Understanding the Complexity of Word-of-Mouth Responses in a World of Increasing Connectivity

Word-of-Mouth (WOM) has increasingly become an important aspect of modern marketing in the broad sense due to increasing peer-to-peer connectivity (e.g., social networking). Yet no one has looked at its response domain which is a complex of inter-related diffusion curves. WOM has gained in the importance of the marketing of political candidates, celebrities, products and services, and organizations (both profit and nonprofit) due to the advent of electronic communication. This paper examines the complexity of Word-of-Mouth (WOM) response domain through the use of a catastrophe model. Such models can deal with processes that are capable of both nonlinear and discontinuous behavior (often described as messy behavior). We provide a parsimonious model that can capture the complexity inherent in WOM responses so that managers can understand how changes in WOM occur with a view toward helping them deal with this growing aspect of increasing modern connectivity.

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INTRODUCTION

As the interconnectivity of individuals has increased due to enablers like cell phones, the internet (e.g., Facebook and MySpace), electronic media, and greater population mobility, it has increased the importance Word of Mouth (WOM). It has become an essential marketing tool used by organizations and individuals who want to get a message to a given public. New forms of WOM like online customer reviews have changed the nature of marketing communications (Chen and Xie, 2008). The increasing power of WOM has been felt by politicians, celebrities, the government, product manufacturers, and other organizations both private and public.

What makes WOM complex is that it is propagation is nonlinear in nature and can change from being smooth and continuous to violent sudden discontinuous shifts in the opposite direction. A single piece of information can change WOM about someone or something can from positive to negative instantaneously, as has happened to several politicians and celebrities over the last few years causing reversals in career fortunes. This paper will look at WOM in the traditional marketing of products context where there is increasing managerial interest and importance. However, it translates equally well to any "marketing" situation like politics, celebrities, nonprofit organizations and the like.

It has been argued that the effectiveness of traditional advertising appears to be waning and that often WOM is more effective (Arndt 2007; Khermouch, Green 2001; Sinha, Foscht, 2007). Toy manufacturers, fast food restaurants and financial planners alike have all reaped the benefits of positive word of mouth. For example, *WebKinz* stuffed animals have been a huge success with basically no advertising **(**Bulik 2007). Consumers are given a code to enter at Webkinz.com

(Bulik 2007). There owners can take care of their pets in a virtual world as well as interact with other *Webkinz* owners in a community. WOM has also helped Chipotle Mexican fast food chain. During the first 11 months of 2006, *Chipotle,* spent less than 1% of its revenue on advertising while its former parent, McDonalds, and other competitors spent 4% on traditional advertising during the same period of time (Arndt 2007**)**. *Chipotle* has consistently improved, e.g., same-store sales increased by 13.7% in 2006, which was the chain's ninth consecutive year of increases of at least 10% (Arndt 2007**)**. Chipotle founder and CEO, M. Steven Ells, believes traditional advertising is not valuable simply because it does not work given the thousands of advertising message hitting consumers every day (Arndt, 2007). Similarly, Erwin Buck, of Asset One/AIG Financial Advisors, Inc., encourages other financial planners to thank their long-term clients often and even lavishly in order to generate the WOM that will help build the client base (Hubbel 2007).

But it is not WOM by itself that marketers are interested in, but rather its effects on sales. Depending on whether it is positive or negative (Richins 1983) it can have dramatic effects on driving markets. Often the clearest evidence of the power of WOM is found in the entertainment industry and government where it can rapidly change the fortunes of films and public personalities. Numerous movies have been made successful through WOM. For example: *My Big Fat Greek Wedding, The Blair Witch Project, Napoleon Dynamite,* and *The Rocky Horror Picture Show* to name a few (Schwarzbaum 2007). Clearly, WOM can often trump critic's reviews and help create blockbuster movies out of those with poor critical acclaim. Similarly, a number of politicians have gained or lost their jobs on dramatic changes in WOM

From as early by Whyte (1954) and Brooks (1957) much of the literature has argued that Satisfaction/Dissatisfaction (**S/D**) is a prime driver of WOM, or at least highly correlated to

WOM. In addition, we would expect that **S/D** for situations where consumers are more highly involved (vested) or care about the product or service can create very dramatic effects in the speed and diffusion of WOM. By the same token, consumers who are not particularly involved or tied to a product or service may generate little WOM, and it will diffuse more slowly. From this perspective, it is reasonable to assume that product involvement moderates the effects of **S/D** on WOM in most situations.

OVERVIEW OF THE LITERATURE

Since we are looking at WOM in general, as opposed to a specific context, we use the basic definition provided by the Word of Mouth Marketing Association (WOMMA):

> *Word of mouth marketing encompasses dozens of marketing techniques that are geared toward encouraging and helping people to talk to each other about products* (WOMMA 2005).

In today's lexicon, WOM is consumer peer-to-peer communication. It is essentially a diffusion process that focuses on "spreading the word" about a product or service from individual-to-individual. But, before the term "WOM" was used, it was recognized that information (even gossip) about products transmitted from consumer to consumer on a peer-to-peer basis was important to product success or failure. Whyte (1954) and Brooks (1957) both found that a vast network of neighbors talking to each other about products could affect adoption. Around the same time Katz and Lazersfeld (1955) identified individuals who they referred to as "opinion leaders." They influenced consumers by filtering marketing information while incorporating their own opinions, actions, and decisions in communicating with others. The interpersonal theories presented in *Personal Influence* (Katz, Lazersfeld 1955) have fueled further research on how opinion leaders' impact others consumers' decisions. Though this

behavior may be viewed as gossip by some, it is estimated that this aspect of WOM impacts over two thirds of the economy and is prevalent in entertainment and fashion (Dye 2000).

For better or worse there are numerous different characterizations of WOM marketing approaches that have metaphorical names like: pyro, buzz, viral, product seeding, grassroots, evangelist, influencer, cause, conversation creation, brand blogging, to name a few (Womma 2005). A lot of effort by various practitioners is being put into developing scripts for the various forms of WOM (see, e.g., Stielstra 2005). But if we strip away the context specific characterizations and look at the underlying structure (how the propagation occurs), we can get a better understanding of the possible ways in WOM can vary from negative through neutral to positive and vice versa. From the very names used to describe WOM approaches (e.g., viral, pyro) it is clear that WOM is nonlinear in character. For example, if a satisfied adopter tells two other people about the product, and they, in turn, tell two other, and so on, the word will spread at a power-of-2 rate. But nonlinear propagation is typical of diffusion curves in general (see, e.g., Bass, 1969, Mahajan, Muller, Bass, 1995). Analogically, viruses spread exponentially (mathematically often of the form A_0e^{kt}) with growth and decay cycles often taking a sigmoidal shape (e.g., Ushimi, Henson, Gorham, 1972; Byrd, Hruby 2005). If propagation were linear, there would be little point to focusing on WOM because it would simply take too long to "spread the word".

Current academic research has looked at different aspects of WOM. For example, Lou and Homburg (2007) examined the connections among customer satisfaction, WOM, efficiency and the performance of human capital. On the other hand, Lam and Mizerski (2005) investigated how individuals' locus of control impacted their likelihood to engage in WOM communications. They found that individuals with a high internal locus of control are more likely to take part in

word of mouth communications with those other than their friends and family, than low locus of control individuals who do not (Lam, Mizerski, 2005). Using Markov analysis Monahan (1984) developed an analytical model of advertising and WOM connectivity. Brown and Reingen (1987) in a "natural setting" examined WOM referrals for products. The effects of WOM on product specific attributes were looked by Herr, Kardes, and Kim (1991). An interesting study by Mahajan, Muller, and Kerin (1984) developed a diffusion model which can account for positive or negative WOM. Their application was a pilot study of motion picture attendance. Using a game-theoretic approach, Mayzlin (2006) examined promotional chat on the internet. While much more has been written, the foregoing gives a sample of the types of research and approaches that have been used to look at WOM.

The foregoing suggest that what has been done is research that is similar to the story of the 3 blind men who touch different parts of an elephant and come up with different descriptions of what an elephant is. What has not been done in the literature is to look at is the entire WOM-response domain. That is, examining the entire set of possible shapes that WOM response curves can take as a system. Or, what one might call the WOM response gestalt. Understanding the complex whole, helps us understand how there can be sudden sharp reversals in WOM that mirror sudden discontinuous shifts in opinion. It can help us understand how there are WOM propagations that proceed from a slow start to a fast finish, or fast start slow finish, etc. Or, how many possible ways it can change from positive to negative and vice versa? The problem is similar to examining the dynamics of the stock market. We know it goes up and down in some very interesting ways, and there are numerous studies have tried to examine why it does what it does. But in order to understand <u>all the possible ways the stock market can change from boom to bust</u> (its various trajectories) one needs to understand the complexity of its overall response

domain (i.e., all the possible ways it can change). An early example such an approach was by developed by mathematician E. C. Zeeman's (1974). He used catastrophe model showed all the possible ways that the stock market could switch from boom to bust and the reverse. Empirical work by Guastello (1995) tested and supported the model. The result is that he was able to capture the complexity of stock market behavior in a single parsimonious model.

In a similar fashion, it is this purpose of this paper to capture the complexity of WOM responses by using a catastrophe model to capture its underlying structure. The choice of model is based on its ability to parsimoniously capture the complexity of the response domain which can be characterized by both evolutionary and radical changes in behavior.

THE MODEL

Economists, Marketers, and other social scientists have used catastrophe theory (Thom 1975) in a number of different situations. The basic cusp model (its canonical form) is given by Equation 1 below and graphically depicted in Figure 1. Some examples from Economics and Marketing follow: Varian (1979) examined the business cycle; the stability of stock exchange behavior was presented by Zeeman (1974) and tested by Guastello (1995), and modeling bank failures by Ho and Saunders (1980), and technological choice and network externalities (Lange,

$$\mathbf{Z^3 - X - YZ = 0} \qquad (1)$$

Oliva, McDade 2000). In marketing, catastrophe theory has been used to look at an industrial product adoption (Herbig 1991), organizational adoption of Word for Windows (Lange, Oliva, McDade 2004), customer satisfaction and brand loyalty (Oliva, Oliver, MacMillan 1992), customer satisfaction and product performance (Oliva, Oliver, and Bearden, 1995), and the effects of inertia on supply chain performance (Smith, Lancioni, Oliva 2005) to name a few. In

particular, we are interested in how WOM responses change due to changes in **S/D** and modified by involvement (see: Figure 1). Of particular value in this case is the ability of such models to be able to handle both revolutionary and evolutionary type changes. That is, changes in WOM propagation which may occur slowly over time or virtually instantly (as in the case of some public figures).

FIGURE 1 about Here

Travel on the response surface in Figure 1 gives all the possible ways in which WOM can change from positive to negative and the reverse when controlled by the two variables: 1) involvement and 2) **S/D**. The origin (0, 0, 0) is at the back center of the curved surface. It represents the point of neutral or no WOM, with no involvement and consumers being neither satisfied nor dissatisfied (i.e., neutral). Transitions can be smooth (line AB) going from the end points of WOM through each intermediate position or can suddenly shift (line CDE). Similarly, they can also go smoothly in one direction and then change abruptly in the other, etc. Areas to the left of the origin represent mild to intensely negative WOM, while area to the right represents mild to intensely positive WOM.

Model Dynamics

Low Involvement: The assumption for the following discussion is that the situations we are examining are only those for which **S/D** can drive WOM. Movement takes place on the surface of the model shown in Figure 1. We start by taking a slice of the model at a low value for involvement, which is shown in Panel A of Figure 2. When involvement is low, WOM will tend to move in direct proportion to the "positiveness" or "negativeness" of the **S/D**. Hence, movement from point A to B or B to A in the figure will follow (be controlled by) **S/D**. Also, the range of intensity of the positive or negative WOM will be low because consumers are not

vested in the product (have low involvement) and can take it or leave it, as it were. We would expect the situation to be typical for low involvement products/situations like cookies and crackers, or toilet paper (for people without medical issues). Therefore, in these situations the range of positive or negative WOM will be reduced from the extremes (i.e., no highly positive or highly negative WOM), because the product is not that important to them.

FIGURE 2 about here

This may be driven in part because consumers don't seek peer information regarding low involvement products as much as they do for high involvement products. This seems to be reflected in the literate on WOM which has focused on high involvement products like diagnostic centers automobiles, PC's, innovations (Wyte 1954; Arndt 1967; Engel, Blackwell, Kegerreis 1969; Brown, Reingen 1987; Brooks 1957). Where involvement is low, we would expect there is not the intensity to proselytize for the product or start a campaign against the company. In fact, in many cases consumers would be relatively neutral or engage in mild levels of WOM, characterized by statements like "it's Ok." Hence, swings in WOM tend to be more muted at the back of the surface in Figure 1.

High Involvement: When emotional investment in the product or service is high, the structure of the situation changes dramatically (front part of Figure 1). People are vested and WOM becomes intense. Political situations, people's relationship with their music (e.g. rap), picking out a prom dress, all tend to generate situations where the consumer **S/D** (Oliva, Oliver, Bearden, 1995) is strong, concomitantly, WOM is highly positive or negative. There is no middle ground when involvement is high. If we look at positions on the Iraq war, we find diehard Republicans supporting the President, and diehard Democrats supporting withdrawal. These groups have no middle ground. What is important here is that the shift does not involve

any intermediate situations (there is no neutral). In terms of the public, WOM did not go from very positive, to indifference, to negative as evidenced by the 2006 midterm U.S. elections. It is a direct switch from positive to negative that followed the switch from satisfaction to dissatisfaction with no midpoints. In political situations one often hears of the term "smoking gun" to represent the tipping point for when support abruptly stops. Sudden shifts in behavior resulting from changes in **S/D** are not uncommon (Coyne, 1989). Looking at brand loyalty for industrial products, Oliva, Oliver, MacMiillan (1992) show that shifts in brand loyalty have similar type of discontinuous patterns when transaction costs are high. Both Figure 1 and Panel B in Figure 2 show this behavior. Consumers who generate positive WOM (position D) may have some concerns as **S/D** turn negative, but there is a tipping point, the edge of the S-shaped curve, where the consumer "falls off" and engages in negative WOM (position E). Similarly, when involvement is high, the reverse can happen. Position E is on the negative WOM portion of the surface, but as **S/D** gets positive, it reaches a point where consumers switch to position D on the positive WOM surface. Movies plots often exploit a version of sudden shifts in situations where the leading man and leading lady dislike each other (e.g., *It Happened One Night*, 1934, a 5 Oscar winning film), or even hate each other, but after bickering for most of the movie they suddenly look at each other and kiss (i.e., a Gladwell (2000) tipping point is reached and there is an instant switch from hate to love).

Sudden Shifts. The area of overlap (defined by the cusp in the XY-plane) shown in Figure 1 gives the model it ability to characterize many different behaviors. Panel B in Figure 2 shows a slice detailing the overlap at high levels of emotional involvement. However, the boundaries (edges) of the overlap area are in the form of a cusp, from which the model gets its name. This is the locus of "tipping points" (Gladwell 2000) for the model. Panel C shows a

projection of these points on the XY plane. The size of the cusp grows from its vertex at moderate levels of emotional involvement to being quite pronounced at high levels of emotional involvement. Depending on the direction, crossing a cusp boarder can result in a sudden shift from positive to negative WOM. The farther out (towards the front) the larger the shift and the more intense the level of positive or negative WOM (i.e., actively proselytizing for or against the product). In Panel C, the transition of point C across the cusp results in consumers "falling" up to point D. They have gone from engaging in negative WOM to engaging in positive WOM. Within the area of the cusp the behavior is bimodal. That is, the same levels of involvement and **S/D** (i.e., a given xy pair) can result in two different WOM behaviors (z_1, z_2) *which depends on direction* the consumer is coming from. For example, if the consumer(s) is engaging in negative WOM and satisfaction is increasing eventually it will have an effect. When the right most cusp boundary is crossed (see Figure 1, Figure 2 Panel C), the switch is to the positive WOM surface will occur. However, if the situation is one where it is positive WOM person who is being affected by increasing dissatisfaction, then when the left cusp boundary is crossed, the consumer(s) will "fall" down to negative WOM surface. The fact that the cusp boundaries are not at the same point, represents the hysteresis in the system. Consumers do not shift up or down at the same point as they would in the step function, there is a lag. If a consumer is engaging in very positive WOM (say for a Politician) and if for whatever reason satisfaction becomes dissatisfaction to the point where the consumer cannot handle it any more (smoking gun), the consumer will switch to engaging in negative WOM. However, switches back and for do not occur at the same point on the surface. For the politician to regain the consumer's support it will take a significant increase in satisfaction to bring the person back (see points C, D, E on the Figure 1). This situation is analogous to a person who is madly in love with an individual who is

not particularly attentive (forgets birthdays, has affairs, etc.). In time the bad behavior will take its toll and love will turn to intense dislike or possibly hate. Simply saying "I am sorry", is not sufficient to restore the love to the point it was. It will take a lot of highly satisfying behavior over a long time to restore the system to the original state.

Note that we determine where the consumer is in order to determine what will happen as involvement and **S/D** variables change. Hence, it is a state descriptive system where the state of the consumer in the prior period matters. The length of the fall up or down depends on the amount of involvement there is in the situation. As involvement increases the gap widens, while the reverse is true if involvement decreases. Outside the cusp area the function is unimodal and given combinations of involvement (Y) and **S/D** (X) result in a unique response ranging from intense dissatisfaction to intense satisfaction.

The Splitting Factor. If one projects the area of overlap on to the ZY plane for X equals 0, then one gets the view shown in Panel D. The shape of the overlap from this view is parabolic, which can also be ascertained by looking at Equation 1 and substituting 0 for X (neutral or no **S/D**). The reason this is called the splitting factor is easy to see in Figure 1. As involvement increases from zero, there comes a point (the apex of the cusp) were the surface starts to split into two sheets, one for positive WOM, the other for negative WOM. Differences between being satisfied or dissatisfied (i.e., being slightly to the right or left of neutral) as involvement increases from zero will push consumers onto one surface or the other as involvement continues to increase. This is shown by points G and F in Figures 1 and 2. Hence, small differences in **S/D** one way or the other can be critical in determining whether consumers engage in positive or negative WOM as involvement develops (increases) for a product. In essence the system becomes "locked into" positive or negative WOM as involvement increases.

Final Dynamics Comment. The efficacy of catastrophe models is that they capture all possible ways a system can change for a given *parsimonious* set of variables (Thom, 1975, Zeeman, 1976, Cobb, 1978, Guastello, 1995). In this case the response surface can account for all transitions from very positive to very negative WOM as changes in **S/D** and involvement occur. Both smooth and sudden shifts can be captured, as well as, all combinations of smooth and sudden shifts.

DISCUSSION

What does the model suggest regarding marketing practice? The key issue is that when **S/D** drives WOM, Emotional Involvement with the product, service or situation is an important moderator. When consumers are not involved, they will their WOM will tend to respond in direct proportion to the nature of the **S/D**. However, when consumers are highly involved the situation becomes bimodal and consumers tend to speak very positively or very negatively. There is no middle ground. This means that marketers trying to use or manage WOM techniques need to keep an eye on involvement. For example, if there is good initial satisfaction and they get good positive "buzz" going, they should consider taking additional actions which would increase consumer involvement (e.g., freebees like T-shirts, coupons, product samples, a club, etc). The result of increased involvement is increased positive WOM levels in this case. This is particularly true in a competitive situation. Uninvolved or lowly involved consumers will move in direct proportion to changes in **S/D**. If your product looses traction (e.g., trendy dependent) in the buzz and another product gains it, you will have trouble holding your consumers. This in part is the chicken and the egg problem of the situation. There is a lot of mutual causality that

can occur. While not addressed in this work, WOM can drive S/D for some products and services and the system can be self exciting driving itself.

Looking at the negative WOM side the model suggests several things. When involvement is high, to get the WOM changed from negative to at least neutral and better positive, it will take a big increase in satisfaction to convert consumers. However, if involvement is high then it can also help to reduce involvement to "get" consumers to a more neutral stance by heading for the cusp boundary. This may be the shortest route to eventually gain positive WOM. In essence, this would be a move to the back and right of the surface. We see this sort of thing done in consumer complaint departments. In those situations, one of the first things that need to be monitored is the consumer's emotional state. Typically, the initial task it to calm the individual down so you can proceed. Parents also tend to do the same thing when their children are upset by something, by trying to convince them that "it is just not that important." Clearly the model suggests that if you have bad WOM and emotionally involved consumers, the situation is very bad and will take a lot of work because of the hysteresis. Driving down emotional involvement can be done by things that help correct the situation in the consumer's mind. If emotional involvement stays high, a marketer would need to try and generate a very high degree of satisfaction to bring the consumers back to the positive side. This may be an intractable position in the short or near run.

From a managerial point of view the danger area is defined by the cusp boundaries. If the consumer crosses the boundary in a given direction there will be a significant shift in WOM. This can be good or bad depending on where the consumer lands. Also, consumers within the boundaries tend to be, or are becoming, ambivalent. Essentially, the **S/D** is not sufficient to hold the current levels of WOM easily. From the model one might be tempted to believe that if

involvement is high and WOM is positive, you can stand some dissatisfaction. While this is true, it is only true up to a point and it depends on where the cusp boundaries are. The lag in response gives the manager whose product's satisfaction ratings are slipping time to change things before positive WOM goes negative. Similarly care must be taken when there is mixed or neutral initial **S/D** and relatively low involvement. For example, if consumers are relatively neutral on a new product, but **S/D** starts to increase and people see the product as important, then slight differences in the **S/D** in either direction (slight dissatisfaction or slight satisfaction) will move people from neutral onto either the positive or negative WOM surface as involvement continues to increases. This means that as involvement increases it magnifies the effect of a given level of **S/D** on WOM in a form of "lock in". Turning to Panel C of Figure 2 we note the shortest distance to the edge may be back (lower involvement) or a combination of changing **S/D** and trying to reduce involvement. Hence managers may be able to use a mixed strategy control WOM when things are not going well.

From the foregoing it is evident that the model can provide guidelines for managers. For example, in situations for new entries initial satisfaction is crucial and it should be paired with things that increase involvement so that people are driven from neutrality positive WOM as quickly as possible. Initial WOM spin often has a short half-life so they need things which help hook consumers (buy in emotionally) to leverage the early gains.

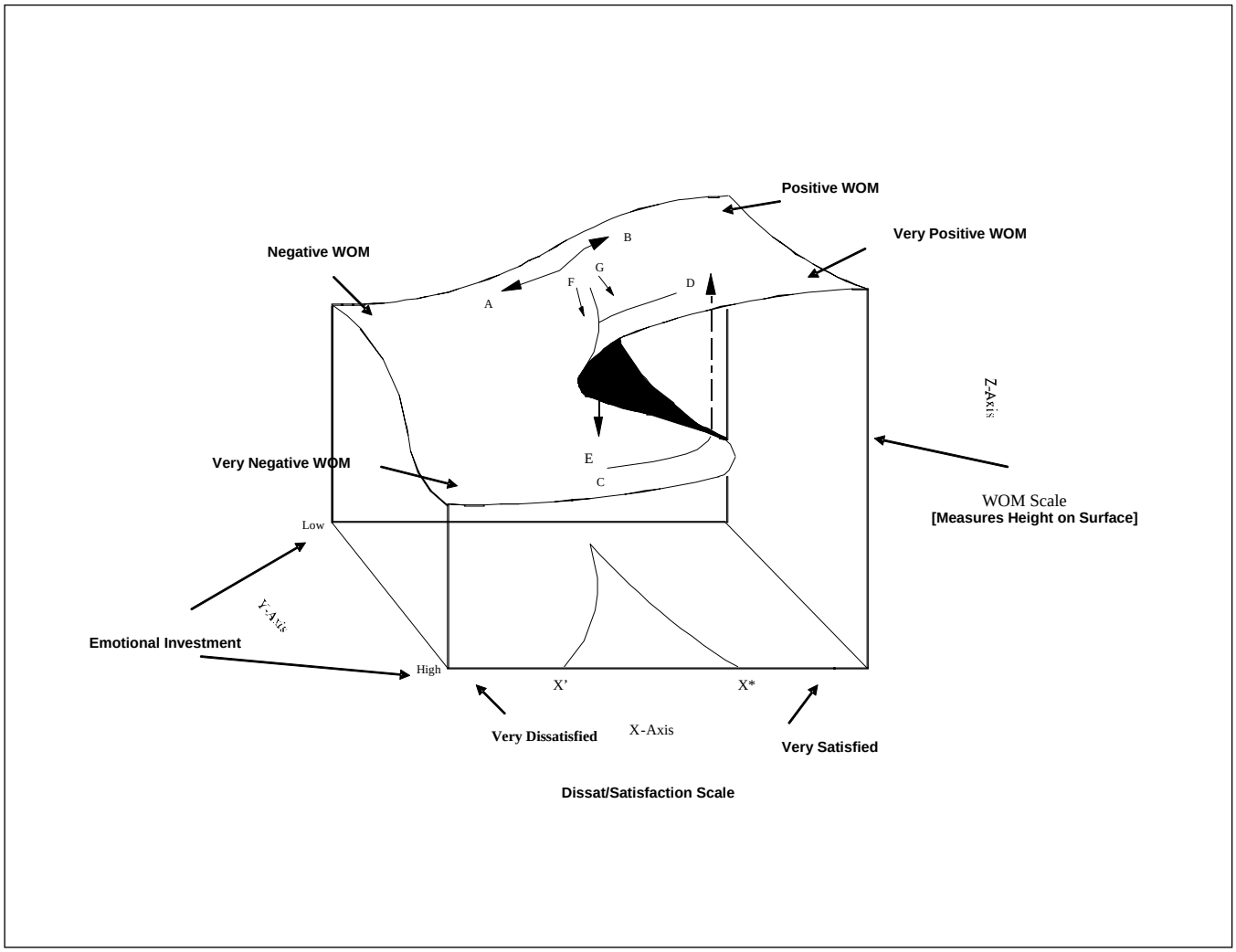

Figure 1
A Model of WOM Driven By S/D and Involvement

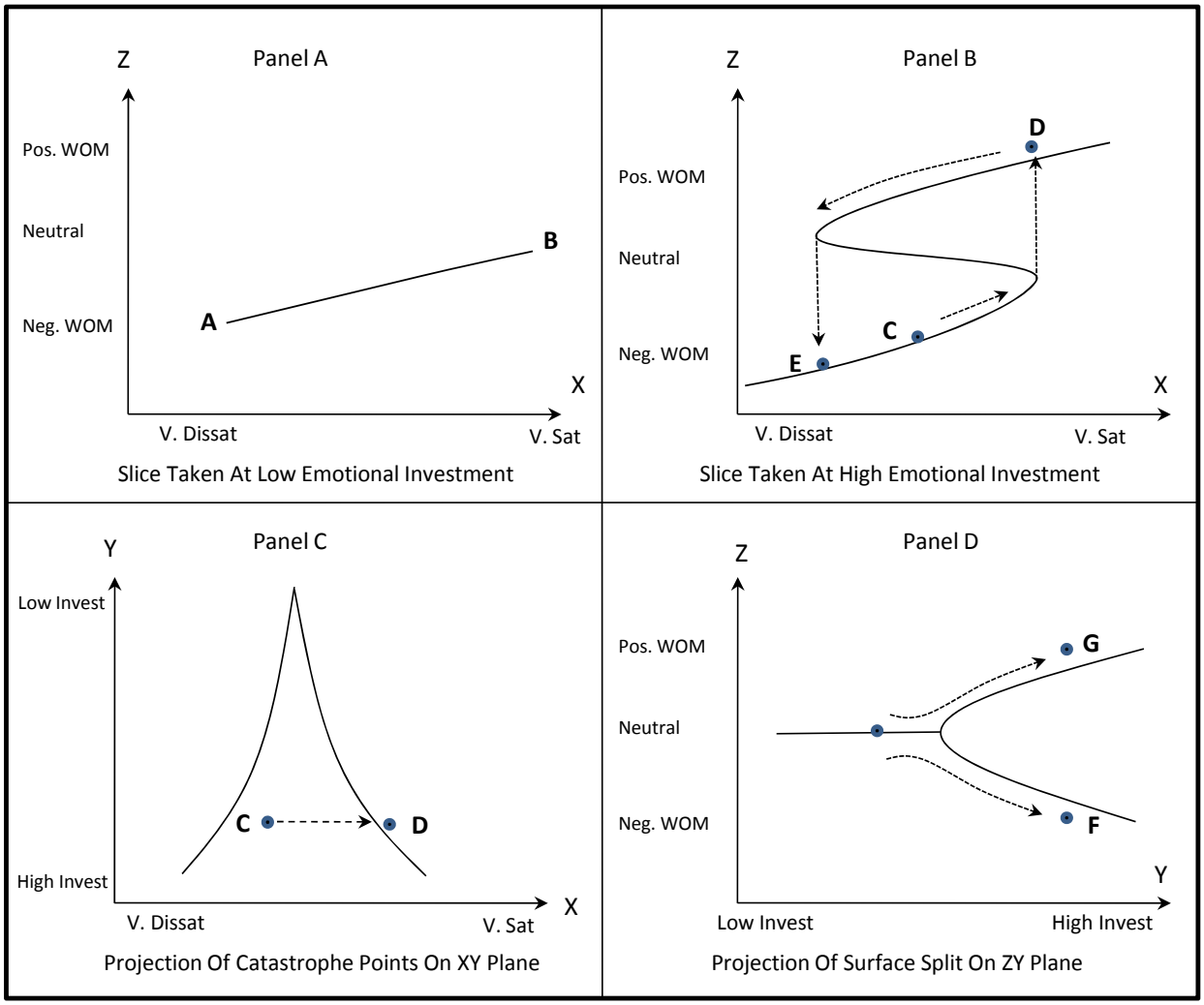

Figure 2
Select Planar Views Of The Model

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