Brand Value in Social Interaction*

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January, 2007

Abstract

This paper explores the consumer value of publicly associating oneself with a brand image. The economic value of such association to the consumer of a brand is coming from its affect on the information exchange between consumers engaged in a search for partnerships with each other. It turns out that the brand use can be valuable to consumers for communication even when they do not have the proper incentives to make simple conversations valuable or informative. In particular, when the correlation of the interests of agents in a partnership is low, conversations are not very informative, while brand use remains informative and valuable. Furthermore, the more widespread the brand use is, the less truthful (and informative) one can expect conversations to be. In addition, the consumer value of a brand image is shown to have an inverse-U shape in the difficulty of searching, as consumers look for conformity when search is difficult, and conversations become more and more truthful when search becomes very easy.

Keywords: Search and Matching, Social Interaction, Communication, Game Theory.

*The paper has greatly benefited from the comments and suggestions by the Area Editor and two anonymous referees. I would also like to thank James Bettman, Joel Huber, Ganesh Iyer, Sridhar Moorthy, Chakravarthi Narasimhan, Ambar Rao, J. Miguel Villas-Boas, Andreas Weingartner and various seminar participants at SICS, the University of Toronto and Duke University for their feedback on an earlier version of this paper.
1 Introduction

While brands have been widely used to identify product origin and its physical characteristics for many centuries, more recently, it has been argued that brand images are increasingly used as forms of personal statements. Marketing News (2003) wrote:

The vast majority of Americans feel that at least some of the things they own or do say something about who they are. [...] A majority also feel that the causes they care about (65 percent), what they wear (60 percent), and the car they drive (53 percent) says something about who they are.

Clothing, perfume, and cars are, perhaps, the most frequently mentioned products that consumers use as means of self expression (Aaker, 1996). However, a much wider variety of products have a brand or user image associated with them. For example, Miller and Tsiantar (1989) reported a study of consumer perceptions finding that Pillsbury cake mix users were consistently perceived as apron-clad, grandmotherly types, while Duncan Hines cake mix users were perceived as slender, contemporary women. Mustang and Abercrombie & Fitch are examples of brands that sharply divide consumers with respect to how much they like their images, and Diesel brand name of apparel (later extended to footwear, eyeglasses, etc.) was specifically build on the idea of self-expression. Such associations of brand users with the image of the brand may affect consumer brand choice, especially when brand consumption is observed by other individuals.

This paper models the value consumers may derive from such associations by explicitly considering the interaction between agents (who are also potential consumers of the brands) and their incentives to reveal or conceal information about themselves to other agents. Naturally, agents may communicate not only through displaying brands they use, but also by talking to each other. However, the two forms of communication are different, because people can adjust what they say depending on who they talk to and what they observe just before each statement. In contrast, people often have to

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1 Farquhar (1989) notes that whiskey distillers burned the name of their product into the barrels as far back as early sixteenth century, and brick manufacturers have been labelling bricks since ancient times.

2 Vodka is another curious example: as Aaker (1997) notes, “Absolute vodka personified tends to be described as a cool, hip, contemporary 25-year old, whereas Stoli’s personified tends to be described as an intellectual, conservative, older man.” These associations are likely to be stemming from the respective advertising campaigns.

3 See http://www.diesel.com for their mission stated as “to create an apparel line for independent people who express their individuality by the way they dress.” The author thanks an anonymous reviewer for suggesting this example.
make the brand choice earlier, when they not only have less information about the other person, but perhaps before they even know who the other person is. Therefore, people may find it rational to make different inferences from the brand they see and from the words they hear. The additional value, which communication through brands brings to the value of communication, over and above the value of conversations alone, is the aspect of the consumer value of the brand images this paper studies. This aspect of the brand image value depends, in part, on the incentives for a consumer to reveal information, and on whether the information stated in a conversation is believed.\footnote{While brands are only one way to communicate before a meeting, they seem to be an accepted choice in consumer-to-consumer communication. The curriculum vitae and the topics of research papers may perform a similar role in communicating a professional inclination for a scholar.}

Consider an environment with the following features. Agents, e.g., people, go through a sequence of costly meetings to “interview” for a partnership, e.g., a marriage. The partnership is declared if and only if both agents want to form it. The payoffs to the two agents in a partnership are different, but correlated, and partly depend on the (common) fit between the two agents. Agents do not have complete information about the fit, but rather each agent at a meeting has information about a part of the fit. This makes communication potentially valuable. Agents may communicate by talking during the meeting, but this conversation happens after they have already observed something about the payoffs of the potential partnership and each other. Agents may also communicate by selecting a brand before the meeting and bringing it to the meeting.

The main implications are the following. First, conversations at meetings can never be completely truthful and hence, can not reveal all information. Thus brand use may help to convey information. Second, if consumers use brands more, conversations become less truthful. Third, the consumer value of communicating through brand use has an inverse-U shape in the search cost per meeting, tending to zero as the search cost tends to zero, and becoming non-positive when search costs are high. When the distribution of payoffs of a match is single-peaked and symmetric, and the correlation of payoffs is close to zero, brand image value is positive if and only if the probability of acceptance of an agent by another (random) agent is less than one half.\footnote{The probability of acceptance at any single meeting decreases as search costs decrease, and hence, the value of brand use becomes positive when search costs are low enough. As search costs tend to zero, the value of brand use tends back to zero, as acceptance decisions themselves start to convey all information.} The desire to not reveal information before a meeting (when search costs are large) can be interpreted as a desire for conformity (herding behavior), since it leads to people trying to adopt behavior and product use as not to “stand out”. On the other
hand, the desire to reveal as much information as possible (when search costs are small) can be seen as tendency to extremes, especially when the desire to stand out actually dominates the benefit of truthful information transmission.

A potential difference between communication through brands and communication by talking is that brands are costly, while statements during a conversation may not be as costly. Exploring this effect of brand costliness has led to theories of conspicuous consumption, where the brand is a costly device signalling that the agent using it is of a “high” type (e.g., Pesendorfer, 1995, Bagwell and Bernheim, 1996).  

However there are at least two reasons to believe that cost is not the only thing that makes brand images valuable. First, there is a large variety of brands that are not expensive enough to be used for costly signalling. In addition, there are images that are at odds with the “pricy” image. For example, can a person possibly signal a thrifty nature by purchasing an inexpensive car, such as Hyundai Accent? Or can a teenager signal a desire for change or adventure by choosing a Pepsi instead of a Coke? Second, even with status goods such as luxury cars, there is often a variety of similarly-priced brands with different images. Oftentimes, while a firm is trying to convey a status image for its brand, it also tries to differentiate from the firms with equally prestigious brands by developing a “style dimension”. For example, a particular Corvette, a BMW, and a Lexus car may be in the same price range and have similar characteristics, but people have strongly differing preferences for them due to the different images associated with the users of each brand.

If a certain attribute is desirable for everybody, costless statements, whether in words or in brands, may not be trusted. However, oftentimes, whether an attribute is desirable or not is a matter of an idiosyncratic preference rather than of an objective quality. For example, what is better: thriftiness or willingness to spend, being cautious or being adventurous, associating oneself with things classic or with things modern? A hybrid SUV may project a very different image from a sports car, but

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6While costly signalling (Spence 1973) has been widely explored in the economics and marketing literature (examples in the marketing literature include Moorhuy and Srinivasan, 1995, Desai and Srinivasan, 1995, Simester, 1995, and Lariviere and Padmanabhan, 1997), the possibility of costless communication (“cheap talk”) has not received as much attention. In relation to the literature on cheap-talk communication (e.g., Crawford and Sobel, 1982, Forges, 1990, Krishna and Morgan, 2004), this paper adds explicit consideration of the search process, communication by both parties, the use of brands (in addition to conversations), and the decisions affecting the other party by both parties involved. This paper also relates to a considerable literature on matching in the context of job search and unemployment (e.g., Diamond, 1982, Hosios, 1989), and in the context of the “marriage market” (e.g., Burdett and Coles, 1997, Becker, 1973). In contrast to that literature, this paper models communication and incomplete information at the time of the choice.
each can be appealing to some consumers (and disgusting to others). If neither attribute is objectively
good, but rather either attribute could be to somebody’s preference, cheap-talk communication may be
informative (Crawford and Sobel, 1982) and the timing of the statement is an important consideration.
When person A makes a verbal statement to person B, person B wonders whether the statement was
made because A has observed that B would like it. In this case, use of brands may be valuable,
because B may know that A chose the brand before A had observed B’s preference.

The rest of the paper is organized as follows. The formal model is presented in Section 2 and
analyzed in Section 3. Section 4 illustrates the model on an example of a particular (exponential)
distribution of payoffs of a match, and derives the implications for a monopoly firm’s decisions on
the number of brands to offer and brand pricing. Section 5 concludes with a discussion of the model
implications, limitations, and potential for empirical testing and future research.

2 A Model of a Matching Game

Consider an environment, where each agent, e.g., a person, has a goal of finding another agent to form
a partnership, e.g., a marriage. For the possibility of finding a partner, an agent must first look for a
meeting with another agent, which is costly (Burdett and Coles, 1997). The payoff of a partnership
to each partner is a function of how much this partner turns out to benefit from (or like) the other
partner. When one agent meets another, each of them forms expectations of the payoffs he/she is
likely to receive from the potential partnership, but may not know the payoffs for sure. They may
each possess some, but not all the information that is needed to determine the partnership payoffs
to each potential partner. For example, while some characteristics of an agent may be observable to
everybody, other characteristics may only be privately known to self. Through communication, agents
may potentially increase the efficiency of the matching process. Note that since the interests of agents
are not fully aligned, the communication value and strategy are not straightforward.

Since the incentives in communication may change when agents receive more information, it is
important to consider the timing of communication. For example, consider a person planning to go to
a party, where she can potentially find a partner. Knowing the likely distribution of other party-goers,
she may choose the appropriate attire as to communicate something about herself to the potential
partners. Later, at the party, she will have some chances of closer contacts with the other people.
Let us refer to these closer contacts as “meetings”. In each meeting, she observes further information
about the other person, which may give her different incentives in communication from the incentives present before she came to the party when only she only knew the distribution of types.

For a partnership to form, each person in a meeting has to agree to it. Let us label the potential decisions as “accept” or “not accept”. Further, to account for the fact that going through the whole distribution of potential partners is costly and/or impossible, let us assume that there is cost a person must incur for each meeting he/she engages in.

Formally, consider the following model. Each agent $i$ from an infinite population of agents has two characteristics, one called the attribute $a_i$ and the other called the preference $u_i$ (toward the other agent’s attribute). This pair of characteristics will be referred to as the agent’s type $t = (u_i, a_i)$. If agents $i$ and $j$ form a partnership, their payoffs are, correspondingly:

$$V_{ij} = A_{ij} + m(u_i, a_j) + \delta m(u_j, a_i),$$
$$V_{ji} = A_{ji} + \delta m(u_i, a_j) + m(u_j, a_i),$$

(1)

where $m(u_i, a_j)$ is the fit of agent $j$’s attribute to agent $i$’s preference, $\delta > 0$ is a parameter that could be interpreted as how much agent $i$ values satisfying agent $j$’s preference and vice versa, and $A_{ij}/A_{ji}$ denote additional payoffs of agents $i$ and $j$ not explicitly modelled (potentially coming from the fit between other agent characteristics). Assume that $A_{ij}$ are i.i.d. across all ordered pairs $(i, j)$, and all types are equally frequent in the population.

Assume agent $i$ always knows her own type $(u_i, a_i)$, as well as the distribution of $A_{ij}$ and of the other agents types. For the possibility of a partnership, agent $i$ must pay the “search cost” $s$ to have a meeting with another agent $j$ (randomly chosen out of other agents who paid the search cost). A meeting is a sequence of the following three stages. At stage 1, each agent observes the other agent’s preference and her own idiosyncratic payoff $A_{ij}$. Thus, at the beginning of a meeting, each agent knows something, but not everything about the other agent. As we will see, this assumption is important for communication to have value. Then, at stage 2, called conversation, agents simultaneously exchange statements about their attributes. These statements are not restricted to be truthful. Finally (stage 3), agents simultaneously decide whether to accept. If both agents accept, the meeting ends with a partnership, payoffs defined by Equation (1) realize, and the game is over for both agents. If either agent does not accept, the immediate payoffs are 0, but agents can continue to search by paying $s$ again for a meeting with another random agent.\footnote{Since the game is symmetric from the point of view of each agent the distribution of the agent types does not change.}
Besides conversation (stage 2 of a meeting), there is one more potential form of communication: a statement about own attribute before the meeting. Naturally, an agent cannot say something to the other agent before meeting that agent; however, she may carry a brand (e.g., of clothes) she has chosen before the meeting. This type of communication may be possible if brands with brand images corresponding to different attributes are available. Note that the brand choice is also a statement that does not need to be truthful, since anybody is allowed to purchase any brand. While conversations are always an available form of communication, brand choice is only available if brands exist. We will therefore compare the brand choice model in the presence of conversations to the conversations only model in order to derive the value of brand use to consumers.

Agents are risk-neutral and have no liquidity constraints, so the total payoff to agent $i$, who ultimately forms a partnership with some agent $j$, is $V_{ij} - N_i s$, where $N_i$ is the number of meetings agent $i$ participated in. An agent may decide not to participate in the game, in which case she has the total payoff of 0. An agent may also decide to give up on further meetings after $N$ meetings, in which case his/her payoff is $(-Ns)$, or she may have an infinitely negative payoff if no meeting ever results in a match. Figure 1 illustrates the sequence of the game for an arbitrary agent.

For simplicity, assume that the attribute can have one out of only two values denoted by 1 and −1. Assume that the preference is also −1 or 1, assume that there are equal number of agents of each type, and $m(u_i, a_j) = u_ia_j$. Assume that the set of possible statements about $a_i$ that agent $i$ is making at stage 2 of a meeting is also $\{-1, 1\}$, essentially either saying that there is a fit or there is a misfit. Since intermediate values of the fit do not exist, it seems reasonable that people may find it hard to make any other statement. Statements about $A_{ij}$ are also not considered because they do not directly as the game progresses.

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8The former possibility cannot be an equilibrium outcome, since there are no liquidity constraints and agents are risk-neutral, and the latter can not occur with a positive probability.
affect agent \(j\)'s payoff. Let the CDF and the PDF of \(A_{ij}\) be \(F_A(\cdot)\) and \(f(\cdot)\) correspondingly.

To summarize, an agent’s decision variables are: 1) which brand, if any, to choose at the beginning of the game; 2) which statement to make about the fit at Stage 2 of every meeting, and 3) to accept or to reject the other agent at Stage 3 of every meeting. Let us assume that the mean of \(A_{ij}\) is high enough and concentrate on looking for a non-trivial perfect Bayesian equilibrium where matches occur with a positive probability (such an equilibrium always exists if the mean of \(A_{ij}\) is high enough relative to the search cost \(s\)). Specifically, assume that the mean of \(A_{ij}\) is higher than \(1 + s + \delta\).

3 Model Analysis

The following subsections discuss, in turn, the setup of the game and the possible equilibria, the equilibrium equations on the acceptance decision, the properties of the communication through conversations, and the properties of communication through brand use. Establishing the value of communication through brand use (over and above the value of conversations), will then allow us to discuss possible brand selection and pricing strategies of the firm (e.g., see Section 4).

3.1 Language Structure and Potential Equilibria

At a meeting between agent \(i\) and \(j\), agent \(i\) learns \(A_{ij} + \delta m(u_j, a_i)\) part of her payoff, but does not know \(m(u_i, a_j)\) part, which becomes known, however, to agent \(j\). Thus, the only unknown to either agent part of the payoff has one of only two possible values: 1 or -1, referred to as “fit” or “misfit” of the corresponding characteristics. While one could potentially consider some forms of communication that would obscure the information transmitted to a degree desirable by the communicating agent, the assumption that agents can not select intermediate statements could be viewed as reasonable since there are no intermediate values of fit, and the fit is either completely unknown (to one agent) or known precisely (to the other agent). The two communication possibilities (conversation and brand use) are different in what the statements can be conditioned on: conversations can be conditioned on the observed value of the payoff and on the knowledge of how this statement will be taken by the other agent, while the communication through brands can not be conditioned on these values.\(^9\)

\(^9\)I assume that an agent cannot stealthily bring two brands to a meeting and display one only after observing the other agent’s preference. For example, it may be not possible, because by the time when the first agent observes the other agent’s preference, this other agent has already observed that the first agent did not display brands. In other words, if an agent is observed to bring both brands to a meeting, then these brands will not have a value in addition to the value of conversation. To simplify brand choice consideration, one can assume that the brand choice is made before the first meeting only, and brand choice implies displaying the brand at all meetings. This is without loss of generality, because,
As with any cheap-talk communication, there are always “babbling” equilibria where what agents state is independent of the truth (i.e., agents “babble” instead of talking), and all agents ignore all statements made. Ignoring statements makes all statements equally optimal, and babbling, in turn, makes ignoring statements optimal. Since such equilibria always exist, the interesting question is then one of whether there are any equilibria with informative communication, i.e., when statements are correlated with the truth. Formally, a statement by agent \( i \) is said to be informative to agent \( j \) if it non-trivially affects agent \( j \)’s beliefs relative to the opposite statement by agent \( i \). Without loss of generality, we can assume that statement “\( m(u_j, a_i) = 1 \)”, which we will call “stating fit” does not decrease agent \( j \)’s belief of the probability that \( m(u_j, a_i) = 1 \) relative to stating misfit (statement of “\( m(u_j, a_i) = 1 \)”). Then, stating fit is informative if and only if

\[
\text{Prob}(m(u_j, a_i) = 1|”m(u_j, a_i) = 1”) > \text{Prob}(m(u_j, a_i) = 1|”m(u_j, a_i) = -1”) \tag{2}
\]

from the point of view of the agent \( j \) receiving the statement.

There could also be a possibility that statements, while informative, do not affect the decisions made, because they do not change expected payoff enough to make a difference. For communication to have value, therefore, it needs not only to be informative (i.e., such that receivers of communication pay attention to it), but also decisive, i.e., such that information transmitted could potentially change a decision.\(^{10}\) As we will see, a sufficient condition for an informative statement to be decisive is that the PDF of \( A_{ij} \) is strictly positive in a sufficiently wide range, since it then allows the accept/reject decision to be marginal for some possible realization of \( A_{ij} \) and thus, possibly swayed by a small change in the expected value of the partnership payoff.

If an agent at a meeting knows she will for sure not accept the partnership with the other agent, her statement at the meeting is inconsequential. Therefore, let us restrict consideration of the statements of an agent about her attribute to the case when the decision of that agent could be to accept. The behavior of agents when they know for sure they will not accept may affect the correlation between the statements and the truth, but does not affect the outcomes. In other words, while it can affect the overall correlation between statements and the truth and contributes to the multiplicity of equilibria, it

\(^{10}\)One could think of the informative and uninformative communication equilibria as separating and pooling ones, respectively, in the context of costly signalling. See Simester (1995) for a more extensive discussion of different possibilities of equilibria. Note that in the context of costless signalling, Intuitive Criterion fails to restrict equilibria, and hence, pooling equilibria always exist.
does not change the value of conversation. Note also that this issue does not arise with communication through brands, since before a meeting, an agent can not know that she will not accept.

3.2 Accept Decisions and the Reservation Rule

As in any setup with sequential search and incomplete information, and where an agent’s possibilities and information sets do not change with the agent’s search history, the decision to accept follows a “reservation rule” strategy. That is, the optimal strategy on when to accept is to set up meetings until the expected payoff from the match in the meeting is at or above the agent’s reservation value $G$. As we will see from the equilibrium equations below, this value is equal to the expected payoff from the stream of future meetings and thus, can also be called the value of the game.

To derive equilibrium conditions on an arbitrary agent $i$’s reservation value $G_i$, consider agent $i$ deciding whether to accept agent $j$. By definition, reservation value $G_i$ is such expected payoff that agent $i$ is indifferent between a) foregoing this payoff and searching further and b) accepting this payoff and not searching any more. The cost of not accepting and searching once more is $s$ and the benefit of searching once more is that agent $i$ may find a higher payoff from another agent $j$ who accepts agent $i$. Explicitly, the equation is

$$ s = \int_{E_i(V_i(\omega)|j \text{ accepts}) > G} (E_i(V_i(\omega)|j \text{ accepts}) - G) \text{Prob}(j \text{ accepts } \omega) dF(\omega), \quad (3) $$

where $E_i(V_i(\omega)|j \text{ accepts})$ is the expected by agent $i$ payoff of agent $i$ conditional on agent $j$ accepting, and $\omega$ spans the probability space of different outcomes in the next meeting with probability distribution $F(\omega)$. The probability of agent $j$ accepting $\text{Prob}(j \text{ accepts } \omega)$ used above is the probability as known to agent $i$ at Stage 3 of the meeting. Note that since the decision of $i$ to accept or not only matters if agent $j$ accepts, agent $i$ decides to accept or not as if he/she thought agent $j$ has accepted. This equation, defining $G$ as a function of parameters $\delta$ and $s$, can be rewritten as

$$ s = \int_{x>G} (x - G) \text{Prob}(j \text{ accepts } E_i(V_i|j \text{ accepts}) = x) dF_{E_i(V_i|j \text{ accepts})}(x), \quad (4) $$

by substituting $E_i(V_i(\omega)|j \text{ accepts}) = x$ and omitting the dependence of $V_i$ on $\omega$.$^{11}$

3.3 Informativeness of Conversation

Let us now consider the agent strategy on what to say about his/her attribute $a_i$ at stage 2 of a meeting. As noted before, the only unknown part of the potential payoff to agent $i$ at a meeting is

$^{11}$When $q = \text{Prob}(j \text{ accepts } E_i(V_i|j \text{ accepts}) = x)$ does not depend on $x$ (such as shown below to be the case when $A_{ij}$ is exponentially distributed), the above equation becomes $s/q = \int_{x>G} (x - G) dF_{E_i(V_i|j \text{ accepts})}(x)$. 

9
Let us denote by $z_i$ the expectation of this value by agent $i$ conditional on the other agent at the meeting accepting. The only purpose of any communication is to influence this value. The question is whether agent $i$ should indicate that there is “fit”, i.e. state “$m(u_j, a_i) = 1$”, or misfit, i.e. state “$m(u_j, a_i) = -1$” depending on the actual fit $m(u_j, a_i)$ and on the realized value of $A_{ij}$.

If conversation is informative, stating fit by an agent increases the value the other agent expects from the partnership (since it increases $z_j$), and therefore, it increases the probability of the other agent accepting. This leads to the incentive for an agent to state fit regardless of actual fit when she observes a high value of her idiosyncratic payoff ($A_{ij}$). A more subtle effect of increasing the value the other agent expects from the partnership is how it affects $z_i$ – the expectation of the unknown part of the payoff to the first agent conditional on the other agent accepting: making the other agent accept with higher probability may make his acceptance less indicative that this part is high. If $\delta = 0$, this (second) effect does not exist, since $z_i$ is always 0 (since the other agent does not care about $m(u_i, a_j)$ at all), while if $\delta > 0$, this effect could lead to the incentive to make a truthful statement.\footnote{If the effect of stating fit by agent $i$ on $z_i$ is negative, agent $i$’s strategy depends on the balance of this effect and the effect of stating fit on the probability of acceptance. If it is positive, conversation can never be informative.} Note that this consideration implies that for any communication to be informative, both sides must have incomplete information. As agents care less for each other’s payoffs ($\delta$ small), they are less likely to tell the truth:

**Proposition 1.** As $\delta \to 0$, conversation is either not informative at all, or the probability of any agent stating fit tends to 1 (regardless of actual fit).

**Proof.** All proofs are in the Appendix.

In other words, when the correlation of payoffs is close to zero (i.e., when $\delta \to 0$), agents almost always try to convince each other that there is fit. Hence, conversation becomes not very informative. While it is possible that conversations are not informative at all (e.g., Section 4 shows that that this is the case if the distribution of $A_{ij}$ is exponential in the appropriate range), the following proposition shows that under general conditions, one can never expect conversation to be completely truthful.

**Proposition 2.** If agent $i$ believes that agent $j$ will truthfully state her type, it is optimal for agent $i$ to state fit regardless of actual fit. Furthermore, stating fit is strictly dominant strategy for such agent $i$ if the probability density of $A_{ij}$ is strictly positive on the interval $[G - 1 - \delta, G + 1 + \delta]$ and agent $j$ perceives communication by agent $i$ as informative.

This proposition implies that with a non-degenerate distribution of $A_{ij}$ “always telling the truth” can not be an equilibrium strategy followed by all agents:
Corollary 1. When the support of $A_{ij}$ is large enough (e.g., when the p.d.f. of $A_{ij}$ is strictly positive on $[G - 1 - \delta, G + 1 + \delta]$), there are no equilibria in which all agents always tell the truth.

The intuition for the above result is the following. Arguing by contradiction, suppose all agents would be always telling the truth. Then agent $i$ knows that at the time of her accept-reject decision, she will have full information. Therefore, she will either reject or will strictly prefer to increase the probability of the other agent accepting, as far as her statement may ever affect the other agent’s decisions (the condition that the PDF of $A_{ij}$ is strictly positive on a large enough interval ensures that statements will sometimes be affecting decisions). Hence, stating fit (regardless of actual fit) is strictly preferable for agent $i$. The above analysis leads to the following partial-equilibrium result: if an agent believes the other agent to be truthful, the first agent has no incentives to tell the truth. This may be viewed as the opposite of a tit-for-tat (or fairness) strategy, which would suggest that an agent should be more truthful if he/she believed that the other agent is truthful.\textsuperscript{13}

Since, according to the corollary above, conversations can never be completely truthful, other forms of communications can be potentially valuable. While conversations can be valuable as well, they are normally freely available. Thus, from the profit maximization point of view, it is more interesting to derive the value of communication through brand use than the value of communication through conversation: a firm may take advantage of the former value through selling brands. Let us now turn to the analysis of the brand value in the presence of conversation possibility.

3.4 Consumer Value of Brand Images

As the previous section shows, the potential problem with conversations reducing their informativeness is that at the onset of a meeting, an agent observes the other agent’s preference, and can modify her statement accordingly. Let us now consider brand choice strategies, i.e., the decisions to state the type before meetings. Unless stated otherwise, assume that brand images corresponding to two attributes are available at zero cost to all agents. We are interested in how much consumers value these brand images. In Section 4, for tractability restricting the model to the exponential distribution of $A_{ij}$, we will consider the brand pricing decision by a firm and derive the value of brand images to the firm. This section shows that, in contrast to conversations at the meetings, brand choice strategy may lead to full revelation of all information by the agents.

\textsuperscript{13}To have an intuition for this difference, note that arguments in support of tit-for-tat and fairness strategies are usually given through a repeated interaction, whereas our game is not repeated (nor there is a possibility of punishment after a lie is detected).
Looking as before at equilibria with informative communication, suppose that brand use is informative. Let us consider the incentives of an agent to choose the brand corresponding to her attribute vs. the brand corresponding to the opposite attribute. Since in the future meetings, this agent is as likely to meet agents who prefer her own attribute as those who prefer the opposite one, choosing the brand corresponding to either attribute does not change the probability of favorable evaluation by the other agent, and thus, does not change the probability of acceptance by the other agent. However, since the other agent is more likely to accept if he believes this agent has attribute of his preference, stating the attribute truthfully before meeting (relative to stating the opposite) would decrease the average value of the fit given the other agent acceptance. This means that as far as an agent chose to state her attribute before a meeting, she will strictly prefer to choose the statement indicative of her true attribute rather than the statement indicative of the opposite attribute. Thus, brand image communication is always truthful (if exists). Therefore, as a corollary to Proposition 2, we have the following proposition:

Proposition 3. If agent \( i \) is meeting agent \( j \) who is using a brand, agent \( i \)'s statement of her attribute at the meeting is not informative.

To see this, note that as argued above, using a brand is equivalent to truthfully revealing the attribute. Therefore, according to Proposition 2, agent \( i \) will always state fit regardless of her actual fit, and thus agent \( i \)'s statement at the meeting is not informative. Note that under the condition of the above proposition, agent \( i \)'s choice of brand is still informative, since it has been chosen before observing agent \( j \)'s preference. In fact, the above proposition implies that when more people use brands, the importance of brand use for communication increases, since the communication without brand use (conversations at the meetings) become less informative.

Since when a brand is chosen, it is always the one corresponding to the agent's attribute, the only non-trivial decision an agent faces in brand choice is whether to reveal her attribute (use a brand) or to leave it uncertain for the other agents (not use any brands). A related question is how much an agent values (is willing to pay for) possibility of revealing her attribute. As the following proposition shows, the answers to both questions depend on the search cost and the distribution of \( A_{ij} \).

Proposition 4. Suppose \( A_{ij} \) has a finite support. Then: a) as per-meeting search cost \( s \) tends to 0, brand image value tends to 0; b) as \( s \) increases and \( A - \delta > 0 \), brand image value becomes zero or negative, and: c) for a symmetric single-peaked distribution of \( A_{ij} \), as \( \delta \to 0 \), brand image value is positive if the reservation value of the payoff is above the mean of \( A_{ij} \) and is negative otherwise.
The intuition for these results is the following. If search costs are very low, agents can search a lot until they find a very good potential payoff, and are not willing to agree to a partnership when they observe a negative value of the fit. This means that no communication (with brands or otherwise) is necessary or useful. On the other hand, when search costs are very large, agents are willing to match as far as they don’t observe something extremely negative. In this case, not revealing information helps not to be perceived as too negative, and so, agents are unwilling to use a brand that would reveal their attribute. This may be likened to the “herding” behavior, where everybody tends to want to use the same outfit as everybody else. Finally, in the intermediate range, communication may be valuable, and since conversation can not be fully informative (according to Proposition 2), consumers may value communication through brands.

The exact condition on when consumers would (positively) value brands is easier to formulate when $\delta$ is close to zero, implying that conversations are not informative or almost such, and the distribution of $A_{ij}$ is symmetric and single-peaked. In this case, using a brand, and thus revealing own attribute, has an effect on the probability of acceptance by the other party, and not on the value given acceptance (since when $\delta$ is small, payoffs are almost independent across agents). When agent $i$ reveals her attribute to agent $j$, agent $j$’s evaluation changes from about $A_{ji}$ (ignoring terms of the order of $\delta$, which is small) to about $A_{ji} + m(u_j, a_i)$, which is a mean-preserving spread of $A_{ji}$. Therefore, in the case of symmetric and single-peaked distribution of $A_{ji}$, it leads to a higher probability of acceptance by agent $j$ when the cut-off value for acceptance is above the mean of $A_{ij}$ (i.e., when the probability of acceptance is above 1/2), and to lower probability otherwise. Thus, agents want to use brands when the probability of acceptance in a meeting is below 1/2, and do not want to use a brand (have a negative value for it), if the probability of acceptance is above 1/2.

Proposition 4 implies that when $A_{ij}$ has a finite support, one can expect the value of brand images to be inverse-U shaped in the cost per meeting, since the value of brand image is close to zero (or even less than zero) for very high and very low costs per meeting. This may predict, for example, that ego-expressive brand use will be more widely observed in more densely populated areas or where meeting other people is easier (such as large cities vs. small cities and suburban areas), and brands used will have to be cheaper in a setting/group where meeting other people is extremely easy (such as, hypothetically, at a large undergraduate college or university).
Another implication of Proposition 4 is that the desire for uniqueness (the “snob effect”) and conformity (the “bandwagon effect”), sometimes studied as exogenous (Amaldoss and Jain, 1997) may be related to the size of the peer group, since search costs can be thought of as the ease of finding new people, and hence, inversely related to the size of the group. As we will see in the following section, if identifying own type is not possible by some reason, but identifying one’s type as the opposite is possible, then it is also a possibility in the current model that an agent may even want to pretend to be a type she is not just to stand out.

4 Exponential Distribution of the Payoffs

This section illustrates that it is possible that all information is revealed through brand choice even when conversation at a meeting could not be informative at all, and shows what implications can be drawn for the behavior of a firm choosing the number and prices of brands to sell on the example of the exponential distribution of $A_{ij}$. Specifically, assume that the CDF and PDF of $A_{ij}$ are $F(x) = 1 - e^{-bx}$ and $f(x) = be^{-bx}$ for $x > 0$, correspondingly. Also, assume that search cost $s$ is such that the value of the game is at least $1 + \delta$. This allows us to have the PDF to be $be^{-bx}$ for all relevant $x$ in the equations that follow, which makes calculations tractable. In particular, we have the following Lemma.

**Lemma 1.** Assume agent $j$ follows a reservation rule strategy. Then the expected value of the fit $m(u_i, a_j)$ by agent $i$, given agent $j$ accepts, is $z = E(m(u_i, a_j) | j$ accepts) = $\frac{e^{2b(1+\delta)} - 1}{e^{2b(1+\delta)} + 1}$.  

**Corollary 2.** When $A_{ij}$ is distributed exponentially, conversations at a meeting are not informative.

Let us call a brand matching an agent if its image corresponds to the agent’s attribute.

**Lemma 2.** Assume that the fraction of agents using brands does not depend on the agent’s type, and that brand use is perceived as implying (with certainty) the corresponding attribute of the user. Denote

$$BV_1 = \frac{1}{b} \ln \frac{e^{2(1+\delta)b} + 1}{e^{2(1-\delta)b} + 1} - 2\delta \quad \text{and} \quad BV_2 = \frac{1}{b} \ln \frac{e^{2(1+\delta)b} + 1}{e^{2b} + 1} - \frac{2e^{2b}}{e^{2b} + 1}.$$  

Then the value of using the matching and the mismatching brands for an agent are $BV_2$ and $BV_2 - BV_1$. Furthermore, $BV_1 > 0$, $BV_2 > 0$, and $BV_1 \to 0$ when $\delta \to 0$, while $BV_2$ decreases in $\delta$.  

Thus, the brand value is positive (since $BV_2 > 0$). It is interesting to observe that, unlike with truthfulness of conversations, the value of the brand not only does not have to go to zero as $\delta \to 0$, but could even increase as agents’ payoffs become close to independent. The intuition for this is that as the correlation of payoffs between agents in a match decreases, the fact of acceptance is less informative

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14The results that $BV_1$ and $BV_2$ do not depend on $s$ is due to the exponential distribution of $A$, and is not general.
of fit, and therefore, the value of revelation increases. Furthermore, since $BV_2 - BV_1$ is positive when $\delta$ is small enough, an agent may even prefer to use the mismatching brand rather than not using any brand at all. The intuition for this is that in this case, even though using the mismatching brand decreases the expected fit, it increases the probability of acceptance by the other agents. This suggests a possibility that a person may try to convey a wrong image of him/her-self, not because this image is objectively more desirable, but just to appear more unique, and may be interpreted as a “tendency to extremes.” Note that this may happen only when the correlation of payoffs ($\delta$) is small enough.

Another implication of the above lemma is that in the case of exponential distribution of $A_{ij}$, and assuming symmetric use of brands by all agent types, the aggregate demand curve for the brand images is flat. This contrasts the upward slopping demand curve for status goods.

### 4.1 A Monopolist’s Strategy in the Number and Prices of Brands

Now, let us consider the supply side, and remove the assumption that brands corresponding to each attribute are available (and available at zero cost) to all consumers. If two brands corresponding to each attribute are available at the same price, consumers only use brands that correspond to their attributes. If the fraction of consumers using each does not depend on consumer type, then Lemma 2 states that the value an agent would place on the brand corresponding to his/her attribute is $BV_2$. Therefore, as far as the brands are available at prices below $BV_2$ and at the same price (or, at least at prices that are different by less than $BV_1$), consumers will want to buy the brand with the image corresponding to their attribute and only that brand. Therefore, one could expect a monopolist selling two brands to be able to sell to each consumer a brand with the corresponding image at the price of $BV_2$ and brand use will identify agent’s attribute.

Consider now a monopolist selling one brand with the brand image corresponding to one of the attributes, let’s say attribute $a = 1$. Define Segment 1 as consisting of consumers with attribute $a = 1$ and Segment 2 as consisting of the other consumers. If only consumers of segment 1 use the brand and only a small fraction of them, then the value of this brand to Segment 1 is $BV_2$, while the value of this brand for Segment 2 is $BV_2 - BV_1$. If instead almost all of Segment 1 uses this brand, then, as before, the use of this brand implies attribute $a = 1$, but not using the brand implies the opposite attribute. In other words, not using the brand becomes equivalent to using the (non-existing) brand with the opposite image. Therefore, in this case, Segment 1 consumers value this brand at $BV_1$. Hence, Segment 1 consumer value of the brand depends on the number of consumers Segment 1 consumers
using the brand and changes from $BV_2$ to $BV_1$ as the brand penetration among consumers with the corresponding attribute increases from 0 to 1. If $BV_2 > BV_1$, then brand value decreases in the number of people using it, and a skimming strategy (reducing price with time) may be optimal for the monopolist. But if $BV_2 < BV_1$, then the valuation increases in the number of consumers using the brand, and penetration strategy (increasing price with time) may be optimal for the monopolist.

The following proposition summarizes the static results above:

**Proposition 5.** A monopolist offering a brand for each attribute can achieve full penetration with price $p = BV_2$. In this case, the monopolist extracts all the consumer surplus from better matching, and the total consumer expenditure on search does not change relative to the case of no available brands. A monopolist offering a single brand can sell the brand at the price $BV_1$ to all consumers with the matching attribute.

Note that in the case monopoly selling two ego-expressive brands, the monopoly revenue is $BV_2$ times the total mass of consumers, and consumers are as well off as in the case of no available brands. If the brand image creation is costly, the proposition implies that a profit-maximizing monopoly would introduce two brands only if it is socially optimal. This contrasts the status good case of Pesendorfer (1995), where due to the signalling device, all consumers are strictly worse off. On the other hand, if the monopoly chooses to sell one brand, consumers may be worse off with this brand than in the case of no brands. Comparison between the profits implied by Proposition 5 leads to the following insight in the choice of the number of brands to offer by a monopoly firm:

**Proposition 6.** When $\delta$ is close to zero, a monopolist chooses to sell two brands with opposing images at the same price equal to $BV_2$. When $\delta$ is large (e.g., higher than $1/2$), a monopolist prefers to sell one brand at a price of $BV_1$.

In particular, this proposition implies that when $\delta$ is large enough, a monopolist should prefer not to sell to all consumers and use fewer brands.

Finally, note that since for a brand image to be indicative of an agent’s attribute, the brand must be relatively not too expensive (since as Lemma 2 implies, it must be priced not more than $BV_1$ above the other brand). This is in contrast to status goods valuation. An implication is that if brands have images that can be perceived as good by some consumers and bad by other consumers, competition can reduce prices without decreasing consumer value.

Although, the change of the consumer brand value as the market share increases could go either way (since $BV_2$ could be higher or lower than $BV_1$), one could expect that given the optimal decision of the firm on the number of brands, only the increasing value with the market share would be observed.
This change of consumer value can be seen as a bandwagon effect, although unlike when brands are used to indicate status, it does not come from the desire to imitate others, but due to informational change of the brand image use. This contrasts the case of status goods, since in the case of status goods, larger market share reduces their value by making them less exclusive.

5 Discussion, Limitations, and Future Research

While brand meanings may spontaneously arise from the types of people who use brands, the brand manufacturers may facilitate the process of brand image creation through advertising. Relating this view of advertising to the informative and signalling views of advertising,\(^\text{15}\) note that similarly to the signalling view, this paper considers the value of advertised images that are not physically related to the product or its price. But in contrast to that view, the value explored depends not on the amount the firm spends, but rather on how well the firm has conveyed the brand image.\(^\text{16}\)

Wernerfelt (1990), discussing brands as a symbolic language allowing consumers to communicate their types to each other, postulates that consumers have a certain value of communicating their types to each other, assumes that the brand use is the only means of communication, and focuses on the supply side. This paper further develops this consideration by explicitly looking at the search process, modelling why and how much consumers should value communication through brand use over and above communication through verbal conversations, thereby modelling the demand side.

How brand meanings are established, and specifically, how a firm may educate consumers of the desirable to the firm meaning of the brand is an interesting area for future research. One of the possibilities, suggested by McCracken (1989), is the transfer of personality meaning from the celebrities used in advertising to initial consumers of the brand and from the initial users to other consumers (Escalas and Bettman, 2006).

In contrast to status goods, this paper considers the orthogonal case of completely symmetric

\(^{15}\)The informative view of advertising (Nielsen, 1974) considers advertising as either informing consumers of the product existence (e.g., Iyer, Soberman, and Villas-Boas, 2004, and Villas-Boas, 2004) or product attributes (e.g., Soberman, 2004), while the signalling view (Milgrom and Roberts, 1986) considers the possibility that advertising per se signals high quality.

\(^{16}\)Mitchell and Olson (1981), in an experimental setting, confirm that consumer feelings about an advertising message translate into consumer preferences for the product advertised, even if the advertising content is clearly unrelated to the physical characteristics of the product. While private “consumption” of the brand image may enter consumer utility directly due to emotional response, this paper shows how to explain the utility of conspicuous consumption of costless images through payoffs in social interaction, which allows us to analyze what and how the consumer value of brand images depends on.
distribution of preferences, where agents are equally divided in whether they consider each attribute as good or bad in a match. In reality, many firms try to establish some mix of a prestige and style image for their conspicuously consumed branded products, and it would be an interesting extension to consider the brand valuation problem when some attributes are more preferable than others, or when the fractions of people with each attribute are not equal. This could lead one to expect brand valuations to exhibit a mixture of properties of status goods and “style” that was considered here.

Another possibility of (semi-symmetric) attribute distribution could be that some attributes are more extreme and some attributes are more moderate on both sides of the spectrum. For example, some people may like travelling in various degrees and some people may dislike travelling in various degrees. One could expect people who like or dislike travelling to like people of the same kind (i.e., who like or dislike travelling, respectively), and like them more if they are more extreme of the same kind, because a person who likes travelling can free-ride on the other person’s efforts to travel and vice versa. In the above situation, one could ask: when would people want to appear to be of a more extreme type and when of a more moderate type? An interesting implication of this extension could be, as one could speculate, that when search costs are high, people would be willing to match with anybody who is not extreme of the wrong type, and therefore it is best to pretend to be moderate. On the other hand, if search costs are low, people would be willing to look for an extreme type they like, and people may want to pretend to be more extreme than they are. This suggests herding and polarization behavior when search costs are, respectively, high and low. For example, at a restaurant or bar, people tend to choose a dish/beer nobody else at the table has chosen (Ariely and Levav, 2000). The model we considered suggests possible qualifiers of such behavior.

It would also be valuable to examine the validity of the predictions in an empirical or experimental setting. Fortunately, the theory provides a number of predictions that can be tested in at least an experimental setting. For example, one could try to verify that consumers would be more truth-telling as they expect the other person to provide less information in a single-shot game where the payoffs depend on the unknown fit between consumers. The inverse-U shaped relationship between brand valuation and per-meeting costs, the reverse correlation between the brand use and the truthfulness of conversations, as well as the value of brand image vs. informativeness of conversation as the correlation of payoffs tends to zero are also predictions that can be tested either experimentally, or, if sufficient cross-sectional or longitudinal data on the brand use and social environment are available, empirically.
References


