Defeating Feature Fatigue – The Right Way

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Abstract

'Feature fatigue' represents the phenomenon of overwhelming consumers by including too many features with products. In this paper, we critique the seminal piece on feature fatigue and highlight the need for a deeper analysis than those covered in previous studies. We present a simple model which is consistent with previous empirical findings, but consequently derive starkly different results. While earlier studies recommended a reduction of features from the number desired by consumers, we demonstrate the flaw in this recommendation. We conclude that the right way to defeat feature fatigue is not to reduce the number of features, but to reduce the fatigue through improved product design.

1. Introduction

An almost universally applicable phenomenon is that of diminishing marginal utility: there can always be too much, even of a good thing. The number of features and options that are packed onto products should be no exception. Ergo, consumers can suffer from 'feature fatigue.'

'Feature fatigue' was introduced by Thompson et al. (2005) to represent the phenomenon of overwhelming consumers by including too many features in products. They presented results of three experimental studies that investigated the feature fatigue effect. They discovered that consumers generally believed that more features improved the capability of a product, but reduced its usability. And consumers preferred more features before purchase. In fact, when given the option, they preferred to pile on many, many features even after being fully aware of the possible feature fatigue effect in the future. Subsequent to use however, consumers appeared to place a greater emphasis on usability and actually experienced the fatigue. This shift in priorities from capability to usability presents a dilemma for managers. If they overload products with features, it results in feature fatigue. If they underload products, it can result in lower sales. Thompson et al. (2005) subsequently presented an analytical model to derive the optimal number of features that reflects the balance between the two extremes and maximizes the net present value of the typical customer's profit stream. Their main managerial recommendation was to offer simpler, specialized products to narrower market segments, thereby increasing product variety. This, they argued, would result in higher customer satisfaction and hence repeat purchases. They also recommended the design of market research in which consumers actually use products to encourage satisfaction with fewer features.

2. Motivation

We can see Thompson et al.'s (2005) recommendation at work in Apple's design of the i-Phone 8GB. As expected, customers wanted many features; much more than the number included by Apple. In the recent

lukewarm reviews received by the much anticipated i-Phone 8GB, the common theme appears to be simple: “a host of missing features…left us wanting more” (German and Bell, 2008).

The problem is that reduced feature fatigue can lead to disappointed customers, and disappointed investors.

Thompson et al. (2005) acknowledged this lower initial sales short-term effect, but argued that overall firm profits in the long run would be higher from repeat purchases by satisfied customers. The problem with that argument is it is hard to argue that a firm will earn higher profits from repeat purchases by few satisfied customers, if much of the market is disappointed by the bland nature of products. Or worse, if disappointed customers balk in favor of purchasing competitors’ products that come jam-packed with neat features.

Admittedly Thompson et al. (2005) did a splendid job of identifying and describing feature fatigue. They failed however to explain the fundamental oddity in the phenomenon. *Why* do consumers prefer feature-filled products in the first place, despite their full awareness of feature bloat? And it is only after a solid understanding of the phenomenon that appropriate guidelines can emerge. A second omission in their analysis of feature fatigue was the role of competition as they used a monopoly model to derive optimal conditions. In the presence of competition, a firm will face a serious threat of usurping by competitors if it opts to offer fewer features.

The research questions we answer in this paper are as follows:

1) If consumers are fully aware of feature fatigue, why do they still find it irresistible to choose products with more features? And what causes them to resent their decision later on?
2) Should firms disappoint consumers with bland products, or create products that lead to feature fatigue?

We build a model that is consistent with the empirical findings of Thompson et al. (2005), as well as with extant modeling literature. Surprisingly we find that the optimal number of features that firms should provide is equal to the number that consumers initially prefer. This contradicts the recommendation in the previous studies to offer fewer features than what is expected by consumers. We also introduce 'mismatch costs' as a cause of consumers' resentment subsequent to purchase, and highlight its difference from feature fatigue. Reduction in features can lead to two serious problems. First, any reduction in features will lead to disappointed consumers, who will likely choose competitor products. Second, reduction of features can lead to the side-effect of an increase in product variety, which in turn can impose search costs on consumers. Consequently, a firm's best response to feature fatigue effect is to reduce the fatigue. This can be established through improved product design.

The next section summarizes the relevant literature. Our model and analysis follows. We conclude with a discussion that includes managerial implications of our results. We also highlight arguments that resolve the difference between our findings and those in the seminal piece by Thompson et al. (2005).

3. Literature Review

We have already summarized the principle findings of the first and most prominent study on feature fatigue by Thompson et al. (2005). Owing to the high relevance of the study, we mention some highlights of their methodology. In three separate studies, they investigated the feature fatigue effect using experiments in which subjects evaluated or used web-based products. In their first study, they discovered that perceived capability increased as the number of product features increased while perceived usability decreased. Expertise appeared to reduce the latter effect. In their second study, subjects were given the opportunity to customize the product. Once again, subjects perceived products having more features to be more capable. They only found partial evidence that perceived usability decreased as the number of features increased. In their third study, participants actually used the products. The study revealed that

consumers placed more weight on capability relative to usability before use, and less after use. This shift in consumer priorities, they argued, led to feature fatigue. Subsequently they used a simple analytical monopoly model to highlight that if firms adopt a longer horizon view that considers the shift in consumers' priorities, they will include fewer features than the amount desired by consumers before purchase.

We base our assumptions on prior modeling and empirical works. Thompson et al (2005) also provide an excellent review of the relevant extant literature. Consumers' preferences link product attributes to consumer demand (Lancaster 1971). Consumers perceive products having more features to be more valuable than competitors' products having fewer features (Carpenter et al. 1994). Non-negative features perceived to add little value tend to decrease brand share because they provide reasons against choosing the enhanced product (Simonson et al. 1994). Further, consumers will experience diminishing marginal utility due to learning costs. According to Nielsen (1993), each incremental feature is "one more thing to learn, one more thing to possibly misunderstand, and one more thing to search through when looking for the thing you want" (p. 155).

Finally, experimental research has produced evidence that when consumers evaluate options for the distant future, consumers prefer highly desirable options that are less feasible, whereas the reverse is true for options in the near future (Liberman and Trope 1998). Since consumers at the time of purchase can be uncertain about the exact future utility of the features, the newsvendor model can be used to represent the consumers' decision problem of selecting the right number of features. The newsvendor model is solved to yield the optimal number for production or inventory in the face of possible overage or underage costs following the observation of a random variable. The solution is optimal in that it minimizes the total expected cost. The simplest model involving a single stochastic variable and single period has become a standard inclusion in operations and management science readings (c.f. Porteus 1990; Cachon and Terwiesch 2006). Research to expand the model to reflect richer settings continues. Mileff and Nehez

(2006) for example extend the model to multiple finite periods. Perakis and Roels (2006) study the effect of having only partial information about demand. We extend the model to explicitly incorporate feature fatigue.

4. Model

The number of features that can be included in a product is given by $F > 0$. Buyers of the product face two dilemmas before purchase. First, they face uncertainty about the future need of each feature. Second, they face costs such as learning curves in using more features that add to the complexity of a product.

Regarding the first dilemma, the buyers like neither underloaded products that will not perform well, nor overloaded products that are needlessly expensive. In particular, the number of features that the buyer will actually need in the future is the value of a random variable A having the cumulative distribution function Φ, which is continuous and monotone strictly increasing in $A \geq 0$. If the future value of A is larger than F, then a buyer experiences disutility from total 'underage costs' of $(A - F)c_u$, where $c_u > 0$ reflects the per-feature underage cost. On the other hand if the future of A is smaller than F, the buyer experiences disutility from total 'overage costs' of $(F - A)c_o$, where $c_o > 0$ is a similar parameter.

Regarding the second dilemma, the buyers generally experience diminishing marginal utility with an increasing number of features. That is, the usability of a product having F features is reduced by an amount αF^2, with $\alpha > 0$ reflecting the potential degree of feature fatigue.

The buyers' dilemma can be summarized as trying to minimize the resentment, or disutility, given by the following total cost function.

$$C_F = \max(0, A - F)c_u + \max(0, F - A)c_o + \alpha F^2 .$$

From the buyers' perspective, the optimal number of features will balance the resentment from having too few features, and the resentment of having purchased too many features that also reduce the usability.

5. Analysis

Why do buyers deliberately prefer products overloaded with features, and then subsequently experience resentment? Would it not be more reasonable for rational buyers to maximize their own utilities from selecting products that come with fewer features minimizing feature fatigue?

We can use our model to determine the optimal number of features preferred by buyers by selecting the number of features F^* that minimizes C_F.

Result 1: *The optimal number of features desired by the buyer solves* $F^* = \Phi^{-1}\left(\frac{c_u - 2\alpha F^*}{c_u + c_o}\right)$. *It exists only if* c_u *is large enough and/or* α *is small enough.*

Proof: In appendix.

The above result explains the behavior of the consumers and is hence sufficient for answering the first research question. We can use it to make the following observations:

- The buyers do not ignore feature fatigue at the time of purchase. Rather, in anticipation of feature fatigue, they reduce the number of features they prefer before purchase. It is quite straightforward to show that as α increases, F^* falls. So it is wrong to conclude that buyers first ignore feature fatigue, and then experience unusually high levels of fatigue.

- The buyers experience both feature fatigue and mismatch costs, which are different. The feature fatigue experienced by the buyer is $\alpha\ (F^*)^2$ whereas the mismatch cost experienced by the buyer depends on the value of the random variable A. Thus the source of resentment for buyers is not just feature fatigue, but includes mismatch costs.
- The experience of mismatch costs after purchase does not invalidate the optimality of F^* before purchase. This is because the value of the random variable A is realized only after purchase.

In light of the buyer's behavior, we can state the following result.

Result 2: *Firms can offer the highest value to consumers by offering* F^* .

Proof: Immediately follows the definition of F^*.

The implications of result 2 for the firm's strategies are as follows

- Offering any number of features fewer (or more) than the number desired by buyers will disappoint them. This is because F^* is optimal by definition as it minimizes the buyers' expected total cost or disutility. Buyers will expect that a different number can only increase their total cost.
- While feature fatigue can be reduced by offering fewer features, mismatch costs will increase by a greater amount. For any value of $F < F^*$, clearly $\alpha\ F^2 < \alpha\ (F^*)^2$. But by the definition of F^*, we know that the increase in mismatch costs has to be relatively higher .

Both of these implications completely contradict the recommendation in earlier studies to reduce feature fatigue by reducing the number of features in order to gain higher levels of customer satisfaction.

5.1 Providing features to maximize firm profit

While we have presented the optimal number of features from the buyers' perspective, we need to consider the firm's optimal preference. To a large degree, the firm's selection of the number of features will depend on its cost structure. If the firm faces a significantly high marginal cost of adding features, it may actually opt to offer features fewer in number than F^* if that maximizes profits.

But in cases where we are discussing feature fatigue, it is more likely that the marginal cost of adding features is low enough so that the firm finds it feasible to add at least F^*. Indeed, earlier studies have assumed marginal cost of adding features to be negligible. In this case firms should select F^* as a direct consequence of result 2.

Offering F^* becomes quite critical when the firm faces competition. The explanation is quite simple. If the firm offers more or fewer than F^* features, the customers will be disappointed, again as a direct consequence of result 2. A competitor firm may then successfully acquire these disappointed buyers by offering F^*, the number that results in the happiest buyers.

5.2 Reducing feature fatigue the right way: reducing fatigue, not features

We have already seen that even though buyers suffer from feature fatigue in the form of $\alpha (F^*)^2 > 0$, reducing the number of features from F^* will disappoint them by increasing their expected mismatch cost. It follows then that the best way for sellers to reduce the feature fatigue experienced buyers is to reduce the α. We call this reduction of fatigue, and not features. In fact, firms can increase the value offering of their products by striving to completely eliminate the feature fatigue effect. It is noteworthy

that the buyers will nonetheless experience some resentment subsequent to purchase in the form of mismatch costs.

How can managers reduce fatigue, α , in practice? A good way is to improve the product design. A swiss-army knife is a symbolic example. It has effectively defeated feature fatigue, as models with more features (tools) sell for higher prices. Its strategy is to brilliantly accommodate the features in tucking and folding supplementary tools without compromising the quality of the primary toolset.

5.3 Side-effect of reducing features: greater product variety

We have already seen that reducing features is an undesirable way of reducing feature fatigue, as it can lead to disappointed customers. In this section we briefly mention another disadvantage of reducing the number of features. A side-effect of feature reduction can be an increase in product variety.

The problem with increasing variety is that it can impose search costs on consumers prior to purchase, thereby introducing new forms of fatigue. In a separate but related research effort, we highlight that in the presence of ignorance among consumers about their true preferences, increasing product variety can significantly reduce value offering. This is because in selecting products, consumers will need to learn about the features. Since learning curves can be a significant cause of feature fatigue, forcing consumers to learn about features prior to purchase can overwhelm them easily.

6. Discussion

Previous studies of feature fatigue indicated the paradoxical behavior of consumers in their preference for feature-loaded products despite a full awareness of feature fatigue. We model the relevant consumer choice problem of selecting the optimal number of features under assumptions that fully agree with empirical findings. Our analysis is important as it explains the behavior of consumers. It is also of high

managerial significance as it indicates the flaw in earlier recommendations, and offers a deeper understanding of feature fatigue that can help managers choose the right course of action.

Buyers face two reasons for resentment or disutility. First, the usability of products is compromised when there are too many features, which leads to feature fatigue. Second, the buyers experience mismatch costs in having too many, or too few features in comparison to their actual needs over the lifetime of the product. Buyers choose the number of features to minimize their total disutility from these two sources. We highlight the difference between these two sources of disutility, and its importance. In particular, when a firm tries to reduce feature fatigue by reducing the number of features, it increases the buyers' overall disutility by increasing the mismatch cost.

Our results are completely consistent with previous empirical findings. Interestingly however, as a result of our analysis, our recommendations are at odds with those found in the extant literature. While we recommend offering the buyers products with the number of features they desire at the time of purchase, Thompson et al. (2005) recommend offering fewer features. And while we recommend reduction of feature fatigue through improved product design, Thompson et al. (2005) recommend offering simpler products to narrower market segments, thereby increasing product variety. Even though we have built very rigorous arguments for our recommendations, there is a need to resolve the difference between the two studies of the same phenomenon.

Upon closer inspection, we can identify some of the reasons for the difference between the findings of the two studies. First, we do not rely on the assumption that buyers are unduly naïve or simply eccentric. Rather, we demonstrate how it may be quite rational on their part to prefer feature-loaded products even after fully anticipating feature fatigue. Thompson et al. (2005) on the other hand assume that buyers first deliberately ignore and then experience feature fatigue and fail to explain this erratic pattern. Second, Thompson et al. (2005) used a monopoly model to derive analytical insights. We contend however that

the use of a monopoly model may be misleading as competition can be a significant drive for firms to make customers happy at the time of purchase. Third, the analytical model used by Thompson et al. (2005) suffers from a technical fault. In calculating their total revenue stream from the two periods of sales, they fail to capture the lowered-initial-sales effect of reducing the number of features which they themselves acknowledged. Doing so would help to derive results that are more consistent with ours. Finally, Thompson et al. (2005) misdiagnose the resentment suffered by consumers subsequent to purchase to be caused entirely by feature fatigue. We however highlight that feature fatigue is only half the story. In addition to feature fatigue consumers can suffer disutility from foregone opportunities or unfulfilled needs for features if products have too few features.

Although we have derived a result that optimizes number of features desired by consumers, we do not discuss its robustness. For managerial purposes, the robustness of the result may be quite relevant as parameter estimates may have errors. One option is to directly incorporate robustness by using alternative optimization routines, such as maximin or minimax regret. Such an approach will however significantly complicate the model. Meanwhile, our objective from modeling has not been to derive a precise value for the optimal number of features, but to indicate the general desirability of improving product design instead of reducing features. Nonetheless, we recommend the investigation of robustness for future research. Another recommendation for future research is the experimental investigation of our findings, contrasting them against previous findings. It is possible for example to test whether feature fatigue is experienced after the effect of mismatch cost is isolated.

7. Conclusion

The seminal study on feature fatigue by Thompson et al. (2005) was well-received both in academia and the industry. Their subsequent publication titled “Defeating Feature Fatigue” in the Harvard Business Review (Rust et al. 2006) was featured in NPR’s Weekend Edition (Stamberg 2006), WBUR’s Here and Now, the Jim Lehrer News Hour, and PBS’s Nightly Business Report. This is not surprising as feature

fatigue does exist. Thompson et al. (2005) pointed to anecdotal evidence for that existence as the following.

"It may seem crazy to think about increasing the perceived value of a product by removing features, but there are a number of great examples of companies doing this both inside and outside the information-technology industry. In fact, the March 2003 Harvard Business Review's toolkit, Finding Your Innovation Sweet Spot, sites "subtraction" as one of four methods to innovate with a new product. The example cited is the Philips Consumer Electronics Slimline Q-series DVD Player. What Philips found was that most functions that people needed on the actual DVD player could be controlled by a single button. So they built a player with that one button and put the rest of the control buttons on the remote. This created a simpler and more elegant product.

Another interesting example … is Google's interface. Google's founders … created a very focused and simple product. Instead of trying to be an information portal with maps, directions, local information, weather, traffic, etc., they focused on building the world's best search engine. They believed that being the best by definition meant leaving the other features to those who otherwise might be competitors. Google would work on speed, completeness, and simplicity. It's so focused, as a matter of fact, that someone reportedly counts the words on the home page to ensure that it isn't too complicated. Searchers of all skill levels can more easily navigate the Google site than its kitchen-sink foes. Google is widely considered the market leader today" (Ammirati 2003).

But if one actually analyzes the examples above carefully, it is possible to recognize that Philips and Google are reducing feature fatigue through improved product design, and not by reducing the number of features. A recent BBC article (BBC News, 2009) reports results from a survey of 4000 consumers in the US and UK that provides support for our view of the right way to handle feature fatigue. The survey found that 85% of users reported they were frustrated by the difficulty of getting a new phone up and working. Further, 95% said they would try more new services if phones were easier to set up.

Thompson et al. (2005) were quite right in identifying the problem: too many features can lead to fatigue. But with increasingly demanding consumers, firms should attempt to defeat feature fatigue not by reducing features, but by improving product designs that reduce the fatigue. Otherwise their products can disappoint consumers and perform poorly on the market, opening an opportunity for competitors.

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Appendix 1

Proof of result 1

$C_F = \max(0, A - F)c_u + \max(0, F - A)c_o + \alpha F^2$

Let $E[C_F] = g(F)$

$= E[\max(0, A - F)]c_u + E[\max(0, F - A)]c_o + \alpha F^2$

$= c_u \int_F^{\infty} (A - F)\phi(A)dA + c_o \int_0^F (F - A)\phi(A)dA + \alpha F^2$

$= c_u \left(\int_F^{\infty} A\phi(A)dA - \int_F^{\infty} F\phi(A)dA \right) + c_o \left(\int_0^F F\phi(A)dA - \int_0^F A\phi(A)dA \right) + \alpha F^2$

Then $g'(F) = c_u \left(-\int_F^{\infty} \phi(A)dA - F\phi(F) + F\phi(F) \right) + c_o \left(\int_0^F \phi(A)dA - F\phi(F) + F\phi(F) \right) + 2\alpha F$

$= -c_u(1 - \Phi(F)) + c_o(\Phi(F)) + 2\alpha F$

Using FOC, $g'(F^*) = 0$,

$\Phi(F^*) = \frac{c_u - 2\alpha F^*}{c_u + c_o}$

A solution exists only under the condition, $0 \le c_u - 2\alpha F^* \le c_u + c_o$,

since Φ^{-1} is defined only over the unit interval. The upper bound is trivially

fulfilled since $c_u, c_o, \alpha > 0$ and $F \ge 0$. Fullfilling the lower bound requires $F^* \le \frac{c_u}{2\alpha}$.

Sps that condition is satisfied,

then note that $\frac{c_u - 2\alpha F}{c_u + c_o}$ is a linear function decreasing in F,

while Φ^{-1} is also continuous, but increasing over the domain $\left[0, \frac{c_u}{c_u + c_o} \right]$.

It follows that Φ^{-1} is a continuous, decreasing function over $0 \le F \le \frac{c_u}{2\alpha}$. Finally

note that $\Phi^{-1}\left(\frac{c_u}{c_u + c_o} \right) > 0$, and that $\Phi^{-1}(0) = 0$. Then, there exists a value

for F^* such that $0 \le F^* \le \frac{c_u}{2\alpha}$, and $F^* = \Phi^{-1}\left(\frac{c_u - 2\alpha F^*}{c_u + c_o} \right)$.