio files to the participant. After participants listened to the commercial, they were asked how much they were willing to pay for a one month supply of Advidol. This allows us to analyze the overall change in willingness to pay within subjects and then compare this change across treatment groups.

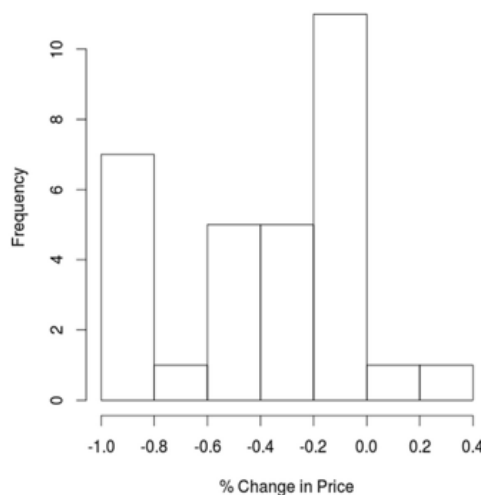
We then collected information that we thought might help explain any of the observed differences in changes of willingness to pay among groups. We presented individuals with two sliders to report their perceptions of the product on a scale of 0-100. Each participant faced sliders for perceived risk and benefits. The order in which they were asked about risks and benefits was randomized. After indicating their perceived benefit and danger levels, participants were asked to recall benefits and side effects of the product. The order in which these questions were presented was also randomized. In the final set of questions, we collected demographic information including gender, household income, country of residence, and whether the participant suffers from sleeplessness.

The main strength of this treatment design is that the randomization of group assignment allows for identification of the causative effect of any observed differences. Any observed changes must be due to the treatment we impose.

V. Results

The distribution of percentage change in willingness to pay is shown in Figure 4.

Figure 4. Distribution of % Change in Price



From Figure 4, we can see that only 2 out of 31 participants increase their willingness to pay after the advertisement. This result indicates that participants have lower willingness to pay after given side effects information. This is consistent with our expectations from prospect theory. The introduction of side effects creates uncertainty about whether the medicine will place the consumer in the loss domain and leads people to decrease their reported willingness to pay by an average of 32.3%. This result is significant at the 1% level.

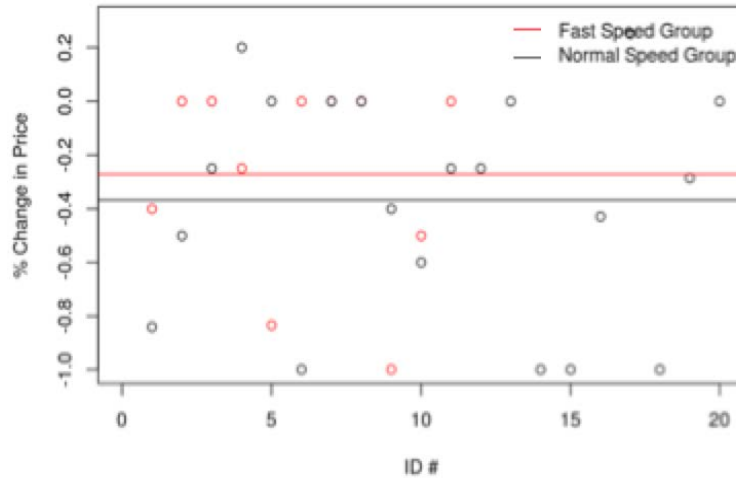
To observe the effect of reading the side effects faster on willingness to pay, we combine participants. Those in treatment groups 2 and 4 that listen to the advertisement with fast reading speed are analyzed as the *Fast* group and participants in Treatment 1 and 3 as *Normal speed* group. 55% (6 out of 11) of participants in the *Fast* group cannot recall any side effects information or signify uncertainty by writing questions marks after the side effects they think they remember. In the *Normal* group, however, we only observe such responses from 10% (2 out of 20) of participants' answers. The difference indicates faster reading speed negatively affects memorization. To see its effect on willingness to pay, Table 1 displays the mean change in willingness to pay in both groups.

Table 1. Mean of % Change in Price

% Change	Mean	# of Participants
Normal	-36.77%	0.42
Fast	-27.12%	0.37
Difference	9.65%	-0.05

A comparison of the means shows that the *Fast* group has a 9.65% higher percentage change in willingness to pay than the *Normal* group. Figure 5 shows the same result with a regression plot. From the scattered dots, we can see that data from our relatively small sample are heterogeneous, which reduces the significance level of our results.

Figure 5. Average % Change in Price



Some heterogeneity comes from participants' various perceptions in reported benefit and danger scales, here labeled *Benefit* and *Danger*. From Table 2, we can see that the effect of higher perceptions of *Benefit* increases willingness to pay and is significant at the 5% level.

Table 2. % Change ~ Benefit & % Change ~ Danger

% Change	Coeff.	P-value
Benefit	0.00834**	0.038
Danger	-0.0022	0.440

* Significant at the 10% level

** Significant at the 5% level

*** Significant at the 1% level

Table 3 shows the comparison of change in willingness to pay in *Fast* and *Normal* groups. We can see that if we control for heterogeneity in perceived *Benefit*, the *Fast* group on average has 26.2% higher change in willingness to pay than the *Normal* group. The difference is significant at the 10% level.

Table 3. % Change ~ Benefit + Fast

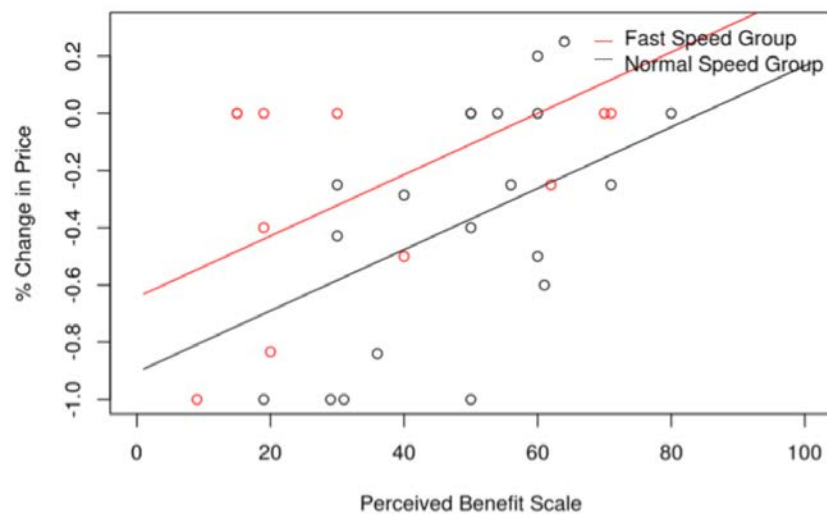
% Change	Coeff.	P-value
Benefit	0.011***	0.00
Fast	0.262*	0.08

* Significant at the 10% level

** Significant at the 5% level

*** Significant at the 1% level

Figure 6 shows the same result with a regression plot. From the scattered dots, we can see that our data display a less heterogeneous pattern compares with Figure 5.

Figure 6. % Change ~ Benefit +Fast

VI. Conclusion

Our investigation of willingness to pay in DTCA has led to several interesting findings. The first is that the inclusion of side effects significantly decreases willingness to pay by 32.3% across all treatments. The second is that increasing the speed at which side effects are read by only 50% decreases memory of side effects and mitigates the decrease in willingness to pay from the inclusion of side effects. The third finding is that perceived benefit is an important determinant of willingness to pay. This suggests DTCA is not just about minimizing perceived risks, but that it could be beneficial to focus on maximizing perceived benefits. We failed to find any relationship between tone of voice and willingness to pay. This could be due to several factors. It could be that our sample was too small to detect any effect. It could also be that the tones we utilized between treatments did not have enough variation to elicit different responses. It is also possible that tone of voice does not actually affect willingness to pay. These findings should be generalizable to any type of marketing which requires disclosure of undesirable information. Willingness to pay should decrease with the presentation of any form of risk. Presenting the risk information quickly should partially mitigate this decrease. More research is needed to understand whether the decrease in willingness to pay is more dramatic with DTCA since the consumers' health is directly affected.

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