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The Tale of the Tape: Standards, Path Dependency and the Trendy Consumer

by

Daniel J. Meeking

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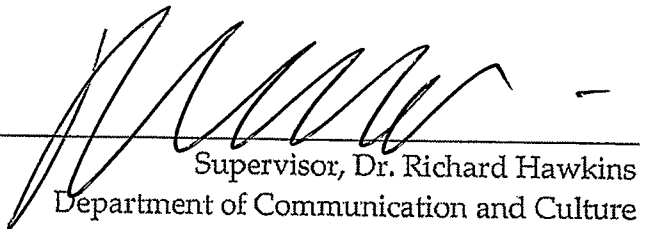
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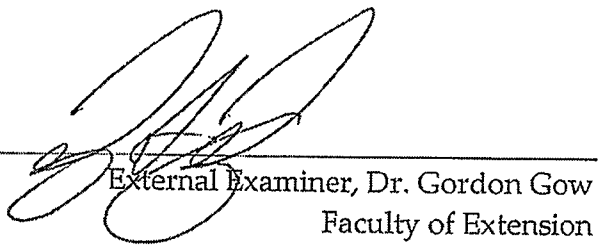
UNIVERSITY OF CALGARY

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The Tale of the Tape: Standards, Path Dependency and the Trendy Consumer" submitted by Daniel J. Meeking in partial fulfilment of the requirements of the degree of Master of Arts.

  
\_\_\_\_\_  
Supervisor, Dr. Richard Hawkins  
Department of Communication and Culture  
University of Calgary

  
\_\_\_\_\_  
Internal Examiner, Dr. Patrick Feng  
Department of Communication and Culture  
University of Calgary

  
\_\_\_\_\_  
External Examiner, Dr. Gordon Gow  
Faculty of Extension  
University of Alberta

July 19, 2011

*Date*

## Abstract

This paper explores the role that standards play in the consumption of technological goods through a re-appraisal of the battle between VHS and Beta video cassette recorders in the late 1970s and early 1980s. A richer picture of the consumer – the “trendy consumer” – is introduced as an alternate explanation for the development of increasing returns to adoption of standardized consumer electronics platforms. The trendy consumer highlights the importance of consumer dynamics in determining whether the winner of a standards battle will lock-in the market.

The trendy consumer is not attracted to devices (e.g. a VCR) so much as to the complementary goods and services offered as part of the platform (e.g. movies for sale and for rent). The importance of standards as providers of the stability is highlighted as a necessary precursor to the formation of complementary goods and services that attract the trendy consumer to the platform.

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## Chapter One: **Background & Introduction**

### 1.1 Motivation and problem

This work grew out of my realization that the literature on technical standards is stuck in the context of a neo-classical economic search for optimality in terms of coordination and efficiency. There is very little literature that considers technical standards as something other than a means of altering the economics of the realm of production of goods. This standard frame of reference was developed with industrial goods in mind and to that end it has served its purpose well. This work questions the degree to which this industrial frame of reference is also valid for standardized consumer goods such as home video entertainment equipment.

Having been influenced by exposure to concepts such as fitness landscapes, path dependency, and emergence in complex systems theory, I began to question the notion of optimality as it relates to consumer goods. Optimality is an enticing philosophical construct, but what does optimality look like in the realm of our daily lives? Do consumers seek or recognize optimality when choosing between competing products or technologies? Brian Arthur famously warned of the possibility for historical events to lock the economy into “the monopoly of an inferior technology” (Arthur, 1989) and used the battle

between VHS and Betamax Video Cassette Recorder (VCR) format standards as an example of this (Arthur, 1990). This battle of the VCR formats has been told, re-told interpreted and re-interpreted so many times that it has taken on the status of gospel in the literature on standards. Beta, the supposedly technically superior format, lost the standards battle and therefore the proliferation of the inferior VHS format detrimentally impacted our collective welfare.

If Arthur is right, then the 1980s were not as enjoyable as they would have been had society selected Betamax instead of VHS become a fixture in the majority of North American households. Is there any way of corroborating Arthur's assertion that public welfare really and meaningfully suffered because of the adoption of a supposedly inferior video cassette recorder standard? This question is difficult to answer because the extant literature on standards is overwhelmingly oriented towards firm and industry-level issues of efficiency, coordination and optimality. This focus on the economics of standards has, like neo-classical economics more generally, very little to say about the consumer. Where the standards literature does attempt to engage with the end-user (the consumer) as in Arthur's discussion of lock-in, it is through the lens of concepts such as efficiency, coordination and optimality. The picture of the consumer that results from looking through these conceptual lenses is, not surprisingly, a



utility-maximizing rational consumer who seeks efficiency, coordination and optimality. The Nobel Prize awarded to Kahneman for showing that individuals behave irrationally when faced with uncertainty suggests that the utility-maximizing, rational consumer who seeks efficiency, coordination and optimality is little more than a figment of our theoretical imaginations.

## 1.2 Objectives and Question

This thesis takes up technical standards from an unusual angle and looks at the effects of standards on end-user consumption, specifically format standards for home entertainment devices through a case-study analysis of the VHS versus Betamax VCR standards battle. A typical economically informed analysis of standards is focused on efficiency and optimality of production and distribution and thus ends at the moment of purchase. I am opening up the analysis of standards to include an understanding of the effects of standards in the context of the acquisition and use of standardized technology by consumers. Nobody is looking at standards and asking what they mean to consumers – or whether they matter to consumers – and that is what I set out to do in this thesis. My research question is: **what role do standards play in the consumption of technological goods by consumers?**

### 1.3 Definitions

Definitions for three central concepts that flow throughout this work are required to prevent confusion between their usage in this work and their usages in a variety of other contexts. I adopt David and Greenstein's definition of **standards**: "a set of technical specifications adhered to by a producer, either tacitly or as a result of formal agreement" (1990, p. 4). This definition is adopted because it captures the essence of technical standards as a means of defining a minimal set of technical characteristics for goods while remaining indifferent (as does this thesis) about the process through which the standard was developed and the exact type of the standard (formal, informal, *de facto*, regulatory, minimum quality, safety, etc.). **Consumption** is the acquisition and use of goods. By explicitly including the processes of *acquisition* and *use* of goods in the definition, consumption becomes a process and not just a single action or decision. **Consumers** are real-world, everyday individuals like you and I. This work is exploring the role of standards as they relate to consumer and therefore the useful definition of consumers captures the concept of real-world, living breathing individuals, instead of either industrial entities or stylized, rational, utility seeking actors

## 1.4 Outline

The objective of this thesis is to situate and then re-appraise the battle between VHS and Betamax formats that occurred in the late 1970s and early 1980s. This particular standards war has achieved the status of gospel within the literature on standards where it told and re-told as a classic example of competition between competing standards. That VHS captured the vast majority of the market is framed by Arthur (1990) as an example of lock-in, a situation in which the public welfare suffers on account of society having selected and now being stuck with the inferior technology. This can be characterized as a failure in standardization: the most optimal standard failed to be adopted, or it can be framed as a failure for the consumer to choose the optimal technology. In either case, the concept of optimality is necessary to make the argument. Throughout this thesis, I challenge the relevance of the concept optimality to battles between competing consumer electronics standards, and instead highlight the importance of peer influence on consumers' consumption decisions relating to standardized consumer electronics.

### *1.4.1 Literature Review*

This thesis begins by reviewing three bodies of literature. First, the literature on technical standards, with a particular focus on theories of how

standards relate to the widespread adoption of consumer electronics; this provides the background necessary to explain the standard explanations of the case that is the core of this work: the VCR standards battle. Second, sociologically and anthropologically-influenced literature that reveals how consumption is very significantly socially and culturally determined situates the influencers of consumption decisions nearly diametrically opposed to the explanation provided in the literature on standards. Finally, a variety of sources that can be grouped together as answers to the question of how we, as consumers, experience technology are reviewed and provide the basis for questioning the degree to which the intrinsic technical characteristics form part of the experience of technology.

#### ***1.4.2 Concept Building***

Following the literature review is a chapter in which I introduce the continuum between the calculating and trendy consumer. This continuum highlights the differences between the extremes of the *calculating* consumer who rationally and individually (that is, without any influence from peers) evaluates the intrinsic characteristics of the goods that they consume and the *trendy* consumer who is entirely swayed by the opinions and actions of their peers, but pays no attention whatsoever to the intrinsic characteristics of the goods. I argue

for the need to more seriously consider the trendy consumer, particularly in light of the varied body of literature reviewed in the final third of the literature review that questions the degree to which consumers engage with the intrinsic technical characteristics of goods and therefore raises questions about how and whether consumers select technology according to any calculated search for an optimal configuration of characteristics.

Further arguments for reducing the importance of technical optimality are developed through a critical examination of Arthur's (1989) phenomenon of lock-in through path dependence. From the perspective of the calculating consumer, this is a failure of consumers to correctly evaluate the technical characteristics of the competing technologies, resulting in consumers settling on sub-optimal technologies. If, however, consumers do not or cannot discern between technical characteristics of two similar but incompatible competing standards, then the notion of "optimality" is problematic because the differences do not matter and thus lock-in loses its negative connotation.

And yet, lock-in still occurs in the sense that one technology does often capture the market in what looks like a situation of increasing returns to adoption. By taking an alternate view of standards as platform-building

instruments rather than characteristic-setting instruments, it is possible to construct an explanation for lock-in by highlighting the importance of the trendy consumer's role in selecting the goods and services complementary to the standardized platform. This allows us to revise Arthur's concept of network-effects driven path dependence with a concept of path dependence driven by trendy consumers' peer influences instead of network effects.

### *1.4.3 Case review and re-appraisal*

Following on the conceptual development in Chapter Three is the re-appraisal of the VHS versus Betamax VCR format standard battle. Existing interpretations of the VCR standards battle are heavily influenced by neo-classical economic conceptions of the consumer as a rational, utility seeking individual, characterized as the calculating consumer. Introducing the continuum between the calculating and trendy consumer makes it possible to re-evaluate the VCR standards battle. By re-examining the case with the trendy consumer in mind, I show that Arthur's model of network-effects driven path dependency is not supported by the case. Indeed, the market for the VCR did not develop during the standards battle but instead began to grow several years after the standards battle was settled, when video rental stores began to spread across the United States. Because of this delayed market formation, the lock-in and path

inefficiencies that Arthur identified in his appraisal of the VCR battle could not have formed simply because the market did not exist yet. Instead, path dependence driven by the trendy consumer provides an explanation that more plausibly fits the available empirical evidence as it can reasonably explain both the timing and the magnitude of growth in the VCR market

## Chapter Two: Literature Review

This chapter examines three bodies of literature that provide three viewpoints on what it is that drives the adoption of consumer-oriented technologies. First, the literature on standards, with special attention being paid to works that frame standards as coordinating agents that foster externalities highlights the extant standards literature is entirely focused either on the effects that standards have on producers or, in rare cases, industrial users. In no cases is the literature oriented towards the consumer as perceived in the present study. Next, literature on consumption is reviewed with a focus on the factors that influence consumption decisions; this highlights the communicational aspect of consumption while also highlighting that consumption is not determined only by intrinsic characteristics of goods, but also by the social context(s) of the consumer. Finally, literature that (from a variety of perspectives) answers to the question of how we, as consumers, experience technology provides the basis for questioning the degree to which the intrinsic technical characteristics form part of the experience of technology.



## 2.1 Standards

### *2.1.1 Types and Effects of Standards*

Standards are classified according to one of several existing (and not mutually exclusive) classification schemes. Generally, the choice to use one scheme over another reflects nothing more than a desire to differentiate standards in a manner that highlights the topic being studied. Three common classification schemes applied to standards are first, classification according to intended economic effects such as compatibility, minimum quality/safety, variety reduction, or information / measurement (e.g. David, 1987; Swann, 2000). Second, classification according to the formal or *de facto* processes used to arrive at the standard (Blind, 2004; Swann, 2000) and thirdly, a scheme that differentiates according to authorship with categories such as unsponsored, sponsored by proprietary interests, sponsored by voluntary standards organization, or mandated by governmental agencies (David & Greenstein, 1990).

These three schemes, while useful for tracing the origins and intended effects of a standard, universally categorize standards based on either the process of standards development, or on the influence that the standards will have on the production of goods that are covered by a particular standard. In no cases do these classification schemes address questions of how consumers are influenced

by a standard,<sup>1</sup> and so they are limiting to the present study because this study is attempting to examine effects of standards on consumers and their consumption of goods.

### *2.1.2 Standards as Coordinators*

Standards are primarily theorized in terms of their ability to act as coordinating agents. Coordination is not limited to physical compatibility such as the dimensions of mechanical components but can also include the coordination of knowledge and industries. Coordination of knowledge occurs because compatibility standards embody architectural knowledge by, for example, defining the interfaces between systems (Abernathy & Clark, 1993). Once a standard defines the architecture of a system, subsequent innovation may occur at the level of the components without affecting the overall structure. Henderson & Clark (1990) refer to such standardized architectures as a technological paradigm (or a dominant design) around which organizations develop knowledge and develop procedures. Changes in the architecture (architectural innovation) therefore erode the value of the established firms' knowledge and procedures and therefore have significant competitive implications.

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<sup>1</sup> With the possible exception of minimum quality/safety standards that, when present in certain consumer goods, may attract consumers who are aware of and who desire goods that meet those quality/safety standards.

In those cases where a standard results in the establishment of a dominant design (Abernathy & Utterback, 1978), entire industries can be coordinated around that standard (Schmidt & Werle, 1998; Swann, 2000). This happened with the ubiquitous Redbook Compact Disc standard (IEC 60908) which was introduced in 1980 by Philips and Sony followed by products that supported the standard arriving on the market in 1982 (Koninklijke Philips Electronics, 2008). In addition to the production of the hardware to play compact discs, there was enormous growth in the music industry from the sale of music on compact discs.<sup>2</sup>

Dominant designs do not last forever and established market leaders whose businesses are built around a particular dominant design leave themselves vulnerable to disruptive innovations that alter the architecture of the established design. Henderson & Clark (1990) tell the story of how Xerox, after inventing the core technology of photocopying, was confronted in the mid-1970s by competitors offering copiers smaller and more reliable than those that Xerox manufactured, resulting in a loss of over 50% of Xerox' market share. Changes in the architecture (architectural innovation) therefore erode the value of the

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<sup>2</sup> Sales for CD albums peaked in 2000 at 2.455 billion units sold ("How the CD was developed," 2007)

established firms' knowledge and procedures which can have significant competitive implications.

Standards are one way that firms and industries can try to ensure architectural stability; however, despite stability being one of the key outcomes of any successful standard, the reality is that standards invariably change over time through changes that occur during the development, maintenance and ultimately the succession of standards. A recent book titled *The Dynamics of Standards* by Egyedi and Blind (2008) is dedicated entirely to the dynamic lifecycle of standards. While the authors point out the reality that standards are dynamic entities that do change, the fact that they do change is viewed as an unsettling source of irritation; successful standardization requires that the pace and quantity of change in standards be minimized as much as possible. While the reality is that standards are dynamic entities that change over time, the normative theory of standardization nevertheless holds that standards ought to be as static as possible.

### ***2.1.3 Standards, platforms and Business Models***

In industries such as the Personal Computer industry where products are built upon one of a small number of standard architectures, competition is best characterized as being between architectures, or platforms, rather than as

competition exclusively between firms (Bresnahan & Greenstein, 2003). Because standards can help to stabilize the architecture of a system, it comes as no surprise that firms will develop standards with the explicit intent of establishing a stabilized architecture, or platform, that they control. Individual firms will attempt to develop platforms that encourage the development of complementary products and services while also establishing proprietary boundaries that give rise to lock-in effects, a concept referred to as *platform development* (Ballon & Hawkins, 2009). In effect, these firms are using standards not only as a means of coordinating technology, but also as a means of organizing markets. The insight that firms use standards as a means of organizing markets by coordinating technology changes the way that standards are conceptualized by shifting the time frame of standardization to be earlier than it was traditionally conceived. Traditionally, standardization was considered to occur later in the product development lifecycle, as a means of driving efficiencies and economies of scale (Vernon, 1966). When viewed as instruments for the establishment of platforms, the standardization strategies are necessarily moved to the beginnings of the product development lifecycle with the express consideration of how standards can be developed to not only coordinate technology, but also to organize markets (Ballon & Hawkins, 2009; Blind, 2004; Schmidt & Werle, 1998). Viewing

standards as vehicles for the organization of markets also highlights that standards also determine how products related to the platform will be transferred in the marketplace, demonstrating a link between platform-setting standardization efforts and the business models that serve to link the technical capabilities of the platform goods with the desires of the consumers. Ultimately, the platform-development view of standards highlights that there is often an interrelation between standardization strategies and business-model strategies (Ballon & Hawkins, 2009).

#### ***2.1.4 Externalities, Increasing Returns & Lock-In***

Externalities are an economic concept referring to side effects that arise from economic activities. When externalities exist, the producers and consumers of goods do not share in all of the costs or benefits that arise from the goods. Externalities are generally negative (they have a detrimental effect on society), and regulatory approaches to mitigate negative externalities are called for (Breyer, 1982). For example, an industrial firm that creates a vast amount of air pollution (a *negative* externality) does not bear all of the costs associated with that pollution since the pollution disperses and pollutes a broader area of the world.

Standards are, rather uniquely, a source of *positive* externalities (Farrell & Saloner, 1985). Two types of externalities are identified in the literature: network

effect and lock-in effects. Network effects are benefits that arise from belonging to a network of users (Katz & Shapiro, 1985). New users to the network gain additional benefits from the size of the existing network and existing networks gain marginally more advantage as new users enter and expand the network. Telephones, for example, are only of value when there are other users who also possess telephones, and as the network of telephone users increases, so does the utility or benefit of the telephone increase because of the increased likelihood that the individual that you wish to call also possesses a telephone. Widespread network effects cannot develop without widespread compatibility and so standards often play an important role in the formation of network effects (Farrell & Saloner, 1986; Katz & Shapiro, 1985).

When network externalities arise, suppliers strive to produce products and accessories compatible with the established standard. To do otherwise forces users to choose between acquiring products compatible with existing standards or incurring significant switching costs if they were to adopt a novel, but incompatible, product (Arthur, 1989; Farrell & Saloner, 1986). While this does show how the concept of network externalities can be used to influence consumer decision making, prevailing theories of network externalities are far too general to provide a satisfactory explanation of consumer decision making.

For example, as pointed out by Cowan et al. (2004), externalities in the literature on *de facto* standards are assumed always to be positive and to apply equally to all members of a community when in fact externalities need not always be positive. It would be very difficult indeed to make the case that externalities apply equally to all members of any real-world community consisting of heterogeneous groups of real people, not stylized homogenous economic actors.

Brian Arthur (1989) introduced another type of externality to the literature on standards. Lock-in effects are a path-dependent phenomenon that arise when one technology becomes so broadly adopted that it is effectively entrenched and cannot be readily displaced even if better alternatives exist. In some situations, a growing network of compatible devices increases the differential benefit of growing the network. Arthur refers to these situations as exhibiting “increasing returns” because the marginal value of joining the network increases with each new member of the network. Conversely, many contexts face decreasing returns; firms mining finite supplies of natural resources will find that as time goes on the best veins of resources become depleted forcing the mining companies to mine ever less productive and more difficult to access veins, resulting in decreasing returns to their activities.



In contexts where increasing returns are present, and multiple incompatible technologies are fighting for market share Arthur (1989, 1990) theorizes that whichever technology by chance happens to get an early lead in adoption will go on to “corner the market” of potential adopters. When this happens, the market is said to be locked-in to the dominant technology. In this lock-in model of achieving dominance in the marketplace on account of small but fortuitous historical events, Arthur also introduces the concept of “path inefficiencies”. When increasing returns are present, the momentum gained from any early lead in adoption makes it very difficult to displace the dominant technology: this is path dependence. Path inefficiencies arise when the technology selected by the market is sub-optimal: the technology which benefitted from an early lead in adoption is inferior to other competing technologies. When this happens, society is locked-in to an inferior technology and for this reason lock-in is generally looked at as a negative outcome.

#### ***2.1.5 Examples of Standards, Externalities, Increasing Returns & Lock-In***

Competition between incompatible technologies receives much attention in the standards literature; examples include the settlement of the United States on the light water nuclear reactor (R. Cowan, 1990), AC versus DC power (David & Bunn, 1988), AM versus FM radio (Besen, 1992), QWERTY versus Dvorak

keyboard layouts (David, 1985; Liebowitz & Margolis, 1990) and VHS versus Beta video cassette recorders (Arthur, 1990; Liebowitz & Margolis, 1995). Of these, VHS versus Beta and QWERTY versus Dvorak have been cited (by Arthur (1990) and David (1985), respectively) as examples of lock-in to an inferior standard, only to have the story revised and the claims of inferiority challenged by Liebowitz and Margolis (1990 for the keyboards, 1995 for the VCR).

QWERTY and Dvorak are two keyboard layouts with QWERTY being the by far the most common layout. The QWERTY layout was patented in 1878 (U.S. Patent No. 207,559) by C.L Sholes and features an arrangement of keys that spread out common pairs of letters such as t-h. This spreading out of common pairs ensures that commonly paired keys were mechanically separated and so when two common pairs of keys were pressed in quick succession, the type bars that swing up with each key press do not jam together. Because the QWERTY layout was designed to maximize mechanical efficacy in the typewriter era, operator efficiency (ease, speed and accuracy of typing) suffered as a consequence. Recognizing this shortcoming of QWERTY, John Dvorak, a professor at Washington State University, filed for a patent in 1932 (U.S. Patent No. 2,040,248) on a new keyboard layout that grouped commonly used letters together, and also separated common vowels and consonants between the left

and right hands so as to help establish a rhythm alternating between right- and left-hand key presses. This new design was meant to greatly improve overall typing efficiency. In an influential paper, David (1985) uses the QWERTY/Dvorak keyboard layouts to illustrate technological lock-in, arguing that QWERTY was adopted early but is inefficient in the face of the new Dvorak layout and modern typing devices and thus this is an example of the market being locked-in to an inferior standard. This argument rests on an argument about the technical superiority of the Dvorak layout, however, and this claim of superiority has been since been questioned and the studies that provided evidence of the technical superiority of the Dvorak layout were characterized to be at best inconclusive (Liebowitz & Margolis, 1990). If claims of the technical superiority of the Dvorak layout cannot be substantiated, then Paul David's claim that the overwhelming lock-in to QWERTY represents a lock-in to an inferior technology is untenable.

The VHS versus Beta case is discussed in detail in the following chapter, so for now it suffices to say that the oft-cited (e.g. Arthur, 1990) explanation of the VHS/Beta battle are strikingly similar to the QWERTY/Dvorak case in that they depend on a claim that one competing technology (Beta) is superior to the technology (VHS) that captured and locked-in the market. Just as with the

keyboard layouts, Liebowitz and Margolis (1995) provide a detailed analysis claiming that the technical differences between the VHS and Beta standards are over-stated.

### *2.1.6 Increasing Returns*

As defined by Arthur (1989), positive returns to adoption increase as the size of the installed base of compatible devices grows. Thus, positive externalities in scenarios of increasing returns to adoption are a function of the size of the installed base. Much like how an object's strength of gravitational attraction is a function of the mass of the object, the strength of the externalities that give rise to increasing returns are a function of the size of the installed base. This "gravitational" view of externalities and increasing returns to adoption implies that all consumers are equally likely to be drawn in by the increasing returns.

Standards play a central role in the development of these externalities. Positive network effects cannot develop without assurances of compatibility between products and architectural stability in the infrastructure that binds the products. Standards that ensure both compatibility and architectural stability are thus a prerequisite to the development of these effects. In the case of lock-in effects, standards (formal or otherwise) are a logical requirement of the

development of increasing returns and lock-in. If one standardized product does not capture the vast majority of the market, we cannot even speak of the concept of lock-in. It is worth highlighting, once again, that although this literature is oriented to the effects that standardized products can unleash on society, remarkably little is actually said about what it is that actually leads to the development of these lock-in or network effects. Although standardization is characterised as a necessary prerequisite to the development of these effects, the presence of standards alone clearly does not ensure the development of increasing returns or the achievement of lock-in.

We can take from this model of standards and network effects the theory that consumers are motivated to pick one technology over another by the relative sizes of the technologies' installed base. But this is not the only view of what motivates consumers and so we look now at some of the literature on consumption to seek a richer picture the motivations behind consumer decision making.

## 2.2 The Problem of Consumption

The standards literature has a strong focus on the production-related effects of standards and a vanishingly small focus on the effects of standards on consumption. Since most of the literature on technical standards is born out of the field of economics, it does not inherit any useful concept of the consumer. In neo-classical economics (with the notable exception of Lancaster who is discussed below), demand is a force that is taken as a given and that is primarily a function of price. With the widespread adoption of the concept of the passive consumer, there is no particular reason for economics, or bodies of thought such as the theory of standardization that are heavily influenced by economics, to explore the forces that drive the consumer and as a natural result, hardly any attention is paid to end-user consumption. In the rare cases where the standards literature does engage with the concept of an active consumer (for example, Jakobs, 2006), these users are industrial users that may shape the outcome of the standardization process (for example, telecommunication providers). Industrial users do not match the definition of consumers as taken up in this thesis and so while there is occasionally a concept of an active user in the standards literature, the concept of users found in that literature has little in common with the concept of consumers as defined herein.

Conversely, the literature on consumption presumes a more active consumer who is sensitive to much more than just price. Because this thesis is exploring the influence that standards in particular have on consumers, the most relevant area of the consumption literature for this project is that which deals with factors that influence consumer behaviour, especially purchasing decisions and it is this area which will be reviewed.

### *2.2.1 Lancaster's Consumer Theory*

Providing what is perhaps the only neo-classical economically-based treatment of consumer preference, Lancaster (1966a, 1966b) argued that people exercise a preference not for goods themselves, but instead for their individual perceptions of the characteristics offered by goods. Because each individual is expected to make a different subjective assessment of the value of the characteristics of a particular good, individuals are anticipated to display varying preferences for a particular good. The process that an individual undertakes when selecting a good is to find the closest match for their individual preferences against the ensemble of characteristics offered by the available goods, while also confronting ever present financial constraints.

With the exception of basic necessities such as food and shelter which are universally needed by people, "preference" is taken by Lancaster to be an

entirely individualistic phenomenon; social and cultural factors do not enter Lancaster's theory as an influence on individual preference except insofar as "the typical consumer will inherit his traditions from his social background" (Lancaster, 1966a, p. 19). This focus on individualism limits the usefulness of Lancaster's work as it means that his theory cannot provide an account for the shared demand for goods which do more than satisfy basic necessity. While Lancaster's framing of demand as an *individual* matching of preferences to the ensembles of characteristics offered by goods remains a very useful construct, today there is a large and growing body of literature showing that *shared* demand is commonplace and uses anthropological and sociological tools to explore this shared demand.

### ***2.2.2 Anthropological Individualism***

Drawing heavily on the field of anthropology, efforts have been made to situate consumption within a social setting while also framing consumption as a discrete action performed by individuals. Douglas and Isherwood (1996), for example, argue that goods ought to be viewed as part of a social communication system, and that as a result, the consumption of goods is analogous to a communicative act that signals social information about the consumer. Douglas and Isherwood define consumption as "a use of material possessions that is



beyond commerce and free within the law" (1996, p. 37) by which they intentionally place consumption as an extra-market activity (that is, it begins where the market ends).

Quite unlike a traditional economic view which invokes utility maximization as the motivation for consumption, Douglas and Isherwood show that goods have a dual role: subsistence *and* informational. Subsistence refers to the fulfillment of basic human necessities such as food and shelter whereas the informational branch of consumption functions by drawing the lines of social relationships. By adding in this social/informational dimension to goods, Douglas and Isherwood depart quite radically from the economic concept of demand which, with its reliance on methodological individualism and utility maximization, entirely lacks a social dimension. Moreover, because we live in a modern industrial society where subsistence is all but assured for the majority of our citizens, Douglas and Isherwood argue that the majority of consumption actually occurs in the informational branch, not the subsistence branch. Out of this informational branch of consumption come the notions of status and preferment over which there is great and elaborate competition within this branch.

The introduction of the social dimension also underpins Douglas and Isherwood's criticism of Lancaster whom they criticize for lacking any preconceptions about the objectives of shared consumption. As a result, Lancaster's theories are unable to account for how universal needs arise or, more concisely, are unable explain which characteristics of today's luxury goods will make some (but not all) of them tomorrow's everyday necessities.

### *2.2.3 Trends and Trend Setters*

How the informational or social branch of consumption operates is the subject of a wide variety of literature. Warde (2002) suggests that social relationships and the particular cultural context typically govern that which is consumed and, furthermore, that the diffusion of innovation ought to be explained as a diffusion through networks of peers, influenced by social capital instead of the popular epidemiological model of diffusion put forward by Rogers (1964). This places social factors, including social capital, at the forefront of the factors that influence consumption decisions. Warde's social factors differ from the inherited social factors mentioned by Lancaster in that the Warde social factors are ever-changing, and not just a static set of preferences inherited from one's social background.

In a pair of studies, Tomlinson and McMeekin (1998, 2002) analysed data on household consumption. One study (2002) was based on an extended survey of the consumption of food in households which showed that consumption of various foods depends on more than just changes in income<sup>3</sup> and instead highlight that other class indicators such as the type of occupation are often more significant predictors of household consumption. This study is somewhat unique since it studies routine consumption behaviour which the authors argue is necessary in order to properly understand consumption. In this study, routine behaviour was collected through a random sampling of 9,000 UK households over the course of two years. Data were initially collected in 1984-5 on areas of lifestyle and consumption including smoking, alcohol consumption, detailed information on food consumption as well as a variety of socio-demographic variables such as social class and household composition. Respondents were then tracked and re-interviewed seven years later which gave the researchers similar data from two points in time. Ultimately, Tomlinson and McMeekin conclude that the socio-demographic changes over the course of the intervening seven years resulted in a large variety of consumption changes and they were

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<sup>3</sup> As famously predicted by Ernst Engel in 1857

even able to identify certain goods whose consumption patterns can be correlated with social class (including yoghurt, tea, chips, squash and cheese).

Another study by McMeekin and Tomlinson (1998) looked at data in the General Household Survey from the Office for National Statistics in the UK. They examined the rates of adoption for various household goods (dishwashers, microwaves and freezers) and concluded that there exist discernable groups who adopt products at different rates and, importantly, it is not income but rather other socio-demographic traits that identify these groups. Both of these McMeekin & Tomlinson studies provide evidence that socio-demographic variables influence consumption much more than changes in income and in both studies, the authors conclude that their study provides support for Bourdieu's (1990) concept of Habitus, a set of dispositions acquired both voluntarily and involuntarily through interaction with various aspects of the social world.

By looking at everyday consumption, the two McMeekin and Tomlinson studies are also reacting against a focus on conspicuous consumption and individual decision making that they, along with Warde (2002), view as overrepresented in the literature. "This is not to advocate abandoning sociological concern with conspicuous consumption and its role in establishing

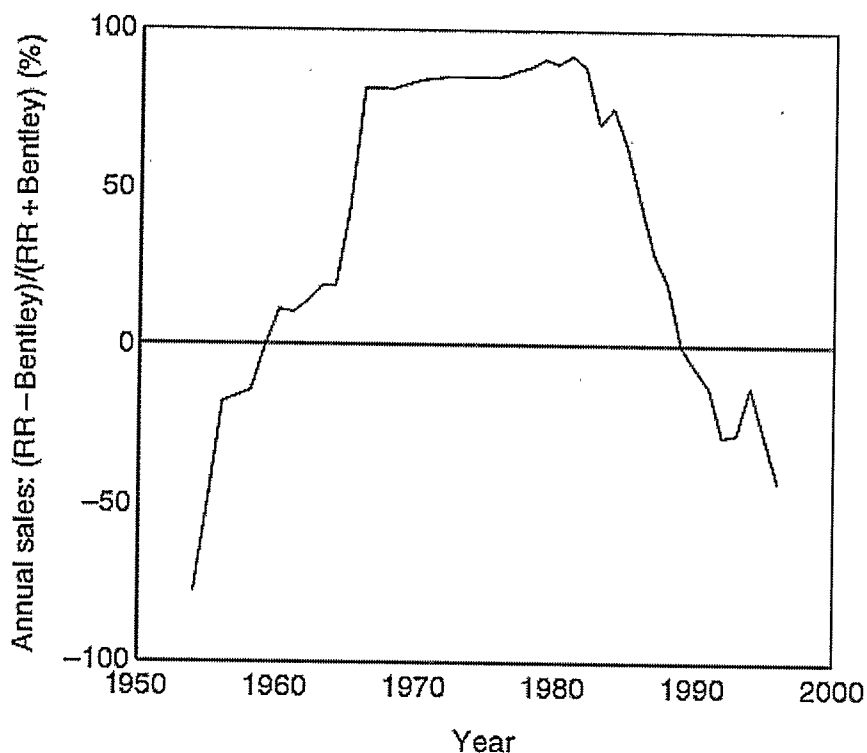
social distinction and displaying social status... rather it is to make the claim that much consumption is surreptitious, highly constrained and unremarkable" (Warde, 2002, p. 18). Warde advocates looking at "inconspicuous consumption" much of which he argues occurs only within the boundaries of social practices that are governed by convention, a hypothesis supported by the findings of McMeekin and Tomlinson.

#### *2.2.4 Peer Groups*

Cowan et al. (1997) propose a model of consumer demand that is based on the consumer's interactions with other consumer groups, divided into peers (similar consumers), contrast groups (those with whom the individual does not want to interact) and aspirational groups (those whom the individual aspires to share consumption activities). Briefly, this model predicts that the majority of consumption will be conditioned by the peer group, although consumers will also be attracted towards consuming goods that are consumed by aspirational groups and, conversely, conditioned *not* to consume those goods that are consumed by contrast groups.

An example of the application of this theory is found in Cowan, Cowan & Swann (2004). This paper argues that non-market forces (such as the interdependence of people) need to be considered when looking for drivers of

demand. Too often, dependencies are treated too simply. For example, network externalities, as they have been discussed in the literature on de facto standards, are always positive and are assumed to apply equally to every member of a community. Such a view assumes that every peer is a peer of everyone else, and that all peers are homogenous. Against this view, Cowan et al. (2004) are arguing for the importance of considering the heterogeneity of peers. An example is the relative levels of consumption (sales) of Rolls Royce and Bentley luxury automobiles. Post-World War Two, Bentley and Rolls Royce were manufactured by the same company and, apart from the name badge and a distinctive grill, were identical cars. Until about 1960, Bentley outsold Rolls Royce, but in 1960s the balance shifted and during the 1970s and early 1980s almost all sales were the Rolls Royce brand. As illustrated in Figure 1, in the early 1980s the tides shifted again and by the end of the decade the ratio was roughly 50/50 again before Bentley sales again became dominant in the 1990s.



**Figure 1: Relative sales levels of Rolls Royce and Bentley luxury automobiles.**

**Source: Cowan et. al (2004)**

The proposed explanation of this oscillation is that in the 1980s, Rolls Royce became too popular with the wrong crowd: rock stars, and other *nouveau riche*, began flaunting their "Rolls" and this, in turn, debased the brand for the established "old money" crowd and effectively turned wealthy consumers away from the brand because the brand's exclusivity was lost. Too many "undesirables" came to own a Rolls Royce and so the established wealthy consumers moved away from Rolls Royce. As a result, the more subdued Bentley

brand began to rise again in popularity. A particularly germane conclusion of this study is that, at least in this case, intrinsic attributes do not determine demand. Because the intrinsic features of the two brands were identical, differences in the respective features cannot provide the basis for an explanation of the oscillations in the demand for the brands. Instead, the authors argue that it is the particular nature of image associated with each brand which determined the final distribution of consumption across the social spectrum – the final steady state for the good – as well as the changes in demand over time.

From this literature on consumption, we can see that various social factors are apt to influence consumption. By providing greater insight into the social and cultural conditions within which consumption occurs, this body of literature provides a view of consumption that is distinctly different from the individualistic characteristic-assessing theory of Lancaster and, importantly, supports the notion that consumption decisions are based not only on characteristics intrinsic to the goods, but also upon a variety of socially- and culturally-rooted forces. Going forward, these various social and cultural factors will be referred to as **fashion effects**, a blanket term that simply captures the idea that different groups aspire to consume different things depending on what they



feel is or is not fashionable, or desirable as well as the notion that the act of consumption always communicates something about the consumer.

### 2.3 Discerning the Characteristics of Technical Goods

What is it that consumers are evaluating when they make the decision to acquire a particular good? Lancaster (1966a, 1966b) answers this question with his theory that consumers evaluate goods on the basis of the goods' intrinsic characteristics. Warde (2002) answers this question with the notion that much of what we routinely consume is conditioned by the consumer's cultural context. Cowan et al. (1997, 2004) re-enforce this thinking with their theory of peer, aspirational and contrast groups which also theorizes that consumption (routine and conspicuous) is conditioned by our social and cultural contexts. In suggesting that much of what is consumed is conditioned by peers, the consumption literature has painted a picture of consumption which deprecates (or in the extreme view, eliminates) the consideration of intrinsic characteristics. The more we look to our peers to figure out what we want to consume, or the more we are influenced by fashion effects, the less we are looking at the characteristics intrinsic to the goods. The final section of this literature review looks at this question of whether and how consumers discern characteristics intrinsic to goods.

Douglas & Isherwood (1996) argue convincingly that most consumption is motivated by the communicational aspects of consumption, not the technical characteristics of goods being consumed. In this view, consumption is largely an extra-market activity which serves to communicate your ability to acquire and make use of scarce and/or prestigious goods and is therefore not motivated by the technical characteristics of the goods but rather the ability for the acquisition and use of the good to communicate something about your social standing. Similarly, Warde (2002), Cowan et al. (2004), and McMeekin & Tomlinson (1998; 2002) all elaborate on the various ways in which consumption is conditioned by consumers' social milieu. In this view, consumption decisions are primarily conditioned by a consumer's social surroundings and this highlights the prominence of non-technical determinants of consumer decision making.

There is also the earlier reviewed Cowan et al. (2004) paper which looks at the differential adoption of Rolls Royce and Bentley automobiles. I highlighted that a conclusion of that study was that intrinsic attributes do not determine demand: because the intrinsic features of the two brands were identical, differences in the respective features are cannot provide the basis for an explanation of the oscillations in the demand for the brands. This study provides clear evidence that, at least for conspicuous consumption, consumers are relying

on something other than the intrinsic characteristics of goods to inform their decisions.

Albert Borgmann (1984) takes this point even further when he claims that we *experience* technology as the ends of the technology, not the means. In Borgmann's formulation, a technology's *means* is the inner workings or the technical characteristics of the device; the *ends* are what consumers experience. Borgmann also argues that a particular device can be completely replaced with one that has completely different inner working while still preserving the experienced means of a good. For example, an oil-burning furnace could be replaced with a gas burning furnace while still preserving the stable experience that the home owners have come to expect: the furnace heats the house. Therefore, consumers are expected to differentiate between goods on the basis of their ends, not their means. In the context of a standards battle, the ends of the two standards are, by virtue of them being considered part of a standards battle, largely the same and so it seems unlikely that differentiation based on the technical characteristics (the means) is at all likely.

In *The Limits to Satisfaction*, Leiss (1988) argues that there are more than just technical characteristics at play in the realm of consumption. Many

consumption activities are driven by a desire to fulfill a social need, rather than a need that can be expressed in terms of basic necessity or rational utility. In making this argument, Leiss argues that both technical and symbolic characteristics of goods need to be considered. Unlike technical characteristics that are defined in the production setting, symbolic characteristics develop in the cultural / extra-market setting and, in many cases, it is the symbolic characteristics that people are ultimately (and according to Leiss, vainly) seeking when consuming goods. An important insight in Leiss' work is that the characteristics of goods are not as inherent as is often assumed. The "cool" factor of a new gizmo is not an inherent characteristic of the good. Over time, the cool factor will inevitably change drastically as other changes in the extra-market setting occur. Even technical characteristics are not objectively discernable because most of us lack the craft knowledge to truly evaluate either the quality of products or their inherent characteristics. Part of Leiss' overall argument is that we do not derive the satisfaction that we expect from our consumption activities precisely because the goods that we consume are, in reality, divorced from their characteristics. Thus, when we consume a good but fail to achieve the expected satisfaction from this act, we react by consuming yet something else which also fails to provide the expected satisfaction and so begins a positive feedback loop

that encourages more and more consumption resulting in less and less satisfaction. While the consumer might wish to evaluate goods on the basis of their intrinsic characteristics, Leiss argues that in practice this is very difficult to do.

Finally, as Arthur (1989) explained, in contexts which exhibit increasing returns to adoption, any chance historical event which gives one lucky technology a greater market share than others will all but assure the lucky technology captures the market and achieve lock-in. In this telling of battles between competing technologies, there is no room whatsoever for the outcome of a technical battle to arise because of decisions by consumers. Rather, Arthur leaves it all up to chance, a single small fortuitous historical event which gave one technology a lead. From this point on, consumers flock to the most popular technology and path dependency invariably carries us to a locked-in final state. If Arthur is correct, consumers do not evaluate goods at all on the merits of their characteristics but instead just play follow the leader and in situations of increasing returns, consumers would not bother to evaluate the technical characteristics of the goods at all.

Though the work of Warde, Cowan et al., Tomlinson & McMeekin, Douglas & Isherwood, Borgmann, Leiss and Arthur have varied heritages and some share little common ground, they all can be interpreted (as I have above) to contribute to the sentiment that consumers do not primarily depend on technical characteristics to inform or influence their consumption decisions.

## 2.4 Chapter Synthesis

Standards are overwhelmingly theorized in the literature as something that influences the world of producers and suppliers. This is largely a result of the literature on technical standards being strongly influenced by mainstream neo-classical economic theory which is also overwhelmingly focused on the world of producers and suppliers. As a result of this supply-side orientation, theories of standardization have precious little to say about what standards mean to consumers and how standards are expected to influence consumer decision making. One slight exception to this is that standards contribute to the development of positive externalities such as network and lock-in effects; however, even the application of this notion of positive externalities is rife with generalizations and assumption. For example, network effects are presumed to apply equally and positively to all consumers. Even when theories of standardization do introduce the notion of a consumer, it is in a very abstract

and stylized fashion, exactly as we would expect given the inheritance from neo-classical economic thinking.

Next, a portion of the literature on consumption was reviewed and in this review forces that could be recognized as externalities are characterized as fashion and peer effects by Cowan et al. (2004) and by Tomlinson and McMeekin (1998; 2002) who empirically demonstrate that consumption is conditioned by social contexts. Moreover, both Leiss and Douglas & Isherwood introduce a concept compatible with externalities when they explore how consumed goods take on symbolic (Leiss, 1988) or communicational (Douglas & Isherwood, 1996) characteristics in the extra-market setting. In the reviewed theories of consumption, the acquisition of a good was viewed not just as the acquisition of a good, but also as a validation of the consumer's social position. An act of consumption is doubly-linked to one's peers. First, the decision to make a particular consumption decision is strongly influenced by one's peers and second, the act of acquiring the good serves to re-enforce the consumer's relationships relative to various peer groups, including signalling the desire to *not* be associated with certain groups.

Finally, I reviewed literature that deals with the question of how consumers experience technology and the criteria upon which consumers choose goods. The inspiration for this review was the recognition that while the work of Lancaster hinges on the ability for consumers to individually evaluate the technical characteristics of the goods that they wish to consume, several varied bodies of literature suggest that we should not expect that consumers are either capable or even interested in evaluating goods on the basis of their actual technical characteristics. This raises the question of whether standards matter at all to consumers, because if standards are primarily methods of defining technical characteristics and if technical characteristics mean little to consumers then there is an apparent disconnect between the function of standards and the basis for consumer decision making. Resolving this apparent disconnect is the topic of the following chapter.



## Chapter Three: Expanding Variety and the Stable Standard

In Chapter Two, I reviewed separate bodies of literature on standards and on consumption. The standards literature is nearly silent about the consumer, but a richer picture of the consumer is begun in Lancaster's characteristic-based approach and is further developed in the more socio-economic derived fashion effect approaches of Douglas, Cowan et al., Tomlinson, McMeekin and Warde. What remains is to show the relationship between standardization and the fashion effects reviewed in the previous chapter and thus how standards influence consumers.

### 3.1 Calculating and Trendy Consumers

The literature review highlighted the considerable differences between the determinants of consumer decision making for consumers as conceived of by Lancaster and the sociological/anthropological consumption literature. Lancaster's (1966a, 1966b) outline of the consumer paints a picture of individuals as completely closed systems that are not influenced by peers and only inherit a static set of "traditions" from their "social background." This heavily stylized view of the individual was likely intended to portray the 'as-if' individual: on average, individuals behave *as-if* they were closed, autonomous systems who

carefully and rationally calculate their consumption decisions. Going forward, I will refer to these as *calculating consumers*.

There are limits to the ability of people to act as calculating consumers: people never possess perfect information or rationality but at best only “bounded rationality” (Simon, 1982). Even with some information to support a rational decision, people still regularly make irrational decisions (Kahneman & Tversky, 1979). The calculating consumer is also at odds with the entirety of the consumption literature previously reviewed. The consumer, as understood in the consumption literature is a dynamic and changing individual whose consumption patterns are variously constrained by peers, education, employment, income and, more generally, socially transmitted “trends” and “fads”. Far from being a static, closed, calculating consumer as pictured by Lancaster, the *trendy consumer* is tremendously porous to the influence of their ever changing peers and social lives.

Which of these is the more useful picture of the consumer in terms of understanding how standard influence consumption? This is not an either-or proposition, but rather a continuum: there are shades of the trendy and calculating consumer in all of us, and both are active to varying degrees during

day-to-day consumption activities. Even the same good consumed by different people might indicate a different balance between the calculating and trendy consumer. For example, professional grade cookware can be utilitarian, calculating purchase for a professional chef but highly trendy for others who lovingly hang it in on display in their rarely-used but immaculately appointed home kitchen. Tomlinson and McMeekin demonstrated with their study of changes in food consumption (2002) and household durables (1998) that simple predictors such as income level also do not predict consumption patterns. For example, the recent sub-prime mortgage crisis in the United States which resulted in untold numbers of houses (taken to be highly symbolic items following Bourdieu (2005)) being acquired by those who could never reasonably have been expected to afford them<sup>4</sup> shows how strongly the trendy consumer can operate even in the absence of monetary resources to support the consumption activities in question. Simple measures such as income level or the possession of monetary resources do not act alone in determining consumption and indeed access to financial resources, or changes in levels of available financial resources

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<sup>4</sup> It is perhaps difficult to claim that these consumers could not have afforded these houses except with the power of hindsight and the knowledge that the housing and credit markets did, indeed, collapse in late 2008. We know now that in the fourth quarter of 2009, 24% US mortgages are "underwater": they owe more on the mortgage than the house is worth (First American CoreLogic, 2010)

may have very little influence at all when compared to the communicational aspects of consumption.

This continuum of the trendy and calculating consumers, which I propose as a useful concept, highlights that varying amounts of the trendy and calculating consumer are embodied within us at all times. This continuum is carried forward in this work as a conjectural tool to help establish the link between standards and consumption.

### 3.2 Stable Standards and the Consumer

One way of viewing standards is as a means of defining the *technical* characteristics of goods and indeed this is little more than an interpretation of the existing literature. If, as Lancaster tells us, bundles of *technical* characteristics are ultimately what consumers exercise a preference for and if standards can define the technical characteristics of goods, then there a clear logical connection between standards and the calculating consumer. One example of where we could reasonably expect to find such behaviour is in battles between competing, but incompatible, technologies and the efforts of standards to ensure optimal outcomes. In the context of standards battles and lock-in, standards are viewed as a means of ensuring optimality. When an inferior quality technology achieves lock-in due to path-inefficiency, public welfare was said to suffer due to the use

of sub-optimal technology (Arthur, 1989). Lock-in is a failure of the calculating consumer to make the most optimal choice between competing technologies.

But is this a failure of the calculating consumer, or is this the trendy consumer in action? If we presume, like Lancaster, that consumers choose on the basis of technical characteristics then lock-in is indeed a failure of the calculating consumer. If, however, we admit that the trendy consumer might be acting, then we can move beyond a simple evaluation of technical characteristics and shed new light on the process of lock-in.

### *3.2.1 Looking Beyond Technical Characteristics*

The concept of lock-in as defined by Arthur (1989) depends on a notion of optimality, and ensuring this optimality is an ideal baked into the very core of the literature on standards. An ideal standard is one which defines the optimal state of affairs for the system in question, and the notion of optimality is used to evaluate the success of a particular standardization effort: the closer the real-world system is to the optimal, the better the standard and vice-versa. For example, the QWERTY keyboard layout is arguably less efficient than DVORAK and thus society's continued dependence on the sub-optimal QWERTY results in our collective public suffering. I discussed previously the various reasons why consumers should not be expected to objectively evaluate the technical

characteristics of a particular good. With this in mind, we can no longer assume the existence of a *Lancastrian* process whereby consumers match the bundle of technical characteristics offered by particular goods to their own personal desires. This view of the calculating consumer relies on the ability and willingness of the consumer to objectively evaluate technical characteristics in a rational and deliberate attempt to achieve an *optimal* outcome. But, because consumers do not generally objectively evaluate technical characteristics, it becomes very difficult indeed to understand why this process is expected to lead to technically optimal outcomes except by random chance. Instead, I propose the following: **standards battles in the realm of household consumer electronics are not decided on the basis of technical optimality.**

While there is a logical connection between standards and the calculating consumer, the preceding discussion highlights that the calculating consumer is unlikely to effectively evaluate the technical characteristics of competing technologies. A conservative conclusion drawn from this is that the difficulties that arise in differentiating between technical characteristics induce consumers to rely on other attributes to support their decision-making. Leiss' (1988) argument supports this since he argues for the consideration of both technical and symbolic characteristics. Importantly, unlike intrinsic technical characteristics that are

defined in the production setting, Leiss' symbolic characteristics develop in the cultural / extra-market setting. These symbolic characteristics are not intrinsic to the goods and are not fixed over time. For example, the cool factor of Apple's latest "iDevice" is not an intrinsic technical characteristic of the device and, indeed, this cool characteristic will fade over time as newer versions of the iDevices and other devices with different technical configurations come to the marketplace, however, despite being a transient characteristic, the cool factor of a new consumer product can be a powerful motivating factor for the consumer.

### 3.3 Stability: The New Optimality

The inability to differentiate (even with hindsight) between goods in a standards battle on the basis of their technical characteristics and the inability for consumers in general to evaluate the technical characteristics substantially weakens the logical link between standards-defined technical characteristics and the calculating consumer. This does not, however, destroy any link between standards and the consumer because the calculating consumer never acts alone: the trendy consumer must also be taken into account.

Consider for a moment what would happen if every new piece of household consumer electronics was completely new and totally incompatible in all dimensions (e.g. interfaces, content sources, cognitive understanding) with

existing products. In such conditions of near-chaos, consumers would be very reluctant to adopt new products and common household electronics such as VCRs, DVD players and televisions, would never have become the common household items that they are today in North America. Moreover, because each new good was completely new, consumers would have a terrible time trying to evaluate these goods on account of any past benchmarks (technical, social or otherwise) being inapplicable. At the very least, enough stability to allow consumers to at relate new experiences to past experiences is necessary for consumers to be able to make consumption decisions.

Stability also helps to ensure compatibility, which is the genesis of a platform upon which variety can flourish. Household consumer electronics such as televisions, stereos, VCRs, and the various formats of music and video disc players are all – as we understand them today – platform goods. This means that consumers who purchase these goods (for example, a DVD player) have not actually purchased anything of any use unless they also go about acquiring complementary platform goods & services (for example, DVDs to watch). In the same vein, CD players are useless without CDs to listen to, and radios and televisions are nothing more than decorations without access to sources of content.



In the literature review, the process of platform standardization was characterized as a means of coordinating technology, but also as a means of organizing markets. This is precisely the theory of standards that is most relevant when evaluating format standards in household consumer electronics. For example, the Redbook audio standard that defines the characteristics of an audio CD organized a brand new market in which consumers could acquire audio content. This content – not the CD player itself – is what consumers are really after. That is to say: consumers do not purchase CD players for the sake of having a CD player but rather they purchase the CD players to grant them access to consume a large and varied library of music. In Borgmann's terminology, the CD player is the *means* to achieve a particular *ends*: listening to music.

Two points need to be raised about this platform argument. First, stability at the level of the format (e.g. the Redbook audio format) absolutely does not mean a reduction in variety for the consumer. Rather: a stable format standard that assures compatibility can result in a sharp increase in the variety of complementary goods & services available for consumption (for example, large libraries of music on CDs). Keeping in mind that consumers are ultimately seeking these complementary goods and services (for example, music, movies, TV shows) and not the technical devices themselves, stability and assured

compatibility at the level of the format & device should be viewed as a positive development insofar as it encourages growth in variety of goods and services that attract the consumer.

Second, content is principally evaluated by the trendy consumer because content, not the device itself, is the artefact that the consumer relates to their peers with. That is to say, people stand around the proverbial water cooler to discuss movies more often than to discuss the technical characteristics of the device upon which they played their movie. As reviewed earlier, Douglas & Isherwood (1996) place goods within a broader social communication system. Others, building on this or similar foundations show that peers (R. Cowan et al., 1997), culture (Warde, 2002) and various social "indicators" (McMeekin & Tomlinson, 1998; Tomlinson & McMeekin, 2002) play an important determining role in consumption. These determinates (or fashion effects), are of paramount importance to the trendy consumer and come sharply into focus when dealing with the content that can be acquired through a platform.

The trendy consumer is most strongly engaged when consuming content and the tendency of the trendy consumer to consume in a manner that is complementary to their peers is a major contributor to decisions to adopt

particular devices. If the trendy consumer needs to be engaged before broad adoption occurs, then **only after a stable platform attracts an increasing variety of complementary goods and services will the platform see broad adoption.**

This also raises the point that settling a standards war is not enough to achieve broad adoption: only when the stability afforded by the resolution of a standards war is parlayed into a vibrant platform to engage the trendy consumer will the platform see broad consumer adoption.

### 3.4 Path Dependency and the Trendy Consumer

Arthur's (1989) theoretical model of increasing returns and path dependency uses a chance historical event to explain how one lucky technology gains an early lead over the competition. This early lead results in path dependencies that, once established, inevitably result in the lucky technology capturing the market. Increasing returns to adoption mean that these positive externalities increase in strength as the network of compatible devices grows until the path dependencies are so strong that the market is effectively locked into the single solution. The chance event's function is to provide one competing technology a lead over the rest. Without one technology gaining an eventual lead, path dependencies could never develop to carry one of the competing technologies to the point of lock-in.

Arthur's concept of path dependency driven by network-effects can be criticized on account of the concept being too stylized and difficult to substantiate through empirical analysis. Cowan et al. (2004) charge that the positive externalities that power Arthur's path dependence externalities are to apply equally and positively to all when in fact externalities need not always be positive and certainly should not be assumed to apply equally to all members of any real-world community. Liebowitz and Margolis (1995) argue that Arthur's logic is seductive but incomplete because of the extremely restrictive conditions under which Arthur's path dependency and lock-in occurs. Liebowitz and Margolis identify three types (degrees) of path dependency:

1. First degree path dependency is when one technology gains broad adoption over competing technologies, however, the technology that wins is superior to the competition. In this situation, there are no detrimental effects to the lock-in and therefore we need not concern ourselves with these outcomes.
2. Second degree path dependency is when one technology gains broad adoption over competing technologies. At some point in the future, a superior technology enters the market place but is unable to displace

the entrenched technology on account of the existing path dependencies. This is characterized as an inevitable side effect of technical progress and again not cause for concern because the consumers made the best decision possible with the information available at the time the decision was made

3. Third degree path dependency occurs when contemporary technologies are competing for adoption and an inferior technology manages to achieve lock-in.

It is this third degree path dependency that Arthur describes with his model (1989) and illustrates with the VCR example (1990). Liebowitz and Margolis argue that conditions for third-degree path dependency to result in lock-in are extremely restrictive: in order for lock-in to occur, "there must be agents who know enough to make correct choices but who fail to take advantage of the implied profit opportunities, and at the same time, adopters who generally know nothing more than the payoff going to the next adopter" (p. 216). Lock-in would only occur in the presence of third-degree path dependency if there were agents who recognized the shortcomings of the winning technology but chose not to take advantage of the opportunity presented to remediate those

shortcomings, and further that the adoptees of the technology also recognize the inferiority of their chosen technology but chose to adopt anyways on account of the extant network effects. Given this, Liebowitz and Margolis conclude that third-degree path dependency is unlikely to ever result, and conclude "path dependence would certainly seem to be a poor candidate as the distinguishing implication of a 'new economics'" (p.224) meaning that positive externalities are a poor explanation for the increasing returns that allow one technology to capture the market.

These criticisms of Arthur's concept of path dependence are not attempts to invalidate Arthur's observation that there are indeed cases where *something* gives the appearance of increasing returns to adoption. Rather, these criticisms point out that Arthur's proposed mechanisms (network effects leading to path dependence) do not provide a satisfactory explanation for increasing returns to adoption. The trendy – calculating consumer continuum can provide this mechanism. Third degree path dependency as defined by Liebowitz and Margolis (1995) only occurs when consumers recognize the shortcomings of the leading technology but choose to adopt anyways in what appears to be another example of the fallibility of the calculating consumer. The trendy consumer does not exist in Liebowitz and Margolis' analysis, but introducing the trendy

consumer provides a plausible mechanism for path dependence that does not hinge on the consumer's ability to evaluate or choose between competing technologies on the basis of the technologies' intrinsic characteristics. In cases where technological platforms exhibit complementary product and services, the trendy consumer could very well be evaluating and selecting for these complementary products and services with comparatively little attention paid to the technical characteristics of the competing technology's platform devices. Even if one competing technology is somehow marginally *better* than the rest, it matters not to the trendy consumer because the calculating consumer is not evaluating the relative merits of the platform devices. Where this happens, there is no failure of the calculating consumer to select the *best* technical configuration because the calculating consumer is not directly selecting the technical configuration at all.

The trendy consumer's selection on the basis of the availability of complementary goods and services is analogous to Arthur's network effects because it provides a mechanism for the increasing returns to adoption. As more and more trendy consumers adopt a platform, stronger and stronger fashion effects develop around the platform's complementary goods and services which attract more consumers and so on *Ad infinitum*. Fashion effects attracting the

attention of the trendy consumer provide a mechanism for increasing returns that Arthur observes without having to resort to the problematic concept of optimal consumer choice on the basis of technical characteristics.



## Chapter Four: **The Tale of the Tape: What we should have learned from VHS vs. Beta**

In Chapter Three, the process of consumer choice for household platform consumer electronics was analyzed from an abstract, theoretical standpoint. The trendy consumer was introduced to occupy the opposite end of a spectrum from the rational, utility-maximizing calculating consumer predominant within neo-classical economics. In the realm of consumer electronics platforms, stability – not optimality – is the key outcome of a standards battle because stability is required for complementary goods and services to appear upon the platform. These complementary goods and services are important because they attract the trendy consumer who is very active in consumption decision making. The trendy consumer's attraction to complementary goods and services was proposed as an alternative to the Arthur's (1989) concept of network effects as a mechanism to explain the path dependency that arises when technologies exhibit increasing returns to adoption.

This chapter uses the trendy - calculating continuum as a lens through which the battle between the Beta and VHS Video Cassette Recorder (VCR) formats in the late 1970s and early 1980s can be re-examined.

## 4.1 Approach and Method

What follows in this chapter is a historical re-appraisal of a single iconic standards story: the battle between the VHS and Betamax Video Cassette Recorder (VCR) formats. Existing interpretations of the VCR standards war were heavily influenced by neo-classical economic conceptions of the consumer as a rational, utility seeking individual, earlier characterized as the *calculating* consumer. Introducing the trendy consumer opens up the possibility of re-evaluating the case and drawing up new conclusions about why the standards battle unfolded as it did and what can be learned from this particular standards battle.

Throughout this re-appraisal of the VCR battle, inconsistencies will be highlighted that are not fully resolved in the existing treatments of the VCR standards battle. First, Arthur's claim that path inefficiencies occurred on account of a sub-optimal technology being selected as the winner of the battle despite there being very little to differentiate VHS and Beta, or more generally that technical optimality should have been a consideration at all during the battle. Furthermore, that the market for the VCR did not exist anywhere near its final form at the time of the standards battle. In reality, the market developed several years after the conclusion of the standards battle. These inconsistencies

can all be resolved by the use of the trendy consumer during the re-appraisal of the VCR standards battle.

Data for this case analysis are entirely gathered from existing published sources and can be grouped into two categories. First, a detailed timeline of the development of VHS and Beta and data on the annual sales and pricing of both VHS and Betamax were gathered primarily from an article in *The Business History Review* by Cusumano et al. (1992). Second, numerous published interpretations of the VCR battle are synthesized and re-interpreted with the trendy consumer in mind most notably Arthur's (1990) recruitment of this standards battle as an empirical example of path dependence resulting in lock-in and Liebowitz and Margolis' (1995) rebuttal.

A re-appraisal of the case is a useful method to explore this battle for several reasons. This standards battle occurred approximately thirty years ago which means that original field research is impractical and rather unnecessary as first person accounts of those involved in the battle (for example, executives at Sony) have already been captured in published reviews of the battle. There is also the practical consideration that published data on the annual sales and pricing of both VHS and Betamax are readily available and therefore freely

accessible for unencumbered analysis. This thesis relies on a definition of consumers as everyday individuals, therefore it makes the most sense to critically examine a real-world case instead of relying on abstract theoretical models that, like Arthur (1989), rely on highly stylized actors. Finally, Liebowitz and Margolis (1995) raise the point that path dependence can only be established by empirical example. Since the VHS and Betamax case is a prominent example of path dependence in the literature it makes sense to re-analyze this case in order to re-frame the concept of path dependence.

#### 4.2 Early History of Beta and VHS<sup>5</sup>

Sony was the first mover in the consumer VCR market, when they introduced their Beta format in 1975. Recognizing the potential for the home VCR market, a consortium of manufacturers led by JVC began developing the VHS format soon after they learned of Sony's Beta efforts and the VHS format made it to the market in 1976: one year later than Beta.

What unfolded was a classic standards battle between two competing and incompatible formats. In 1975, 1976, 1977 and 1978 Sony produced<sup>6</sup> 20, 175, 424

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<sup>5</sup> Most of the history and data in this section come from Cusumano et al. (1992).

<sup>6</sup> The data available from Cusumano et al. (1992) are of units produced, not of units sold. For the present analysis, I will take units produced to be a good proxy for units sold since (1) there was

and 594 thousand units respectively. For the same time period, 0, 110, 339 and 878 thousand VHS units were produced. While Beta was out producing VHS up until 1977, by 1978 VHS had eroded any first mover advantage that Beta held and was out producing Beta by a ratio of 3:2. Cusumano et al. (2002) declared the battle won by the end of 1978 at which point VHS already held 60% of the cumulative market share (and rapidly growing). Figure 2 (annual production) and Figure 3 (cumulative production) illustrate the fact that annual production of VHS almost immediately overtook that of Beta and, furthermore, that Beta never recovered any market share after VHS took the lead. While a precise point in time is difficult to objectively defend, I follow Cusumano et al. and declare the standards battle won by VHS in 1978.

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no indication that either Beta or VHS was building up large inventories of unsold players and (2) Cusumano et al. follow a similar tact in their own discussion of the data.

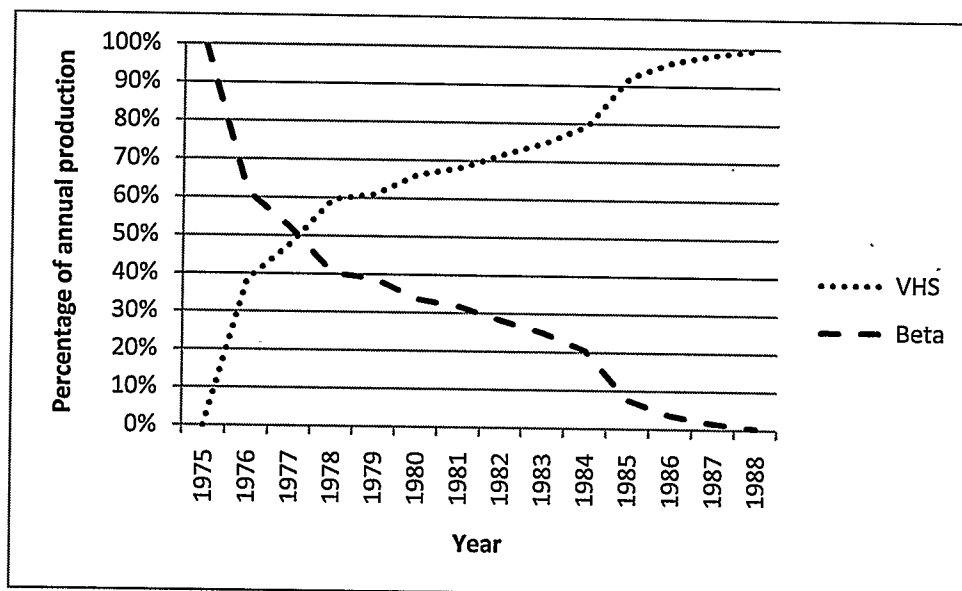


Figure 2: VHS and Beta Annual Production. Data from: (Cusumano et al., 1992)

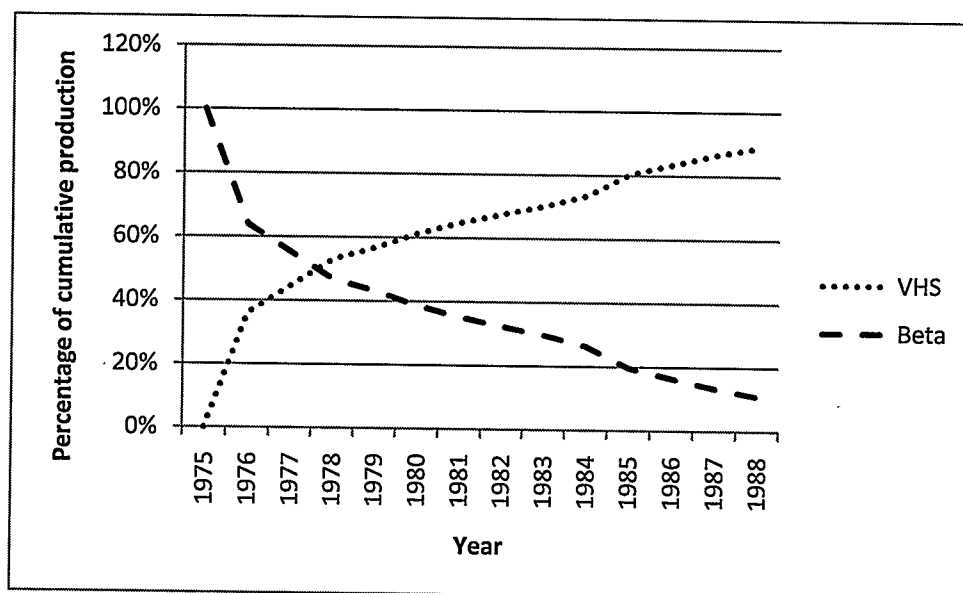


Figure 3: VHS and Beta Cumulative Production. Data from: (Cusumano et al., 1992)

## 4.3 How and why did VHS win?

### 4.3.1 *Technical Advantage*

In Chapter Three it was proposed that standards battles in the realm of household consumer electronics are not won on the basis of technical optimality. If this proposition holds, then a careful examination of battle between VHS and Beta should *not* support the claim that VHS won the battle on the basis of being more technically optimal than Beta. Even with the power of hindsight, is very difficult, perhaps impossible, to make substantive claims about the superiority of one VCR technology over another solely by examining technical characteristics.

Liebowitz & Margolis (1995) argued in their rebuttal of the standard telling of the Beta/VHS case, there is very little technologically that differentiates Beta from VHS but one critical exception was noted: VHS, when first introduced, supported longer playback than Beta. Beta quickly countered and offered even longer playback, however Liebowitz and Margolis contend that the longer playback offered by VHS when it first hit the market was the chance historical event that Arthur's (1989) theoretical model of path dependence requires to give one format an early lead over the other. There is a rather obvious problem with Liebowitz and Margolis' suggestion that longer playback played the role of the chance historical event: it was only in the first year that VHS was introduced

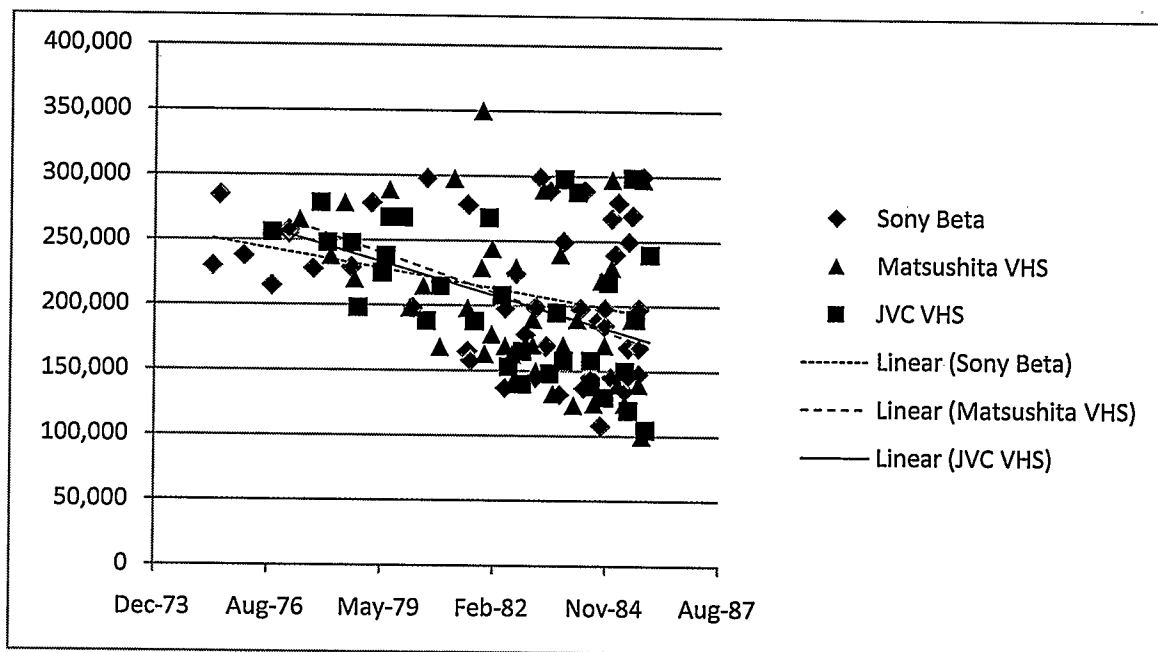
(1976) that it offered longer playback than Beta. In this first year, Beta machines outsold VHS machines by a factor of 1.6 (175 thousand Beta versus 100 thousand VHS) and therefore longer playback for VHS did not give VHS an early lead over Beta because Beta outsold VHS while this advantage existed!

The overwhelming equivalence of the two formats is also noted by Cusumano et al. (1992) in their analysis: "at no time did either format establish more than a transient advantage in features, prices, or picture quality." (1992, p. 76). One format may have been "better" with respect to a particular feature (e.g. Beta had slightly better playback quality) but the other technology would possess a different advantage (e.g. VHS initially offered longer playback). As new features were added over time by one format, the other format was quick to copy the feature and also introduce new features of its own. Finally, it should be re-iterated that VHS was originally conceived of by JVC to be a clone of Beta and so we should expect the formats were in most respects either identical or nearly identical. Claims that there were substantive technical differences the formats cannot be supported and therefore there is no evidence that technical superiority of one format over the other decided the outcome of the VCR standards battle.



### *4.3.2 Price Differentiation*

Although price discrimination is not discussed at length in this work, it should be noted for the sake of completeness that the outcome of the VCR standards battle cannot be explained by price differentiation. Figure 4 plots the manufacturer's suggested pricing (in Japanese Yen) for 120 different models of VCR introduced between 1975 and 1985. This chart shows the steady decline in pricing year over year, but also shows that Sony had the lowest priced units for the first 2 or 3 years during which its market share was quickly being eroded. This data shows that VHS did not gain market share by undercutting the pricing of Beta VCRs and supports the conclusion that price was evidently not a decisive factor in this standards battle.



**Figure 4: Pricing (Japanese Yen) for VHS and Beta VCRs, 1973-1987. Source: (Cusumano et al., 1992).**

#### *4.3.3 Consortium Building.*

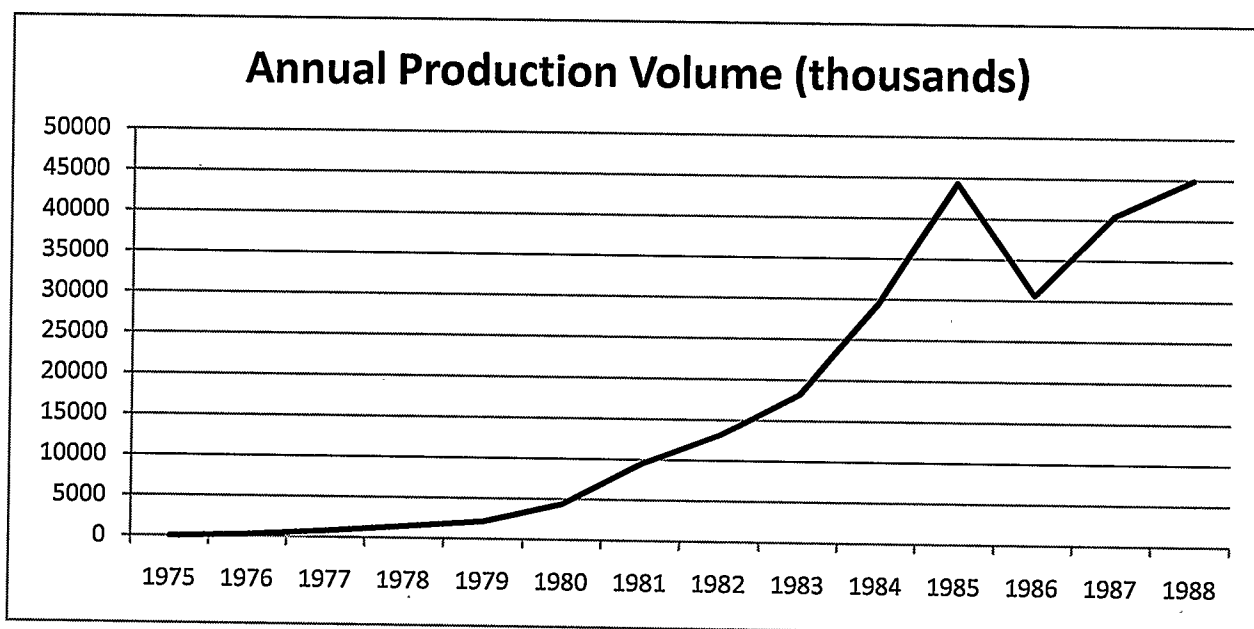
Sony's president, Akio Morita remarked in retrospect that it was a "mistake" and that they "should have worked harder to get more companies together in a 'family' to support the Betamax format" (Cusumano et al., 1992, p. 68). JVC, in contrast, immediately set out to form a large group of licensing and original equipment manufacturer (OEM) agreements, was open to having other companies participate in refining the standard and provided considerable support for marketing and manufacturing of VHS products. Indeed, JVC started to develop these partnerships in 1975, as soon as they saw Sony's initial demonstrations of Beta, and by the end of 1976 when VHS was ready for the

market, JVC already had arrangements with Hitachi, Mitsubishi, Sharp and Matsushita (Cusumano et al., 1992). In the end, a large (perhaps the primary) advantage of VHS was that the coalition of VHS manufacturers had immensely greater production capacity: "A large part of the VHS advantage came from the sheer ability to deliver more VHS machines than Beta producers in the early days of the standards war. Even in 1978, because of Matsushita's massive manufacturing capacity, the VHS group accounted for approximately 66% percent of the total Japanese VCR production capacity of 191,000 units per month" (Cusumano et al., 1992, pp. 81-82). Were we to seek an explanation for the victory of VHS over Beta on account of something that aligns with the paradigmatic theory of standardization, the willingness of JVS to open up the VHS standard would be it. By coordinating a consortium of manufacturers and OEM vendors around the VHS standard, JVC was able to amass a larger army and overwhelmed the lone soldier that was Sony's Beta format.

#### 4.4 After the War was won: the Rise of the Platform

The VCR standards war was won but – importantly – this does not coincide with the VCR becoming a common household device. There is nothing about that standards war having been won that ensured that VHS-based VCRs would become household fixtures. Consider that in 1980, well after the standards

war was won, only 3 percent of American homes with televisions also owned VCRs (Greenberg, 2008, p. 72). It took roughly three years for the VCR standards war to be settled, but then approximately two years after the war ended, household penetration rates were still very small. In around 1981, a remarkable uptick in the production of VCRs occurred (see Figure 5, below) and by 1984, enough VCRs had been produced and sold that fully 20% of American homes with televisions owned VCRs (Greenberg, 2008, p. 72). What is especially interesting is that this upward inflection was not predicted. Forecasts projected a levelling of demand at penetration levels of 15-30 percent by the late 1980s, but in reality penetration rates reached 30% by 1985, years ahead of most forecasts (Cusumano et al., 1992, p. 84).



**Figure 5: Annual VCR Production volume. Source: (Cusumano et al., 1992).**

When VCRs were first marketed, the ability to play pre-recorded content (e.g. movie rentals) was not presented as a feature. Instead, the VCR was marketed as a means of *time-shifting*: recording TV shows for playback at other times. In effect, it was only existing broadcasted television content that was perceived as the source of content by early adopters of the VCR. Starting in 1980, however, entrepreneurs recognized the potential for what Joshua Greenberg (2008) calls "The Gold Rush". Greenberg chronicles the explosion of video rental stores across America in the early 1980s. In 1980 there were 900 stores in the US whose primary product was video tapes, but by 1986 there were at least 25,000. Unlike the early days when tapes were sold as accessories to the hardware, now the hardware was sold as a means of playing movies from the local video store. Greenberg points out that "it seems no coincidence that sales of VCRs dramatically increased as video rental stores proliferated" (p. 77). I characterise this as the establishment of a "VCR platform". In the earliest days, the companies producing for the VCR platform were really just the manufacturers of the devices themselves. It was not until the early 1980s that media companies like Paramount began to recognize the possibility of exploiting this platform as a means of generating additional revenue streams for their feature films. As distributions

channels were ironed out, the market for home video grew exponentially, and the services and products complementary to the VCR platform began to grow quickly.

A very similar argument is presented in two other papers. First, in a paper that develops a model for role of externalities in the development of markets, William Redmond (1991, p. 179) looks at the data for the VCR market and concludes that "the growth of VCR sales and the growth of tape rental stores are highly correlated ( $r = 0.99$ ) for the years 1980 through 1987". Cusumano et al. argue that "In a second phase of rivalry, in the 1980s, the strategic alignment of producers of complementary products reinforced the VHS advantage and hastened the demise of Beta, which might otherwise have survived as a second format" (1992, pp. 65-66).

This example of VHS growing in popularity along with the availability of pre-recorded content is quite clear support for the important role of complementary goods and services driving adoption of the VCR. Before pre-recorded content was widely available, VCRs were positioned as personal time-shifting devices. It mattered whether your VCR was compatible with your television (so that you could record your shows) but it mattered a lot less if your

VCR was the same as everyone else's on the block since sharing of content between individuals was not what VCRs were positioned to accomplish. Once VHS captured the majority of the market share, however, the distribution and sharing of pre-recorded and home-recorded content was greatly simplified: one could all but be assured that the tape would "just work". The stability and certainty that came along with the resolution of the standards war served as an important step in the growth of the VCR market. Suddenly, it was much easier for vast libraries of content to be made available for the VHS platform.

#### 4.5 The Platform and Consumption

What was it about the availability of content that unleashed the torrent of consumption that drove household adoption of the VCR well beyond industry forecasts? To answer this, I return to concepts extracted from the literature on consumption. In the early days of the VCR, the product was framed as a personal device: an individual could time shift their own TV shows and while there certainly were enthusiasts who would share their tapes with friends, there was not a compelling reason for the VCR to ever extend beyond the boundaries of the home. Nor, as noted above, was there a great need for compatibility with VCRs outside the home.

With the availability of complementary content, suddenly there is a platform that transcends the home. With video rental stores popping up across the country, there was a vast and easily obtainable library of content available for the platform. The VCR was no longer a device purchased to fulfill personal time-shifting, but was instead purchased to give households access to the library of content available through the rental stores. The VCR had become a tool purchased to give access to content, rather than a tool purchased for the sake of the device: it was the software (the video content) that was the primary driver.

Correspondingly, there is the opportunity for socially-rooted fashion effects to develop. Individuals using the VCR for personal time-shifting reasons would likely not consider the VCR as an important tool for interacting with others; however, consumers taking advantage of video rental services have seemingly stepped into a social realm and therefore the VCR would be an important tool for participating in this new social realm. This is a reversal of the expected turn of events: "the general perspective is that software sales are a function of hardware sales. That activities in the software rental market could powerfully affect outcomes in the hardware market was difficult to foresee, as it appeared to be a case of 'the tail wagging the dog'" (Redmond, 1991, pp. 178-9).



The trendy consumer is necessarily the force behind the desire to adopt content because there are no intrinsic characteristics that the calculating consumer could evaluate. Movies are a pure experience goods as defined by Nelson (1970), meaning that consumers have a hard time evaluating the characteristics of the good in advance of consumption.<sup>7</sup> Since the good (in this case pre-recorded content) cannot be evaluated prior to consumption, consumers must rely on other signals such as the opinion of their peers. Because this highlights the role of the trendy consumer in driving the consumption of pre-recorded content which in turn drove adoption of the VCR, the argument that in this case the trendy consumer is much more relevant to the ultimate composition of the VCR

#### 4.6 Summary & Outlook

Much manoeuvring is done to win a standards war, but the important thing is that it is settled, that it yields stability. How it was settled, and which technology won is interesting in hindsight, but predicting which incompatible technology will win is not nearly as important as *one* of the technologies – any of the technologies – winning the battle. The stability that this affords is the genesis

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<sup>7</sup> Could also be viewed as post-experience goods which means the quality is difficult to evaluate even after consumption, and third-party information (e.g. peer validation) is often required to establish the quality.

for the truly interesting consumer dynamics to take hold and for the trendy consumer to come alive.

This is a substantial departure from the standard theoretical treatment of lock-in which predicts eventual market domination when one technology gets an early lead. The VCR story provides two arguments against this; first, Beta had the early lead but failed to capture the market. Second, even after the standards war was settled, there was precious little penetration of the VCR into the North American household. I argue that the settling of the standards war is important, but only insofar as it provided the stability around which a family of complementary products & services (in this case, pre-recorded content sales and rentals) could develop. The existence of the pre-recorded content appealed to the trendy consumer and, ultimately, it was a desire on the part of the trendy consumer to access the pre-recorded content that drove the adoption of the VCR devices themselves. In this interpretation of the history of the VCR, the trendy consumer was the driving force behind the VCR becoming the household fixture that it was. This reformulates path dependency as a phenomenon driven by the trendy instead of the calculating consumer, and also highlights that – at least in the VCR case – path dependency powered by the trendy consumer was a powerful force in growing the market.

Although marketing is not within the scope of this thesis, it is nevertheless worth commenting on the possible influence of marketing on the outcome of the standards battle. Persuasive marketing campaigns could have encouraged customers to adopt the VHS standard over Beta. Even if this happened – and no evidence was found to suppose that it did – the effects of such marketing would still only be to influence the outcome of the standards battle. Because the market only started to grow after the standards war was settled, then any marketing efforts that helped to steer the market towards the VHS standard during the standards battle did not directly contribute to the growth of the VCR market. At best, these marketing efforts could have helped to speed up the standards battle. This would have been important insofar as it helped to establish the stability necessary for the complementary goods and services to form around the VCR platform, but since the household penetration rate was so low even after the standards battle was settled, it was not marketing of the VCR devices themselves that ultimately made the VCR the common household device that it eventually became.

#### *4.6.1 The intervening years*

Many years have passed and home video viewing & recording technology has changed quite substantially since the days of the VCR. In North America, we

first had the DVD, followed by another format war between HD-DVD and BluRay which has since been won in favour of BluRay. Today, the high definition BluRay disc is the marquee format upon which high definition video content is recorded, sold and rented to the consumer. The development of these newer formats presents some further evidence in support for the role of the trendy consumer in establishing path dependence.

BluRay is by objective standards better than DVD in terms of both sound and picture quality. If it were true that consumers make their home video consumption decisions on the basis of rational technical evaluations then BluRay ought to be thriving. Not only is quality superior, but the technology is a simple drop-in replacement for DVD: BluRay disc and packaging share the same dimensions as DVDs so existing storage and shelving systems are entirely compatible in both the home and retail environments. BluRay players are essentially the same size as the previous generation of DVD players, and continue to rely on standard outputs so the players ought to be a drop-in upgrade for homes already equipped with a DVD player. Existing home video equipment and existing consumer habits and expectations do not need to be changed in order to upgrade and adopt BluRay. If optimality is what mattered,

consumers should by all accounts be flocking towards BluRay. The sales data overwhelmingly shows that this is not happening.

Digital Entertainment Group publishes annual DVD and BluRay rental and sell-through sales figures and for 2010, BluRay sales increased by USD \$0.8 billion which is a 53% increase from 2009 sales. Concurrently, in 2010, DVD sales decreased by \$1.8 billion which is a 12% decrease from 2009. While on a percentage basis, BluRay is growing rapidly, the growth of BluRay is not offsetting the decline in DVD sales and there is in fact was an overall decline of \$1.0 billion in combined revenue in 2010 for the two formats (DEG Digital Entertainment Group, 2011). While there are many consumers adopting the BluRay format, in 2010 there was roughly two dollars lost in DVD sales for each dollar gained by BluRay. Clearly, the existing installed base of DVD consumers is not jumping to the BluRay platform and, indeed, it appears as though they are jumping somewhere else entirely.

The primary argument in this thesis is that the technical characteristics and the optimality of one device over another is not what is most important to consumers. In the realm of video entertainment, I argued that *access to content* is what matters because it is content that engages the trendy consumer and the

trendy consumer is the primary decision maker in the realm of consumer electronics. In the glory days of the VCR, VHS was the format through which content was delivered to the trendy consumer and therefore VHS adoption was accelerated. Later, the same was apparently true for DVD, but for BluRay, this adoption is not happening.

The simplest explanation, for why the technically superior BluRay platform is failing to attract the attention of the trendy consumer in the way that the ancestral VHS and DVD did is that the attention of the trendy consumer is captured by something else. Given today's pervasive data networks, shipping around data on a plastic disc is quite possibly the most inconvenient and inefficient manner in which digital media could be distributed. Streaming and downloading (legal or otherwise) of content has exploded in popularity along with the rise of the reach, capacity and popularity of the Internet. The packet-based modes of transmission are what attract the attention of the trendy consumer, not the 20<sup>th</sup> century plastic-disc-shipping mode of transmission.

There are also unique features of the streaming environment that the BluRay platform cannot match, including social networks that reveal the popularity amongst your peers of particular pieces of content. There are several

established social networking tools that consumers use to share their viewing and listening activities including LastFM, Pandora and Apple's new Ping service. All of these networks allow users to see what their friends (and strangers) are consuming, how they rated the content and provide direct access to purchase the content. Because of the visibility these social networks give of what our peers are doing, we should expect strong fashion effects to develop leading the trendy consumer to be very, very stimulated by these services. The growth of these streaming services is likely responsible for the overall decline in the DVD/BluRay platform.

## Chapter Five: Conclusions

This thesis set out to answer the following question: *what role do standards play in the consumption of technological goods by consumers?* The answer to the research question is that in the realm of consumer electronics platforms, standards are most important as providers of platform stability. Around this stability, complementary goods and services develop and it is these complementary goods that primarily attract consumers to the platform. To fully appreciate this, the trendy and calculating consumers both need to be taken into account.

The calculating consumer's search for an optimal bundle of characteristics – characteristics that can be defined by standards – provides a straight-forward link between standards and the calculating consumer. The role of standards for the calculating consumer is the definition of certain characteristics of goods that the calculating consumer can then evaluate as part the process of matching their bundle of personal preferences against the bundles of characteristics offered by competing goods.

The trendy consumer, however, does not (or, perhaps cannot) evaluate the technical characteristics of goods. If a standard's only function is to define



characteristics of goods, then standards have no immediate relevance to the trendy consumer. However, another important role for standards is the establishment of platforms: in the case of platform goods (such as the VCR) the complementary goods are sometimes (as in the case of movies) sources of fashion effects which powerfully influence the trendy consumer. To the trendy consumer, the role of standards is an invisible but important role: they form platforms around which fashion-effects laden goods develop. The trendy consumer, being influenced by these fashion effects, is motivated to consume these complementary goods (such as pre-recorded movies), and so the decision to adopt standardized platform technology (for example, a VCR) is not arrived at for the sake of adopting the standardized platform device but instead for the sake of consuming the complementary goods and services.

In the language of Albert Borgmann, consumers are attracted to the *ends* not the *means* of the goods. With respect to the VCR case study that we looked at, consumers were attracted to the ability to play a wide variety of audio-visual content, not anything about the specific technical configuration of the VHS players. The literature on standards appears to have confused or misaligned the ends and means of standardization. A "standard" telling of the VCR story is that standards serve as the means of defining characteristics with the desired end-

goal being to ensure technical optimality which will attract the eye of the trendy consumer. The revised analysis of the VCR case study in this paper shows that standards ought to function not just as a means of achieving a stable platform, but also with an end-goal of encouraging an explosion of complementary content-based goods which attract the eye of the powerful but hitherto under-appreciated trendy consumer.

The overwhelming reliance on the calculating consumer (and the corresponding lack of attention being paid to the trendy consumer) has led to accusations of failures on the part of the calculating consumer. Arthur's (1989) theory of lock-in resulting from adoption of technology in the presence of increasing returns to adoption hinges on the calculating consumer failing to recognize and remediate what Liebowitz and Margolis call third-degree path dependency. Third degree path dependency, left unchecked, results in the market being locked in to an inferior standard which detrimentally impacts public welfare. Liebowitz and Margolis argue that third-degree path dependencies only develop under very restrictive circumstances. Moreover, their careful empirical case analysis of the paradigmatic cases of lock-in (VCRs and keyboards) shows that third-degree path dependence did not exist in these circumstances. Saying that third-degree path dependency did not occur leaves

open the question of what it was in the VCR market that exhibited what looks like increasing returns, particularly after the remarkable uptick in adoption in and around 1981.

Fashion effects, which I argue were amplified as the market for pre-recorded content developed, are a compelling replacement for Arthur's network-effects as the force that causes the appearance of increasing returns to adoption. As more and more people are consuming movies, more and more powerful fashion effects develop, drawing in ever more trendy consumers. Fashion effects are what made VHS not only the runaway winner in the battle with Beta but also grew the overall market much faster than industry analysts had predicted.

In some respects, fashion effects and their influence on the trendy consumer are a form of externality simply because they are, from an economic standpoint, side effects of the act of acquisition. Depending on the context, fashion effects do not always operate as typical positive externalities. When the consumption activities of a group of consumers acts as a positive attractant to other consumers, fashion effects will create what appear to be increasing returns and thus function as positive externalities. Conversely, when fashion effects come from a contrast group – a group which other consumers do not want to

associate with – then in this case fashion effects have a detrimental effect on adoption. This does not imply that the fashion effects are negative externalities – no extra social costs are brought to bear – it simply means that fashion effects are not resulting in increasing returns to adoption.

Where fashion effects diverge from Farrell and Saloner's (1985) definition of – and Arthur's (1989, 1990) arguments around – positive externalities is the means by which they occur. The literature on standards talks of network effects supported by technological compatibility that is assured by standards. This means that network effects arise when standards provide a set of well defined intrinsic technical characteristics that ensure compatibility. Fashion effects have no necessary relationship to any intrinsic characteristics and are therefore established entirely within the social and cultural realm of the trendy consumer.

## 5.1 Contributions

With standards being so common in consumer goods, it is unfortunate that the literature on standards has little to say about the role of standards in the consumption of technological goods by consumers. The reason is that the literature on standards has a strong economic focus and therefore is primarily concerned with the role of standards in production settings: firms and industries. The motivation for this thesis was to contribute a more believable model of the

consumer to the literature on standards and to use this new model of the consumer to re-interpret a central piece of the standards literature.

The conceptual contribution of this work is the conjectural continuum of the trendy and calculating consumer introduced in Chapter Three. Placing the utility maximizing rational consumer at one extreme of the continuum inevitably raises questions about what occupies the other end of the spectrum. The trendy consumer is not only a useful foil to the calculating consumer, but also plays an important explanatory role in the VHS case study analysis.

The re-interpretation of the VCR case through the lens of the trendy-calculating continuum not only re-enforces the shortcomings of Arthur's model of path dependence identified by Liebowitz and Margolis, but also allows the shortcomings to be repaired. The trendy consumer introduces fashion effects as the mechanism that leads to path dependency fuelled by increasing returns, essentially replacing positive network effects in Arthur's model of lock-in. Fashion effects, at least in the VCR case, provide an explanation that does not assume any kind of failure on the part of the consumer, and is also more compatible with the empirical evidence around the VCR battle (for example, that adoption was very strongly correlated with the spread of movie rental stores).

Without the introduction of the consumer dynamic, it simply is not possible to make sense of the lock-in the VHS format achieved.

The trendy consumer's role in driving consumption of pre-recorded content, which in turn drove widespread adoption of VCRs themselves, provides an explanation for the remarkable growth (exceeding industry expectations in both speed and magnitude) of the VCR market. This growth occurred several years after the standards battle was settled - when pre-recorded content became available. That the market formed along with the availability of pre-recorded content instead of during the standards war is another weakness in Arthur's model of lock-in. The market that, in Arthur's view, was locked-in to the inferior standard did not exist in anything even approaching its final form during the standards battle when the lock-in would have occurred. Once again, this highlights the importance of the trendy consumer and fashion-effects in establishing what appear to be increasing returns to adoption.

## 5.2 Challenges

The motivation for introducing the trendy consumer was to provide a picture of the consumer that more closely matches real consumers. This is a challenging concept, if for no other reason than the difficulty in defining something so nuanced and varied. Simple observation at your local supermarket

or shopping mall provides ample evidence that consumers are not only idiosyncratic, but also varied in their idiosyncrasies. Teenagers, young families, senior citizens, rural residents, urban residents, recent immigrants, highly educated, unemployed, blue collar and white collar are just a few of the different categories that could be used to sort and sift consumers. How much a trendy consumer in one of these arbitrary categories shares with a trendy consumer in another category is worthy of much debate. To be truly useful, the concept of trendy consumer might need to be anchored to specific groups. It is likely much more informative to deploy the concept of the trendy consumers only within the context of specific groups that share a common socio-economic background instead of across a population as a whole. In the VCR case study, data were not available to show how different populations adopted the platform and so this more granular analysis of the trendy consumer was unfortunately not feasible.

### 5.3 Outlook

Several different platforms are today under rapid change and would benefit from analysis through the lens of the trendy consumer. For example, television programming is distributed into homes with broadcast systems but is increasingly under pressure from a variety of on-demand streaming sources (legal or otherwise). Will superior technology determine whether the broadcast

model survives the on-demand streaming services, and if the streaming services prevail, what will determine the winner? I predict quite simply that the platform that provides the easiest access to the content desired by the trendy consumer will prevail.

Music distribution is also under rapid change. The industry has seen enormous change in recent years as CD sales collapse and digital distribution channels (legal and otherwise) grow. Apples iTunes music store was the first convenient platform to provide easy legal access to a wide variety of content and its success is a testament to the prevalence of the trendy consumer. There is some interesting competition brewing for Apple's purchase & download model.

Amazon has very recently launched their Amazon Cloud Player where your purchases are stored forever on Amazon's servers and streamed to your on demand wherever you are, and to whatever device you happen to be using (home computer, smart phone, car stereo, etc). It is interesting to consider what role the trendy consumer will play in shaping the outcome of this industry.

There is also the reality that fashion effects change. The non-intrinsic cool factor of whatever consumer electronics platform is fashionable right now will not last forever. Often fashion effects erode because a newer, more attractive.



platform has entered the market. If the incumbent platform currently has the market locked-in, then how might changing fashion effects lead the market to adopt the new platform despite technological lock-in?

Finally, it would be interesting to study the role of the trendy consumer in the development of markets for consumer goods other than content-rich platforms. There is value in exploring the degree to which the trendy consumer is relevant when looking at the market for goods that are covered by different types of standards. For example, is the trendy consumer more engaged by product safety standards for smoke detectors or labelling standards for organic food?

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