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Abstract

Divergence is a fact of social life; people select different tastes to distinguish themselves from others and they abandon tastes when others adopt them. But while we know a great deal about conformity, it predicts convergence, and thus is less equipped to explain why people diverge. We suggest people diverge to maintain clear signals of identity. Our approach emphasizes that the meaning of signals is set at a social rather than individual level. Tastes gain signal value through association with groups or types of individuals, but become diluted when members of more than one type hold them. Thus different types of people will diverge in the tastes they select, and they will abandon tastes they previously liked when they are adopted by members of other social types. (127 words)

> The young always have the same problem- how to rebel and conform at the same time. They solve this problem by defying their parents and copying one another.
>
> - *Quentin Crisp*

Kids want to show they are different from their parents and the jocks want to separate themselves from the geeks. Shanghai residents avoid purchasing Volkswagen Santanas because they "are a favorite first car among the nouveaux riches outside the big cities" (Wonacott, 2004, p. B1) and New Yorkers wore mesh trucker hats until the bridge and tunnel crowd adopted them (Barker, 2004). Intellectuals want to show they are more thoughtful than the masses and the original members of any cultural scene (i.e. music, style, philosophical schools, etc.) want to differentiate themselves from the posers that come along later. The social process that underlies all these examples is one of divergence. People select tastes that distinguish them from other types of people, and they abandon tastes that are corrupted when the wrong types adopt them. Divergence is pervasive in social life.

These facts are so obvious they hardly need stating save for one important observation: our theories in social science are generally unable to account for them. One of the most widely discussed principles in social psychology is that of conformity (Allport, 1924; Sherif, 1936; Asch, 1955; Festinger, 1950, Graham, 1962; Willis, 1965; Allen, 1965; Milgram, Bickman, and Berkowitz, 1969), and indeed it has been raised to the status of a social law (see Social Impact Theory, Latane, 1981). Researchers in sociology recognize similar tendencies under different names (e.g. mimetic isomorphism, DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Scott, 1995).

While conformity and isomorphism processes obviously exist and are important, they cannot account for a world in which people select tastes that distinguish themselves from others and, more costly, abandon tastes they once held when they are adopted by the wrong types. Conformity has difficulty predicting divergence. Indeed, models of the diffusion of innovations and cultural practices, which are based implicitly on conformity dynamics (Rogers, 1983; Bass, 1969), are well equipped to explain increases in adoption, but as Macy and Strang (2001) note, they are "poorly equipped to account for almost anything else" (p. 148). We know that people diverge but why?

The uniqueness literature in psychology has raised the important observation that people experience drives to differentiate as well as to belong, but this literature is much smaller than the literature on conformity, and it leaves some important questions unanswered. The uniqueness literature argues individuals have an internal drive to see themselves as different. Individuals feel bad in situations where they are overly similar to others, and they repair the negative feelings by emphasizing aspects that make them different from others. By focusing on the feelings and reactions of *individuals*, however, the uniqueness literature is not equipped to explain the social character of divergence--the uniqueness literature would allow individuals to diverge in unique, perhaps bizarre, directions, but our approach points out that most divergence is driven by a process that unfolds at the social level.

We propose a signaling identity approach to divergence. Rather than focusing on individual drives for uniqueness, we focus on how meanings are constructed and diluted

as collections of people interact at the social level. Types of people diverge in an effort to maintain clear signals of identity. Individuals cannot construct meaning on their own, they must join with other individuals of a similar type in order to create a signal that is imbued with meaning. But when a taste is adopted by other types of individuals, the taste can lose its ability to signal identity effectively. Our model predicts that collections of individuals will join together to select tastes that signal a shared identity, and they will collectively abandon previously held tastes when other types of individuals adopt them.

Before presenting our theory, we first review literature on convergence and divergence, and then present three key questions that are unresolved by previous literature: (1) Why is divergence not idiosyncratic? Collections of people often diverge in the same direction at the same time, an observation that is difficult to explain within the traditional uniqueness literature. (2) Where do people diverge? People care about divergence much more in some domains than others, about sharing the same music tastes than the same bike lights. We should understand why domains vary in their use as signals of identity. (3) Who drives divergence? People seem likely to abandon tastes when other types of people adopt their practices. Abandonment is a particularly rigorous form of divergence because it requires people to give up a taste they once favored. We should understand in what situations this occurs. The body of the paper addresses each of these questions in turn, providing a simple mathematical model that clarifies our predictions, and then reviewing evidence consistent with the model from previous work in psychology, sociology, economics, and consumer behavior as well as our own recent research.

Previous Literature

Convergence

There are at least two important reasons to believe that people's behavior will converge and cultural practices will be relatively stable. The first, and major reason is conformity. Describing early investigations of conformity (Allport, 1924; Moore, 1921), Turner (1991) notes this work "suggested processes of convergence in the group (i.e. people seemed to move towards and become more similar to each other)" (p. 9). People look to others for information about how to behave (informational influence) and may conform to gain rewards or avoid punishment (normative influence), but regardless people should converge (Deutsch & Gerard, 1955). Whether in comparing the length of lines (Asch, 1955, see Bond and Smith, 1996 for a review), estimating the amount of point of light moved in a dark room (Sherif, 1936), deciding whether to serve intestinal meats to one's family (Lewin, 1947), or evaluating men's suits (Venkatesan, 1966), selecting brands of bread (Stafford, 1966), people choose in ways that conform to the behavior of those around them, and thus their choices and opinions converge with others (convergence even occur nonconsciously, Chartrand & Bargh, 1999; Epley & Gilovich, 1999).

On the macro level, economists and sociologists have models of conformity that discuss how individual imitation can lead to broad scale convergence. Bandwagon effects describe cases where individual demand for something is increased due to the fact that others are consuming it (Granovetter & Soong, 1986; Iannaccone, 1989; Liebenstein, 1950, 1976; Veblen, 1899 [1912]). Actors may also attend more to others behavior when

situations are uncertain, leading to herding behavior or information cascades (Banerjee, 1992; Bikhchandani, Hirshleifer, & Welch, 1992; Strang & Macy, 2001).

A second principle that predicts convergence deals less directly with social motives but can be applied to this area. Research on "mere exposure" has documented that people prefer things they have seen more often (Zajonc, 1968; see also Borenstein, 1989; Frumkin, 1963; Kuntz-Wilson & Zajonc, 1980; Mita, Dermer, & Knight, 1977; Moreland and Beach, 1992). People should see popular things more frequently, and thus may come to prefer what others already like, leading to convergence.

Overall, research suggests that people do what others do and like what others like and together these principles suggest that cultural practices should converge over time. While seemingly uncontroversial, these principles, without amendment, suggest some implausible implications: we should dress identically with others, say the same phrases, and prefer the same music. But the fact that these predictions are so wildly implausible suggests that we need to understand additional factors that produce divergence.

Divergence

Convergence principles have been widely documented, but some researchers have also considered principles that may lead people to diverge. However, as we discuss below, their theories still leave important questions unresolved.

Divergence driven by a desire for uniqueness

Social scientists have argued that individuals want to be different: "the distinction seeking actor is at continual pains to seek out such things that are currently difficult to come by and to reject and avoid those which are becoming commonplace," (Robinson, 1961, p. 384-385). Early on, economic theorizing discussed the drive for difference, suggesting people choose things that set them apart from the masses (Veblen, 1899 [1912]). Liebenstein (1950) argued people "search for exclusiveness…through the purchase of distinctive clothing, foods, automobiles, houses, or anything else that individuals may believe will in some way set them off from the mass of mankind" (p.184), and discussed "snob effects" or cases where individual demand is decreased because others are consuming (also see Liebenstein, 1976; Granovetter & Soong, 1986).

Psychologists have also made a concerted effort to study the drive for uniqueness (Fromkin, 1970; Snyder & Fromkin, 1980). They suggest people are "motivated to seek some sense of difference relative to others" and "when a person feels a very high degree of similarity relative to another, a negative emotional reaction should occur" (Snyder & Fromkin, 1984, p. 34) driving the person to take steps to decrease perceived similarity. When people feel similar to others, they focus on differences between themselves and others who seem similar (Ganster, McCuddy, and Fromkin, 1977), misremember actual levels of similarity (Byrne and Griffitt, 1969; Smith, 1975; Snyder & Batson, 1974), provide lower similarity ratings (Fromkin, Brandt, Dipboye, & Pyle, 1974;), sit further away from those who seem similar (Snyder & Endelman, 1979), generate more unique uses for ordinary objects (Fromkin, 1968), and place higher value on scarce future options (Fromkin, 1970).

Note that the uniqueness literature has focused on processes that might be hard to observe by outsiders—true, people sit further away and work harder at being creative, but focusing on differences and placing value on scarce options are internal, unobservable processes. In one of the few studies that have investigated how people choose when confronted with similarity, Ariely and Levav (2000) find that sequential choice in a group setting tends to induce individuals to choose different options from others. Whether ordering lunch entrees at a Chinese restaurant or beers at a local brewery, people tended to diverge from others' choices (and their divergent choices actually leave them less satisfied). Ariely and Levav suggest this divergence may have been caused by the self-presentational goal of appearing unique to others.

Literature on the pursuit of distinction, then, would predict individuals might diverge in their tastes to maintain a unique sense of self.

A moderate amount of similarity: Resolving convergence and divergence?

Taken together, research on convergence and divergence presents an interesting puzzle. While the conformity literature predicts people will choose the same thing as others, the uniqueness literature suggests people will diverge. If uniqueness is a strong drive, why have previous studies so easily found conformity? Furthermore, if people experience opposing pressures towards convergence and divergence, then how do they resolve the conflict?

Not surprisingly, researchers have argued that they do so by locating somewhere in the middle. The uniqueness literature suggests "a moderate level of similarity relative to another person results in a positive state" (Snyder & Fromkin, 1980, p. 22) and suggest that an extremely high or low degree of similarity to others should be extremely aversive. Supporting this notion, students who were told their responses on a traits, values, and interests test were moderately similar to 10,000 other college students reported more positive mood than students who were told they were either highly similar or highly dissimilar (Fromkin, 1972).

The uniqueness literature (Snyder and Fromkin, 1980) argues conformity research found convergence because it studied a narrow range of (moderate) similarity. Studies of conformity focus on cases where people are moderately similar and are making a small number of decisions. They argue that increasing similarity even further should increase pressures to be unique. Thus if conformity researchers had increased the amount of similarity faced by subjects, the uniqueness literature argues they might have found divergence instead.

We suggest that moderate similarity does not fully explain the differences between the literatures on conformity and uniqueness. If degree of similarity was the sole reason for the different findings, subjects must have felt greater similarity to their fellow respondents in studies that found divergence versus convergence. But Ariely and Levav (2000) studied people, drawn from the population of lunch eaters, who presumably knew many dimensions on which they differed from their lunch partners and who dined mostly in groups smaller than 4. It seems unlikely that these people felt more similar to each other than the 18-22 year old college students in Asch's (1951) study, who knew

nothing about each other aside from their identical responses on one task, and who participated in a group of 8. While the idea of moderate similarity provides some intuition about when to expect convergence or divergence, it does not explain all the differences between the two literatures.

Moreover, though we agree that too much similarity can be aversive, we think the uniqueness literature defined "too much similarity" in an overly stringent fashion. A typical experimental manipulation in research (e.g., Fromkin, 1968, 1972; Ganster, McCuddy & Fromkin, 1977) might have participants respond to dozens of attitude items and then give them feedback that their responses on 80% or 95% of the items were *identical* to the modal response of "10,000 other college students." We suspect divergence processes play a role in social life even in situations where we don't feel identical to 10,000 of our peers.

Literature on optimal distinctiveness (Brewer, 1991, 1993; Brewer and Pickett, 1999; Brewer and Roccas, 2001) suggests people resolve the "fundamental tension between human needs for validation and similarity to others and a countervailing need for uniqueness and individuation" (Brewer, 1991, p. 477) by defining themselves in terms of distinctive category memberships. When people feel overly similar, their renewed need for individuation drives them to emphasize distinctive group memberships (ex: *band member* rather than *Plainsville High student*); when people feel excessively different, they emphasize broad, generic social category memberships (e.g., *Plainsville High student* rather than *chess club member*) (Brewer and Pickett, 1999). Membership in small groups allows people to feel similar and different at the same time: similar because they are part of a group and different because the group is separate from the masses.

We like Brewer's theoretical arguments about the competing drives for assimilation and distinction, but the main mechanism that has been studied by research on optimal distinctiveness is one that is <u>*internal*</u>. When made to feel overly similar, people mentally emphasize groups they belong to that are smaller, when overly distinctive, people mentally emphasize groups that are larger. The uniqueness literature stresses similar internal tactics by saying people can achieve uniqueness by mentally emphasizing ways in which they are different from others (e.g. Ganster, McCuddy, and Fromkin, 1977) or distorting similarity information (Byrne and Griffitt, 1969; Fromkin, Brandt, Dipboye, & Pyle, 1974; Smith, 1975; Snyder & Batson, 1974). Internal processes, however, seem too flexible to account for the costly behaviors we observe when people diverge from others in the social environment. Why get a body piercing when you can mentally emphasize your membership in club culture? Why blow big bucks on a Prada handbag when you can mentally tally the value of your stock portfolio?

Another limitation of previous research on divergence is that it has focused on states that seem highly <u>*transient*</u>. The uniqueness literature argues divergence will occur when "a person *feels* a very high degree of similarity relative to another," (Snyder & Fromkin, p. 34). Optimal distinctiveness suggests that individuals will choose to emphasize more divergent identities when they *feel* depersonalized.

Transient states cannot explain why tastes die or only come back in style after long periods. Sure, people might abandon tastes if they are in a state in which they feel overly similar or depersonalized, but why would these individuals not re-adopt those

tastes once the transient state passed? A leisure suit fan might stop wearing a leisure suit after visiting a club filled with leisure-suited men, but put it on again after a particularly isolated day at work. An English professor might stop talking about Derrida at a party where everyone else is doing so, but take it up again at the next one. We commonly think of fads as transient, but their transientness takes place on a time scales -- weeks, months, or years-- that are mismatched to the momentary processes that have been studied in the lab.

Questions Raised by Moderate Similarity/ Optimal Distinctiveness

While postulating a preference for moderate similarity or optimal distinctiveness helps us understand why we don't see total convergence or divergence in cultural practices, such approaches raise some important questions that have not been resolved.

Question 1: Why isn't divergence idiosyncratic?

Perhaps the most important limitation of previous theories is that they have primarily focused on *individual* level analysis. The uniqueness literature argues divergence will occur when "*a person* feels a very high degree of similarity relative to another," (Snyder & Fromkin, 1980, p. 34). Optimal distinctiveness also focuses on the individual, suggesting "*individuals* will…define themselves in terms of social identities that are optimally distinctive," (Brewer & Pickett, 2004, p. 258). Because these theories have focused on individual divergence, they have difficulty explaining why group A diverges from group B, or why everyone in a group diverges in a similar direction, often at the same time.

We note here that there is another, quite different, class of theories that would predict idiosyncratic divergence. Many of the taste domains we will discuss in this paper may be affected by internal drives for novelty and variety (Acker and McReynolds, 1967; Cattell, 1975; Farley and Farley, 1967). Novelty or variety-seeking would suggest people diverge when they get bored with tastes, but this individual focus means these perspectives have the same difficulty addressing the points raised above.

Question 2: Where do people diverge?

The notion of moderate similarity also doesn't specify *where* people should diverge. Momentary thought suggests there are certain domains where people are much less willing to accept similarity. People get more upset when they wear the same dress to a party than when they bring the same toothbrush to a camping trip. Why?

In answering this question, we would benefit from understanding situational factors that prompt convergence and divergence, but unfortunately the uniqueness literature has little to say about how choice domain induces more or less divergence. Though Snyder and Fromkin (1980) theorized that certain objects may be valued as uniqueness attributes (e.g. scarce products), consistent with the focus on the individual noted above, their original work (Snyder and Fromkin, 1977) as well as most subsequent research has focused primarily on personality and individual differences in the need for

uniqueness (Tepper, 1994; Lyne and Harris, 1997; Tian, Bearden, and Hunter, 2001). Consequently, we know a good deal about how certain individuals may select more unique products, but very little about how the situation itself, or the domain in which the choice is made, influences the degree of divergence preferred. Moreover, the individual approach would predict individuals will either be highly likely to abandon tastes or highly likely to stick with them, without recognizing that people strive to be unique in some domains more than others (music versus bike lights).[1]

Question 3: Who drives divergence?

The prediction that people strive for moderate similarity overemphasizes the underlying driving force of similarity--it predicts people should be most likely to diverge when they feel extremely similar. Because an individual is likely to be highly similar to their friends, the prediction is that individuals should be less likely to dress like their friends than members of another social group. Punks should be more likely to diverge from other punks than from mainstream culture. On a macro level, people in LA shouldn't worry much that their cultural practices are being adopted by people in Des Moines (who differ on many dimensions and thus are only moderately similar), they should worry most about other LA residents. We suggest these predictions are false.

Summary: Three Questions

Taken together, previous work has provided some insight into why people may diverge, but cannot explain many cases of divergence and leaves some important questions unanswered. We argue that previous approaches are overly self-focused. People care about maintaining a unique self-concept, but also about how their identities are received by others. We agree with the previous literature's suggestion that divergence is driven by the desire to express an identity that is somewhat unique, but rather than being driven by individual feelings of extreme similarity, we propose a theory of signaling identity in which divergence is driven by the desire to maintain clear signals of identity.

Why Isn't Divergence Idiosyncratic? Signaling Identity

> "Our consumption habits are now a form of social currency. The man who uses Callaway golf clubs, drives a Jaguar, and wears Ralph Lauren apparel…is a man separate and apart from the man who uses a Penn fishing reel, drives a Dodge Durango, and wears Levi's." (Vincent, 2002, p. 11)

[1] The problem with focusing on individual differences here is the same as that facing typical personality research: concerns about lack of cross-situational consistency (Ross & Nisbett, 1991). This approach would predict that the same individuals pilot new hairstyles, political views, and home decorations.

> "Although social signaling via the display of one's attitudes and preferences is presumably a ubiquitous social communication process, only limited research in psychology has investigated its characteristics" (Shavitt and Nelson, 1999, p. 38).

In an attempt to address the questions raised in the previous section we propose a signaling identity approach to taste divergence. Importantly, our approach assumes that individuals must coordinate their identity signals with others. Individuals cannot diverge on their own, they must be sensitive to how meaning is constructed and destroyed as collections of people interact at a social level.

Our identity-signaling approach assumes that people diverge as part of their effort to maintain signal fidelity. Tastes gain signaling value through their association with groups or types of individuals, but these signals are only valuable to the degree that they actually provide information. If different types of people send an identical signal, it will have no value in distinguishing between types. Therefore, to maintain the signaling value of their tastes, different types will diverge in the tastes they select and they will abandon tastes when their meaning becomes diluted. Our model assumes that both conformity and uniqueness processes are important, but the focus of the model is collective rather than purely individual. Individuals converge with similar others to imbue signals with meaning, and they diverge from others when their signals are adopted by the wrong types of people. Signals are constructed at a collective, social level, and are diluted through a collective, social process.

Introducing a Model of Identity Signaling

We propose a simple model that can account for much of the observed divergence. The purpose of the model is to clarify thinking about the observed behavior, rigorously articulate our assumptions, and lay bare how our proposed mechanism works. Though the mathematics describing the model has been fully derived, we limit the mathematical details to the appendix. The major concepts of the model can be readily understood without them.

To illustrate the ideas of the model, we will construct it in three stages. In Model 1, we show how signals can be used by types to improve social interactions. Model 2 considers how signaling differs across domains and identifies where signaling is likely to occur. Finally, Model 3 adds a group of identity poachers to the model in a dynamic setting and shows how signal dilution can lead individuals to diverge from tastes and behaviors they previously held.

Tastes as Signals of identity

External signals are often used as information when internal attributes are not readily observable. When first meeting a group of people, for instance, we may want to know "who would I enjoy talking to," or "which of these people might I want to get to know better?" Such answers are rarely immediately obvious and we often use signals to determine which people we want to interact with further. Such signals may include the

person's tastes, the clothes they wear, the attitudes they profess, or the phrases they use. As Belk, Bahn, and Mayer (1982) note, "one of the strongest and most culturally universal phenomena … is the tendency to make inferences about others based on their choice of consumption objects" (p.4). Signals can be extremely easy to detect, like whether someone has a pierced nose, or more difficult, like whether they pronounce a slang term with the correct intonation.

Previous literature has noted that tastes can have symbolic value (Abelson & Prentice, 1986; Herek, 1986; Levy, 1959; Park, Jaworski, & MacInnis, 1986; Prentice, 1987; Shavitt, 1990; Solomon, 1983; Zaltman & Wallendorf, 1979), but has given less attention to how tastes actually gain this symbolic meaning. Research suggests people express their identity through their attitudes and possessions (Belk, 1988; Levy, 1959; Wicklund & Gollwitzer, 1982; see Sirgy, 1982 for an early review; Holman, 1981; Abelson & Prentice, 1986; Escalas & Bettman, 2003; Kleine, Kleine, & Kerman, 1993; Ball & Tasaki, 1992; Rubinstein, 1995) and other work suggests that tastes act as part of the social communication system, communicating aspects of the self to others (e.g., Douglas & Isherwood, 1978; Holman, 1981; McCracken, 1986; Richins, 1994a; Richins, 1994b; Solomon, 1983; Schlenker, 1980). But for individuals to be able to communicate or signal identity through tastes, others must be able to decipher or understand those signals.

We now turn to a discussion of how signals gain their meaning.

Meaning Construction: Signals are socially constructed

Signals are valuable to the degree that they provide information, but meaning cannot be generated as an individual exercise, individuals cannot construct signals on their own.

> Coordination Hypothesis*: tastes gain meaning as signals in a social process as they are expressed by similar types of individuals*

We use the term "types" rather than groups, because tastes often span traditional demographic groups yet still carry meaning. People who wear their baseball caps backwards or who talk about Foucault may come from different races, ages, and cultures, but as long as they are similar in some way (e.g. they all listen to the same music, or have the same disdain for reifying power relationships) then the taste has meaning. Thus type refers to some degree of similarity between individuals expressing the taste.

Signals cannot be constructed solely by individuals because an idiosyncratic expressive display could not be understood by others. Consider the inference problem faced by others when an individual sets out to convey a distinctive identity by choosing an entirely unique combination of markers (e.g. wearing a pith helmet and a football jersey), no one will know what that combination stands for and it will have no expressive value. Thus, a person's decision to adopt or abandon a taste is not just a personal choice made to convey a self-image, it must effectively signal identity to the broader social world.

More effective signals can be constructed when individuals join with similar others, conjointly displaying the same signal. If a group of lacrosse fans or mushroom

hunters all adopt the pith helmet and football jersey combination, people may start to recognize it as a signal of identity as opposed to simply being bizarre.

Model 1: Signaling Identity

Imagine a community where actors differ in their preferences, i.e. their interests and tastes. For the purposes of simplicity, let there be two types of actors (Type A and Type B). All actors of the same Type Are identical in their preferences. Actors play a game with two stages. In the first stage, each actor chooses a signal. Although we will use the language of choice, we are not arguing that types have agency; instead we are assuming that certain "picks" are more likely to be stable in an evolutionary process of variation and selection. Every actor can signal by investing in some choice of activity within a fixed domain. For example, in the domain of clothing, an actor can select the color or style of his jacket. In the domain of musical taste, an actor could develop knowledge of independent bands or opera.

In the second stage of the model, the actor randomly meets another actor that she has never met before. She does not observe the other actor's type directly, but observes the taste the other has signaled. Signals are such that they can observed relatively quickly (e.g., during a brief conversation) before significant interaction has occurred.

The receiver observes the sender's choice of signal and then decides how she wants to treat the sender in their interaction. Suppose the receiver would prefer to choose action α if the sender is of Type A and action β if the sender is of Type B. If A and B are two sub-cultures who want nothing to do with each other, then for an actor of Type A, α would be "pursue interaction" while β would be "avoid interaction," and the reverse actions would be chosen by an actor of Type B. Alternatively, suppose A is an outcast Type And B is an elite. If the outcast type is happy to interact with both As and B's, but the mainstream only wants to interact with other B's, then for Type A's both α and β would be "pursue interaction" while for Type B's, α would be "avoid interaction" and β would be "pursue interaction."

We define the function $b_x(y, z)$ to be the benefit an individual of type x receives when an individual of type y chooses action z. As a base case, let us assume that individuals want to be treated as they see themselves.

$b_A(A, \alpha) > b_A(A, \beta)$ and $b_A(B, \alpha) > b_A(B, \beta)$

In words, As prefer to be treated as As rather than as B's no matter whether they are interacting with As or B's, and similarly for B's:

$b_B(A, \beta) > b_B(A, \alpha)$ and $b_B(B, \beta) > b_B(B, \alpha)$

Understanding the Model

In this simple model, there are no conflicting interests; everyone wants to treat senders exactly how the senders wish to be treated. Therefore, the two types have an incentive to coordinate on different signals so that members of each type can uniquely signal their identity. Type A actors should coordinate on one signal, *i*, and all Type B actors should coordinate on some other signal *j*. Signals are important to this model because they facilitate interaction. If people could not signal, there would be no way to identify desired interaction partners or determine roles in interaction. People would have to suffer through more unsatisfactory interactions.

More importantly, the signaling is a social act in two ways (1) it is coordinated among members of the same type who choose the same signal, but also (2) members across types must choose different signals. This coordination improves interactions both with people of the same Type And with people of other Types.

Experimental results support the coordination hypothesis (Berger & Heath, 2005). Stanford undergraduates were given information about one or four users of a given brand (e.g. age, hobbies, etc.) and asked to infer brand personality (e.g. to what degree various personality traits, rugged, sincere, etc. describe the brand, see Aaker, 1997). Half were given information about one brand user (a 25 year-old recent graduate who likes surfing, etc.) and the other half was also given information about three additional users (all around the same age, with similar hobbies, e.g. they all like some extreme sport). We suggest individual expression cannot be received with a high degree of fidelity. Indeed, though there was a high degree of meaning congruence across participants in the similar type condition ($\alpha = .94$), there was significantly lower congruence across participants in the one-person condition ($\alpha = .64$). These results support our proposition that tastes gain meaning through expression by similar types of individuals, not by idiosyncratic individuals acting on their own.

Seeing expression as socially coordinated differs heavily from the traditional perspective on self-expression which has put the emphasis on the self who is doing the expressing. Traditionally the literature has argued that individuals use possessions, attitudes, and beliefs to pursue unique self-image (Fromkin, 1978; Gross & Osterman, 1971; Liebenstein, 1950), "maintain self-concept" (e.g. Ball and Tasaki, 1992, p. 155; Sirgy, 1982) and "express self-identities" (e.g. Prentice, 1987, p. 993) and personal values (e.g. Herek, 1986; Katz, 1960). Escalas and Bettman (2003), for instance, argue individuals "engage in consumption behavior to construct their self-concept and create their personal identity" (p. 339) and Miller, McIntyre, and Mantrala (1993) suggest that the "the fashion process is a dynamic example of the use of products to express *self*-image," (p. 142, emphasis added). Similarly, the functional approach to attitudes (Katz, 1960, 1968; Smith, 1947, Smith, Bruner, and White, 1956; Herek, 1986) focuses on psychological benefits *individuals* derive from expressing "attitudes appropriate to his personal values and to his concept of himself," (Katz, 1960, p. 170).

While some researchers do acknowledge the social and symbolic function of attitudes (e.g. Abelson & Prentice, 1986; Shavitt, 1990), as Shavitt and Nelson (1999) note, "this social identity function of attitudes…has primarily been investigated from the perspective of the attitude holder," (p.38). Speaking more broadly about social

psychology as a whole, Brewer (1991) notes that " in recent years, social psychologists has become increasingly 'self'-centered," (p. 475) and that "until recently, social psychological theories of the self focused on the individuated self-concept- a person's sense of unique identity differentiated from others," (Brewer and Pickett, 1999, p. 71). In this literature, individuals maintain self-esteem by expressing the individual identity they themselves wish to create.

In our view, previous literature has erred in emphasizing the self part of *self*-expression. By focusing on individuals, the literature has neglected the fact that individuals can't *express* meanings that are not socially understood. Adolescent boys can purchase muscle cars to bolster their masculine self-concept, but they cannot define the meaning of that symbol (in fact, that symbol may lose meaning over time when muscle cars are purchased by kids who can barely shave). Individuals also cannot control shifts in the meaning of the signals they send. People can buy SUVs because they want to be seen as outdoorsy, but if society comes to see SUVs as silly gas-guzzlers, the wanna-be outdoorsmen are out of luck. Finally, by concentrating on how individuals construct identities, the previous literature has neglected the broader question of how tastes get their meaning in the first place. To be fair, previous research has not entirely ignored the fact that tastes have symbolic meaning, it has just not systematically discussed how meaning is acquired.

We emphasize the social nature of identities and attempt to understand how tastes acquire their social meaning as signals of social identity. Individuals can select from existing meanings, but the nature of these meanings are determined by social interaction rather than individual action.

Our approach finds theoretical support from a diverse set of literatures. Work on social identity (Tajfel & Turner, 1986) also takes identity as derived from outside the individual, suggesting that aspects of an individual's self image are derived from the groups to which he/she belongs. However, this literature focuses primarily on how individuals use social identities to manage self-esteem, and on how individuals react when they adopt a particular identity (e.g., by venerating the ingroup and favoring it in resource allocations). The theoretical approach of symbolic interactionism (Blumer, 1969; Mead, 1934; Solomon, 1983) also notes the social nature of the self and recognizes symbols acquire shared meaning through socialization, but does not make it clear how this occurs. We share the notion with these theories that identities are not individually assembled, but our model tries to make explicit how meaning is constructed.

The notion that cultural tastes demarcate social groups is familiar to sociologists (Bourdieu, 1979; DiMaggio, 1987; Douglas & Isherwood, 1978; Simmel, 1904; Goffman, 1951), but they often take these markers as given. Simmel (1904 [1957]), for instance, argued that fashion "differentiates…one social stratum form another" (p. 541). Goffman (1951) discussed how status symbols designate class and "visibly divide the world into categories of persons" (p. 294). As Douglas and Isherwood (1978) note though, tastes themselves "are neutral" (p. 12) and we argue that it is only through expression by multiple individuals of the same type that tastes are imbued with meaning.

Summary: Why Isn't Divergence Idiosyncratic?

To summarize, our model suggests that tastes facilitate interaction and acquire shared meaning through association with individuals of a certain type.

Seeing tastes as signals of (type) identity immediately addresses one of the issues with moderately similarity, namely why divergence isn't idiosyncratic. Idiosyncratic divergence will not be understood, and thus individuals will always choose to diverge along with other members of their type. Rather than idiosyncratically selecting and abandoning tastes, people converge with similar others, and so communicate an understandable social identity.

We now move to examine how our signaling approach can resolve another question neglected by previous approaches, where does divergence occur?

Where Do People Diverge? The Question of Domains

Simple observation shows that there is more divergence in the clothes people wear and the cars they drive than in the notebooks they write in or bike lights they use. Similarly, people care a lot more when their music tastes are co-opted by the mainstream than when everyone else seems to use a similar type of umbrella. What predicts the domains where people are more likely to diverge?

The Signaling Approach to Taste Domains

Little research has examined why divergence might be greater in some domains than others, but there are a few literatures that are relevant to this question.

In the literature on conformity, Kaplan and Miller (1987) found the source of conformity pressure depended on the type of issue (intellective vs. judgmental) being discussed. Intellective issues elicited more informational influence and judgmental issues elicited more normative influence. Unfortunately, however, they never considered the possibility of divergence, only forces that might lead people to conform.

Divergence may increase in domains that are public rather than private. Ratner and Kahn (2002) suggest self-presentational concerns lead people to choose more variety in public settings than private ones. Bearden and Etzel (1982) examined how reference groups influenced the choices that people made for products that were public or private and luxuries or necessities (e.g., golf clubs are a public luxury, mattress a private necessity). But the two factors they studied didn't capture much of the variance in reference group influence, even between two public necessity goods (watch and suit). Also, they did not suggest whether reference group influence would lead to convergence or divergence.

Divergence may also increase in domains that are personally important. Campbell (1986), found that people were more likely to make judgments that protected their self-concept (e.g. underestimating the number of other who share our abilities) in personally important areas. Similarly, Kernis' (1984) found need for uniqueness

influenced false-consensus bias on various trait estimates, but only for people who listed a particular trait as highly important to their self-schemas. This work suggests people want to be more unique in areas they find personally important; a coin collector should care a lot about having unique coins.

These approaches, however, cannot explain many cases of divergence. Public domains may increase the drive for divergence, but people often seek divergence on practices (e.g., music tastes or home furnishings) that are not particularly public. Similarly, personal importance cannot explain every case of divergence because across individuals, certain domains (e.g. music tastes or clothing) seem to elicit more divergence.

We suggest people should feel the most pressure to distinguish themselves in domains that define their identities and note that the identity issue plays out on two levels--personal and social. At an idiosyncratic personal level, if people want to protect their self-concepts, then people who are self-schematic about a particular dimension should try harder to diverge from others on practices relevant to that dimension. A coin-collector and bottle-cap collector both probably seek to be unique in their own particular hobby domains. But at a broader social level, individuals cannot idiosyncratically select domains to express their identity if they want others to receive their signal. Signaling domains must be coordinated socially, and domains people use to *express* identity should overlap strongly with the domains that others use to *infer* identity

> Domain Agreement Hypothesis: *The expression of identity is only valuable if it can be received, consequently there should be high degree of agreement about identity domains across individuals.*

> Domain Overlap Hypothesis: *Because of the coordination required for signals to be understood, people should choose to self-express in domains others use to infer identity.*

Berger & Heath (2005) found experimental support for both hypotheses in a broad Internet sample from across the United States (mean age = 38, 82% Caucasian). Separate sets of raters were given a variety of taste domains (e.g. hairstyle, toothpaste, jacket, etc.) and asked to rate each on either self-expression (i.e. how much choice in that domain contributes to self expression) or identity inference (i.e. how much choice in that domain is used to make inferences about others). Supporting the Agreement hypothesis, there was extremely high agreement across raters about which domains were used in self-expression / inference-making (both Cronbach α's > .97) and supporting the Overlap hypothesis a high correlation was found between self-expression and inference making ($r = .97$). In general, respondents suggested people were more likely to infer identity in domains like hairstyle or musical tastes as opposed to backpack or stereo brand. These results support the proposition that self-expression is not an idiosyncratic activity; there is coordination on what domains people use to infer things about others and people express themselves in these domains.

Furthermore, if certain domains are used to infer identity the coin and bottle-cap collectors must be wary of the signals they send in these domains and will diverge beyond the hobby domains they find personally important. Divergence is driven by the need to maintain clear signals of identity, and thus divergence should be greater in identity domains.

> Divergence Hypothesis: *Divergence will be greater in domains used to infer identity.*

Applying this hypothesis to the divergent findings of convergence and divergence proves immediately useful. While many conformity studies used choices likely to have a right answer and hence choice was not particularly self-expressive (e.g. length of a line, Asch, 1951, movement of a point of light, Sherif, 1936, weight of items, Allport, 1924, or brands of bread, Stafford, 1966), many of the studies where divergence was found concern categories such as attitudes (Weir, 1971) or what to order for lunch (Ariely and Levav, 2000) that relate much more to identity.

In our research, we again asked a broad Internet sample from across the United States to choose options in various preference domains (e.g. dish soap, stereos, hairstyles, favorite CD). In each domain, they were told 65% of people preferred Option A, 25% preferred Option B, and 10% preferred Option C, and they indicated which option they would choose. Supporting the Divergence hypothesis, the preference for divergence increased with the degree to which the domain was used to make inferences about others (Figure 1); respondents were more likely to select the option preferred by 10% of others in domains like hairstyle and favorite music artist as opposed to dish soap or toothpaste. People also avoided tastes held by too many others in identity domains; while only 24% of people chose Option A (65%) in domains used to infer identity (median split), almost half (46%) did so in less identity based domains.

In another study we investigated divergence in actual choices. Participants were seated in front of computers and given a packet of preference domains (e.g. movies, favorite city, clothing brand) each including a set of 10 options. They were instructed to select their favorite three options in each domain and asked to enter their preferences in an excel spreadsheet to help with data entry. The spreadsheet already included "selections from previous participants" but they were instructed to ignore those responses and just enter their data on the first free subject line. The previous selections were actually manipulated so that some options in each domain had been selected more frequently; this allowed us to test whether participants would be more likely to diverge from the choices of others in identity domains. Supporting the domain hypothesis, people were more likely to diverge from the popular option in identity-relevant domains; a median split on identity found that while participants selected the popular option 36% of the time in domains not used to infer identity, they did so only 24% of the time in identity domains.

These results suggest that divergence is more likely in domains used to infer identity. But this raises another important question. *Why* are some domains used to infer

identity? Why are hairstyles or music (as opposed to back packs or bike lights) better signals of identity?

Previous research suggests visibility or publicness may influence the degree to which tastes are used to make inferences about the individual. Shavitt and Nelson (1999) argue that expressive/identity behaviors are likely to be public and Belk (1991) found that in general, products that were rated as more informative about users personalities had greater visibility. Ratner and Kahn (2002) suggest people chose more variety in public because they expected others would make inferences about them based on their public choices. But as Bearden and Etzel (1982) found, the public/private distinction does not capture enough of the variance. Indeed, in our own work, publicness of the domains used in 65%/25%/10% study was somewhat predictive of divergence, but only marginally so.

There are clearly some limitations to the use of visibility. A person's clothing is about as observable as their notebook, yet only one of those domains is used to infer identity. Furthermore, we often use less observable domains to infer identity--music tastes, for example, can hardly be described as easily observable. Thus, while visibility is important, it is not the whole story.

Functionality

We suggest that some domains operate more effectively as signals of identity because they are easier to interpret as signals. Most cultural practices have some functional value as well as some self-expressive or symbolic value (Abelson & Prentice, 1986; Richins, 1994; Levy, 1959; Zaltman and Wallendorf, 1979). Practices that have a functional component as well as an identity component will be harder to interpret as signals. If an adult is eating a peanut butter and jelly sandwich, is that a signal of their conservative, perhaps nostalgic tastes, or a sign the cupboard was bare when they packed their lunch at 7:30 a.m.? Did someone buy the new power-sander because its design appealed to their aesthetic sense or because they had something to sand? In other cases, when options are functionally equivalent (e.g. a black jacket vs. a brown jacket), it is less likely that an individual's choice will be attributed to function.

Based on standard theories of psychological discounting (Kelly, 1973; Morris & Larrick, 1995), we predict that people will have greater difficulty identifying a practice as a signal when it has a higher functional component. Thus, we predict that certain taste domains may be particularly suited for expressing identity because choice within those domains cannot as easily be attributed to function, hence in those domains, others will see choices as expressing identity.

> Afunctionality Hypothesis: *Domains will operate more effectively as signals of identity when choice in them is less based on function.*

Bike lights are less likely to be fashion items than hairdos because the function of a bike light is more obvious. Power tools are less self-expressive than music tastes because they have a clear functional interpretation. Similarly, in cultural beliefs and practices where

people think there is a right answer, functionality is high, so those beliefs are less likely to be used to infer identity. Admiring Newton as a scientist will be less identity-revealing than admiring Rousseau as a philosopher. Worshiping a particular god will be less identity-revealing in a monotheistic culture (where there seems to be a right answer) than in a polytheistic culture.

Model 2: Introduction of Costs and Influence of Domain on Signal Interpretation

In the previous model we did not differentiate among domains. We now expand the model to allow different domains to provide different benefits. This allows us to pose the question: if we allowed types to choose which domain to signal in—hairstyle, music taste, clothing—which domain would they pick?

Formally, assume that an activity, i, provides benefits, b_i and costs, $c_{i,x}$, to the actor, x. The benefits and costs can depend both on the history of past investment of the individual actor, as well as the history of past investment by those he associated with. In the domain of fashion, the activity of wearing a biker jacket provides the benefit of warmth and protection but imposes the cost of the purchase of the jacket. In the domain of musical tastes, knowing specialized knowledge about hip-hop imposes the cost of time spent learning minutiae. If the domain is a certain kind of lingo, the cost is time spent listening to others speak the lingo. For simplicity, assume each actor can only invest in one signal each period.

Understanding the Model

The main insight provided by Model 2 is that signaling is more likely to occur in afunctional domains. In functional domains, most people will select the option that provides the most benefit and consequently their choices do not provide good signals of their identity. So choices on intellective tasks or choices of products such as stereos or notebooks will probably not provide good signals. Some practices can also be broken down into aspects that might signal identity and those that don't. On a cold day, the *act* of wearing a coat doesn't provide a signal because the benefits of wearing a coat are clear. However, the *color* of coat one decides to wear provides a signal because the benefits of various colors are similar. Thus, we expect signaling is more likely in afunctional domains.

Consistent with the afunctionality hypothesis, Prentice (1987) distinguished certain types of objects (e.g. photos) that are more symbolic or self-expressive from those that are more instrumental (e.g. stereo). Shavitt and Nelson (1999) found that people make fewer personality or individuating attributions for utilitarian (e.g. aspirin or air conditioners) products.

Other work has directly examined the relationship between functionality of domains and how much they are used in identity inferences. In the study of domains we mentioned previously, Berger & Heath (2005) had respondents rate each domain on functionality. Consistent with the afunctionality hypothesis, there was a high negative correlation ($r = -.90$) between how much choices in the domain were functional and how much people used the domain to infer identity.

Our signaling logic implies that a particular cultural practice will act more effectively as a signal when people could easily choose other cultural practices that have the same functional value. A Burberry raincoat is a fashion statement even on a rainy day because other raincoats could have served the same function at less expense, but it is more of a fashion statement on a dry, clear day. Sunglasses are more of a fashion statement indoors than out. An agricultural CO-OP cap is less of a statement when given free to a farmer and worn outdoors to shade his eyes than when paid for by a Hollywood actor who wears it indoors. A cap is more of a fashion statement when the bill is turned backwards so it no longer serves its functional purpose.

Another implication of our signaling logic is that individual tastes (e.g. fashion trends) can identify themselves as identity expressing by strategically violating functionality. Beehive hairdos and mohawks are time-consuming to maintain, tattoos and body-piercing are painful, high-heeled shoes are difficult to walk on, Rolexes are unduly expensive, goldfish-swallowing and phone-booth stuffing are obviously pointless, baggy Zoot suits waste cloth.[2] The afunctionality hypothesis helps us understand why Zoot suits are baggy, beehive hairdos high, and low-riders low.

Summary: Where Do People Diverge?

Our identity-signaling approach answers the question of where divergence takes place and why. Divergence occurs in music tastes as opposed to toothbrushes because music tastes are seen as signals of identity, and people diverge to maintain the clarity of their signal. The social coordination highlighted by our signal model ensures that individuals must express themselves in the same domains others use to infer identity. Furthermore it predicts, afunctional domains are better suited for identity inferences because those domains make it easier to determine meaning. People are more likely to diverge in hairstyles than bike lights because others are likely to attribute our choice of bike lights to function rather than identity.

The results we summarized here are difficult for prior approaches to explain. The uniqueness literature argues people should diverge when they feel the most similar, but since people are more likely to share the same pen or bike light than they are to have the same shirt, the uniqueness literature would predict a pattern of divergence across domains that is opposite to the one we found. Similarly, theories of novelty-seeking suggest that people should diverge when they are bored, but without a specific theory of why boredom should vary by domain, it cannot explain domain differences in divergence.

Our approach also improves on previous domain approaches suggesting when we should see convergence vs. divergence. Though Kaplan and Miller (1987) suggest there should be more informational (normative) influence on intellective (judgmental) choices and Bearden and Etzel (1982) examined how reference group influence differs across public vs. private and luxury vs. necessity products, our approach goes further to suggest which direction (convergence/divergence) others should influence behavior in different

[2] Indeed the War Production Boards in WWII banned them because they wasted material, http://www.badfads.com/pages/fashion/ zootsuit.html

domains. In functional choices or those more likely to have a right answer, informational influence should elicit convergence. In a dot estimation task, for instance, others' estimates will provide information that leads to convergence, but only if we think the quality of their vision is similar to ours. Others' type will play an even larger role in more judgmental or identity oriented choices. People should converge with others of the same type, but diverge from different types; our friends using a catchphrase should prompt us to use it more, but others using it may lead us to diverge.

So far our signaling model has been helpful in addressing some questions that have been unresolved by prior approaches, but the current model still faces a serious challenge. If types just want to be identified by others then why do many signals end up being costly or subtle? Why would people cut their hair in mohawks, get tattoos, or spend countless hours listening to music if they could just wear t-shirts with smiley faces or motorcycle jackets? The probability of correct signal identification presumably increases with observability, so why would people select anything but the cheapest and most observable signals?

For simplicity, our first model assumed everyone wanted to be identified as their own type. But this is too simple: the middle class might want to be treated as wealthy, the unsophisticated as sophisticated and the tragically unhip as hip. We now expand the model by adding posers who want to be treated as members of a type they don't belong to and we investigate how the presence of posers influences the signals people use and the way people diverge. We investigate, in particular, a particularly stringent form of divergence--when people will *abandon* practices and tastes they once held.

Who Drives Divergence? Signal Poaching and Abandonment

> "It seemed only yesterday that Von Dutch trucker hats were worn by half the aggressively stylish people in the world. Now they are scorned in the hipster circles that only recently flaunted them." (Lindgren, 2004)

So far we have discussed how signaling identity causes people to diverge in the tastes they select, but there is also another type of divergence, namely taste *abandonment*. Types select different tastes to maintain clear signals (e.g. teenagers listen to different music than their parents), but in some cases, people also abandon tastes they previously held. Catchphrases die, people stop wearing certain styles of clothes, and fans abandon the very musical artists they once followed zealously. Why?

We suggest individuals may abandon tastes when they are adopted by other social types and thus their signaling value is lost. Just as tastes gain meaning when they are associated with particular types of individuals, they can lose meaning when they are adopted by other types.

> Abandonment Hypothesis: *individuals of one type will abandon previously held tastes when adoption by other types reduces their signaling value.*

If Type A people ride Harley motorcycles, and Type B people (say brat pack Hollywood actors or suburban accountants) start riding them, then an observer who sees someone riding a Harley will find it more difficult to determine the person's type, and consequently Type A's may abandon the taste because its signal value has been lost.

In many cases, abandonment is driven by posers.[3] In our basic model, types wanted to be identified as their own Type And they coordinated on different signals, but in many cases there are people of one type who would prefer to be considered another type. These posers may express another type's signal in the hope of taking on some of the attributes of a member of that type. Teenagers, for instance, may purchase fake Prada handbags in an attempt to seem rich and rich people may adopt teenage slang in an attempt to seem young and hip.

Model 3: Identity Poaching and Abandonment

To explore the phenomena of identity poaching and fashion abandonment, let us consider a sub-type, Type BA. The posers are formally members of Type B, but prefer to be treated as members of Type A. Formally, they want their interaction partner to choose action α. However, other actors consider the posers to be members of B, and thus prefer to choose action β.

$b_{BA}(A, \beta) > b_{BA}(A, \alpha)$ and $b_{BA}(B, \beta) > b_{BA}(B, \alpha)$

Furthermore, to allow the possibility of dynamic change over time, consider a repeated version of the preceding game. Each period could be a day, a week, etc., but in each period all actors choose to signal and then have the chance to interact.

Understanding the Model

Over time, poaching will undermine the signal, leading to abandonment. Consider a domain (e.g. music tastes) where Type A has coordinated on signal *i* (e.g. hip-hop knowledge), and Type B has coordinated on signal *j* (e.g. pop knowledge) and that signal costs are stable over time. For the moment, take it as given that it is cheaper for Type A to signal hip-hop knowledge that it is for Type BA. Members of Type A (Type B) choose hip-hop (pop) and will treat others who display knowledge of hip-hop as one of their own. Members of Type BA would prefer to learn hip-hop but most will find it too costly and will continue with pop, however, some who do not find it too costly will switch to hip-hop.

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[3] In other cases, types may just happen to move into others' space without an explicit desire to poach. Skateboarders may wear knit caps, but if it gets cold outside, everyone may start wearing them, not because they wasn't to seem like skaters, but because it is cold out.

If an actor sees someone with knowledge of pop, he can be sure the other actor is of Type B. If an actor sees someone with knowledge of hip-hop, the other actor is likely Type A, but there is some small chance that the other actor is a poser, a Type BA. So long as this chance is small, members of the fringe will continue to interact with hip-hop signalers, risking the chance of meeting a poser for the greater reward of meeting one of their own.

Suppose, however, MTV starts playing more hip-hop, making it cheaper for posers to learn about it. Over time, more and more Type BA people will choose hip-hop, and the effectiveness of hip-hop as a signal will decline. Actors seeing someone signal hip-hop will become uncertain whether the other is a true Type A or a poser. If the number of posers who know hip-hop grows to sufficiently high numbers, the signaling will break down and lose all value. The taste will be abandoned.

In addition to explaining why tastes are abandoned, the key insight of this model is that the taste that allow the most effective signaling of identity are those that impose a low cost for in-type members and a high cost for out-type members. Signals that maximize this difference in costs are most effective for signaling identity. In the example above, the high cost of knowing about hip-hop to posers and the low cost to authentic type members, kept posers out. However, if the differences in costs were to disappear (due to MTV or some other factor), the incoming posers dilute the value of the signal, and the signaling breaks down.

What Prior Literature Says About Abandonment

Sociologists agree that individuals make cultural choices to set themselves apart from members of other social categories (Bourdieu, [1979] 1984; Bryson, 1996; Simmel, 1904 [1957]; DiMaggio, 1982; Gans, 1974; Levine, 1988; Veblen, 1899[1912]; Robinson, 1961; Dooley, 1930), but they have primarily focused on high status groups diverging from low status adopters (see Pesendorfer, 1995 and Bernheim, 1994 for economic treatments of the topic). Bourdieu ([1979] 1984) used the term aesthetic distancing to describe the process where people reject tastes that are held by members of other groups. He finds that when asked what series of objects would make a great photo, people with higher levels of education "refuse the ordinary objects of popular admiration" (p. 35) such as a first communion or sunset, rejecting them as trivial or naively human. Bryson (1996) finds that people with higher levels of education tend to actively dislike the music of people with lower average levels of education (gospel, rap, country and heavy metal) more than other types of music. In examining naming differences between blacks and whites in Mississippi in the early 1900's, London and Morgan (1994) found that whites selected names that distanced themselves from the names used by blacks.

Emphasizing that groups compete over identities in the broader social environment, provides a healthy corrective to views that presume individuals construct their own identities in isolation, but unfortunately the sociological literature has focused too narrowly on situations where people compete over identities related to status as defined by particular macro-demographic characteristics. This literature is based primarily on the trickle down theory of fashion (Rae, 1834; Foley, 1893; Veblen, 1899

[1912]; Simmel, 1904 [1957]; Barber, 1957; Robinson, 1961), which suggests people adopt from those above them in the status food chain. Fashions are initiated by the higher class and imitated by the lower classes, but once the lower classes have adopted, the signal value is lost, and consequently high class people abandon the taste. In the context of social groups in the United States, this literature has essentially endeavored to explain why Northeastern WASPs seek to distance themselves from every other group in the country (e.g., blue collar workers, Southerners, Catholics, ethnic minorities).

As Mark (2003) notes, the original emphasis of the distinction literature is overly asymmetric, focusing too much on high status people distancing themselves from low status others. Many examples of abandoning tastes are not easy to classify in terms of a unidimensional status ordering; teenagers reject catchphrases once they creep into their parent's lexicon and just as London and Morgan (1994) found that whites selected names to distance themselves from blacks, blacks often abandon clothing styles or slang that are adopted by whites. Fashion does not solely originate among the upper classes, and in fact often comes from low-status or somewhat marginalized groups. Much of fashion has been started

> "not so much by the upper or even middle classes, as by the déclassé, anti-class youth, and counterculture. Long hair, head bands, beads, tie-dyed apparel...not only mock the materialistic status symbols of the established classes, but have successfully spread into the enemy camp, Fifth avenue and Main Street, where they have caught on and been copied," (Blumberg, 1971, p. 493).

While some theoretical approaches have touched on the notion of bidirectional influence (e.g. mass market or trickle across theories--Sproles, 1981, 1985; King, 1963) and subcultural leadership (e.g. Blumberg, 1974; Field, 1970), they have not systematically discussed how the process works, and in particular they have not recognized that adoption by non-countercultural types will lead the counterculture to abandon tastes.

Our signaling identity perspective takes a more general approach to divergence; rather than divergence driven by status, we suggest divergence is driven by the desire to maintain clear signals of identity.

Experimental Evidence on Abandonment

Some experimental evidence has examined taste abandonment while controlling for macrodemographic status. Berger and Heath (2005) studied college students and examined whether adoption by other college students would lead them to abandon tastes. In the first stage of the experiment, Stanford students in a mass testing session provided their preferences in a number of taste domains. In the car brand domain, for instance, participants were presented with brand names/logos for five car brands (Acura, BMW, Mercedes-Benz, Volvo, Lexus) and asked to circle which car they preferred. Two to three weeks later, participants returned to the lab in small groups for a study in which they had a group discussion about their preferences. After an initial exercise, the experimenter apologized, saying he had run out of copies for the second portion and had to go make them. During the first part of the experiment a research assistant had been working at a side table in the experiment room, visibly entering data form a previous

study. While the experimenter was gone, participants were asked to help this assistant tabulate some preference data. Each participant was given a stack of surveys that had been carefully tailored to suggest that others shared the preferences they had expressed in the mass testing session in some domains (e.g., 8 out of 10 of the data sheets they tallied choose the same car brand that they chose previously). When the experimenter returned with the copies, participants completed a questionnaire that asked for preferences in a variety of preference domains (some the same as the completed at time 1). They then met together as a group as discussed which options they had selected.

Supporting the abandonment hypothesis, participants who were confronted with similar responses by 6-8 fellow students were likely to abandon the tastes they had expressed in the earlier questionnaire. Furthermore, supporting the domain hypothesis, they were more likely to abandon tastes in domains that were afunctional and more identity relevant. A mean split on identity inferences found that participants diverged 28% of the time in domains used to infer identity (e.g. music preference) but only 17% of the time in domains not as likely to be used to infer identity (e.g. bike lights). The results hold controlling for a number of alternative explanations. There was no difference in popularity of participants' original preferences (percentage of participants choosing a given option) between the two sets of domains and we also controlled for number of others selecting one's preference across the sets (e.g. 8/10 others chose the same car and 8/10 others chose the same bike light), so one cannot attribute the results to differences in prior popularity or perceived similarity. A follow up study established that the difference in preference between the first and second choices was no different between identity and non-identity domains, so the greater abandonment for identity domains did not occur because the second domain was more attractive. Finally, because both the participants and supposed adopters were students, one cannot explain the results in terms of status-based divergence.

This study was built on the assumption that when people learn that their preferences are shared with others, they should perceive that that preference is not an effective signal of identity. In another study, we tried to create a situation in which people could actually see that a certain signal no longer had value in distinguishing between types. In this study, we examined the abandonment of an actual cultural product. In the summer of 2004, the Lance Armstrong Foundation started selling yellow Livestrong wristbands to support cancer awareness and research. Originally, the wristbands were worn primarily by athletes, but later caught on and spread contagiously in the general public (see Walker, 2004 for an in depth description).

During the upswing of this trend, we distributed these wristbands to various dorms on a university campus to examine how signal dilution might affect abandonment. Specifically, we sold 40 wristbands to one dorm of 60 people (high prevalence condition), and half that many were distributed to each of two other same size dorms on separate parts of campus (low prevalence conditions). (All proceeds went to the Lance Armstrong foundation.) A week later, researchers returned to the dorms and through an unrelated questionnaire measured whether dorm members were wearing the wristband they had purchased. We predict people in the high prevalence dorm should be less likely to wear the wristband because its meaning has become more diluted--with more wristbands around it was more likely that everyone from computer scientists to hardcore

partiers to athletes were wearing them and thus they had less value in distinguishing between these types. Indeed, abandonment was greater in the high prevalence dorm, where a smaller percentage of members actually wore the wristband to house meeting (58% vs. 88% in control dorms).

These experimental results are difficult for the uniqueness literature to explain. A greater number of others sharing one's car preference or possessing the wristband might have made people feel slightly less unique, but the differences used here (e.g. 30 vs. 15 others having a wristband) were nowhere near the extreme similarity manipulations used in the traditional uniqueness experiments (e.g. 80% similarity to 10,000 students on 30 attitude items).

Abandonment Based on Who is Adopting

We can also use the framework of model three to think about signaling in a richer multiple type setting. Overall, adoption by other types should lead to divergence, but we predict that divergence may be greater when the adopting type is more dissimilar.[4] We could capture this effect even in a model with only two types, if we assume that the two types differ more or less. Presumably, larger type differences imply that people experience higher costs when they are misidentified as members of the wrong type. That is, the differences between correct and incorrect identification

$b_A(A, \alpha) - b_A(A, \beta)$ and $b_A(B, \alpha) - b_A(B, \beta)$

become larger when the types are more dissimilar. Snowboarders might not want to be identified as skiers, but they might prefer that mistake over being misidentified as a golfer.

Alternatively, we could imagine an enriched model that includes many types that vary in similarity to the base Type A (e.g. F is further away than B). If tastes diffuse across similar types, then when a particular taste has been adopted by a very dissimilar type, it is likely that it has been adopted by more people (e.g. if Y has adopted it is likely that B, C…F have also adopted), and thus that the signal has experienced a higher degree of dilution. Consequently, one would expect that divergence would increase with dissimilarity.

To test this notion, Stanford undergraduates were told to imagine their groups of friends engaged in a certain behavior that been adopted by some other group (Berger & Heath, 2005). For each of 15 social groups (e.g. 40 year old white business executives, janitors, college professors, suburban teenagers, etc.) they were then asked to rate how many other people outside that group were likely engaging in the behavior given that

[4] We use similarity in a broader sense than mere demographic similarity. A hip teenager may be demographically dissimilar to a 50-year-old business executive, but if the executive has a shaved head, wears black, and makes independent movies, then the two may be considered similar on the dimension of hipness even though they differ demographically.

group had adopted. Another set of raters rated the groups on similarity. Supporting our prediction, number estimates were highly negatively correlated with similarity ($r = -.74$); people assumed more people had adopted the taste if the adopting group was dissimilar.

It is worth noting that there exists a countervailing effect that should lead to relatively increased divergence when adopting types are extremely similar. The previous two points were based on the consequences of misidentification, but the probability of misidentification should also vary. When types are more similar, they are more likely to overlap in their tastes and they may be more likely to be confused with each other. Also, similar types should be more likely to encounter each other than to encounter more distant types. Thus, the higher frequency of interaction with similar others implies a greater benefit for signaling.

Combining these factors, we predict a curvilinear relationship between similarity of the adopting Type And divergence; people will be more likely to abandon a practice when it is adopted by dissimilar types, but they may also abandon the practice when it is adopted by a type that is extremely similar.

> Similarity Hypothesis: the influence of similarity of the adopting type on divergence will be curvilinear; both extreme dissimilarity and extreme similarity will lead to increased divergence.

We tested this hypothesis (as well as the impact of adopter status) in a study regarding catchphrase usage (Berger & Heath, 2005). Stanford undergraduates were told to imagine their group of friends liked to say a particular catchphrase that no one else was saying. Then they were asked to rate how their use of the phrase would change if it were adopted by various other social groups. Other sets of students rated each group on similarity, liking, and demographic status.

In general, for 14 out of the 15 groups, people said they would be more likely to abandon the catchphrase when others adopted it (see Figure 2 for the pattern), the lone exception was Stanford athletes. The effect was most pronounced for highly dissimilar groups but was also noticeable for similar groups. The curvilinear effect for similarity held even when we controlled for liking and demographic status.

These results are consistent with the signaling approach but inconsistent with other theories. Theories of conformity obviously predict convergence when other people adopt a taste, not divergence. Conformity and other theories (see e.g., Bryson's 1996 sociological approach) might predict that divergence is caused when people dislike other groups, but the similarity result holds even when liking is controlled. This should make intuitive sense-- kids may like their parents a lot, but diverge when parents adopt their slang or way of dress. Sociological models of status also have difficulty explaining these results. Status of the adopting group was not significantly correlated with divergence and while sociological models of status would only predict divergence when lower status groups adopt, we found adoption by almost every other type led to decreased taste usage.

The current results are most surprising from the standpoint of the uniqueness literature. This literature suggests that abandonment is driven solely by similar others. Our results show that similar others matter, but if anything dissimilar others matter more.

An additional study tested both the domain and similarity hypotheses, examining how characteristics of the adopting Type And the particular taste domain would influence divergence. Stanford students were given 10 domains varying in how much they were used to infer identity, told to imagine members of a given group had started to copy their preference in that domain (e.g. Princeton students had started adopting their favorite type of music), and asked to provide the percentage of members of a given group adopting their taste that would lead them to abandon their taste. We varied the group who adopted the practice in a between subjects design; we chose three groups that rated equivalently on liking (40 year old business executives; inner city teens, and Princeton students) that had previously been rated as low moderate or highly similar to our Stanford participants.

Supporting our predictions about signaling, people were more likely to diverge in domains used to infer identity (e.g., clothing versus bike lights), and there was a curvilinear relationship between amount of divergence and the similarity of the adopting group--participants diverged more when the adopting group was either extremely dissimilar (i.e. 40 year old business executives) or extremely similar (i.e. Princeton students) than when it was in the middle (inner city teens), see Figure 3. There was also an interaction between similarity and the degree to which the domain was used to infer identity; both similar and dissimilar groups prompted divergence in domains used to infer identity, but similarity had no effect in domains where tastes are not used to infer identity (e.g. toothpaste). This interaction provides particularly clear support for signaling--people care about the clarity of their signals, but only in domains where signals are being sent.

Summary: Who drives divergence and why?

Our signaling identity approach answers the question of who drives divergence and why. People diverge when other types adopt their practices and they become less able to signal their identity. This relationship is curvilinear--people diverge from similar others because the *likelihood* of misidentification is high, and they diverge more from very dissimilar others because the *cost* of misidentification is high.

A major advantage of our model is the capacity to explain why divergence occurs even when the adopting group is dissimilar. Previous literature has emphasized similarity-- the uniqueness literature argues divergence is driven by similar others and some social identity research has argued groups feel increased pressure to differentiate themselves from similar outgroups (Brown & Abrams, 1986; Diehl, 1988; Jetten, Spears, & Manstead, 1997; Roccas & Schwartz, 1993). Previous research has not explained, however, why groups might want to differentiate themselves from dissimilar others. This seems to neglect some key phenomena in the environment: punks or inner city teens would probably abandon tastes that were adopted by suburban teens (or, even more serious, suburban parents), people in LA are likely to abandon tastes that are adopted by people in Des Moines. Our signaling approach suggests the reason: people in Des Moines may be quite dissimilar from those in LA, but the fact that they have adopted will undermine the signaling value of the taste, and lead people in LA to diverge.

Although we have argued that pressures to divergence are more general than suggested by the sociological and economic literature that has focused on macro-

demographic status, that literature has correctly recognized that some social groups may find the problems of poaching to be particularly acute. If people like to appear wealthy, the rich must keep switching signals; as soon as the riff-raff can acquire counterfeit Prada bags, the rich must change signals to stay ahead of the game. But our model goes beyond the traditional sociological emphasis on macro-status because it predicts the divergence race will also be more intense for types that are highly imitated because they are interesting or cool--say, gay men or inner-city kids. When these types find their distinctive signals have been knocked off, clouded, or confused (e.g., the imitation of gay men by straight "metrosexuals") then they will be forced to change signals in order to maintain signal clarity.

Our research also provides some experimental backing to the notion that popularity may lead tastes to die because they no longer distinguish between types (Lieberson, 2000; Simmel, [1904] 1957). While distinctive tastes allow types "to define themselves and recognize members and outsiders" (DiMaggio, 1987, p. 448), when something becomes popular it reduces the information value of the taste. Massification may consequently lead to abandonment: "smiley-face t-shirts were cast off as uncool and the word 'acid' was dropped from club names and music genre classifications as soon as 'acid house' became a term familiar to general readers of national newspapers," (Thorton, 1997, p 6.). This presents an interesting macro-level paradox. While people are drawn people to popular things because others like them, if too many people hold the same taste it loses both its value as a unique attribute and as a signal and those who care about the signal will abandon it.

We might also speculate that people pay attention, not only to how many others are adopting something, but to how rapidly they are adopting it. Classic "fads" have a steep second derivative--quick rise and quick fall. Perhaps people are quicker to abandon things that have a quick rise because they realize the signal value of these things is depreciating rapidly. Some things may maintain their status as cult objects for a long period of time (Rocky Horror, Grateful Dead) because there is a relatively constant equilibrium of entries and exits into the practice.

Costly Signals

As discussed previously, signals are often costly, yet the prediction of Model 1 was that signals would be visible and low cost. The idea of poaching introduced in this model provides insight into why costly signals may persist. While people might prefer to signal with the least possible cost, cheap signals are the most likely ones to be poached. Thus costly tastes should be more likely to persist over time because they impose barriers that make adoption relatively difficult. Tastes that are painful (e.g. piercing), require lots of money (e.g. expensive jewelry), or take a long time to acquire (e.g. obscure music) make it more difficult for people to adopt and thereby resist signal dilution. In many situations this process may occur by unplanned social evolution (e.g. certain tastes happen to be more costly, and thus are more likely to persist) but in other cases types may deliberately select costly tastes to foil poachers: the jazz musicians who developed the New York sound "deliberately sought to restrict white identification by producing a jazz which was difficult to listen to and even more difficult to imitate" (Hebdige, 1987, p. 47).

We saw in model 2 that tastes are more effective signals when different types of individuals face dramatically different costs. We identify four different categories of costs:

1. **Functionality costs**. Signaling domains should not be functional. If the domain is highly functional—e.g. a properly worn hat—then the cost imposed is very small for all types—and thus not very effective in distinguishing between them.
2. **Effort costs**. Signaling domains that require a high initial cost of effort are especially effective. Specialized music knowledge or ritual scarring are highly costly for all types to obtain. However, they are effective signals because in future periods, maintenance costs are low, whereas the cost for others remains high.
3. **Opportunity costs**. Signaling domains must be sufficiently visible so that they impede the ability of posers, Type BAs, to interact with others. Wearing a mohawk may make it difficult to buy a house or get a job.
4. **Communication costs**. Certain tastes can only be acquired as people interact extensively with others engaged in the same activity. Learning the hottest independent bands, or arcane sports trivia, is easier for people in the in-group because they are surrounded by conversations about these topics. If slang develops amongst members of Type A, learning it is cheap for Type A but expensive for Type BA (due to homophily, members of Type A are more likely to have connections to slang speakers). However, there will always be a few Type BA members with Type A friends and they will be the first to adopt. As the numbers of BA who adopt the slang spread, it also becomes easier for other BA's to adopt. Before long, the signal becomes diluted and is abandoned.

Visibility

These last two costs add a new tension along the dimension of signal visibility. Publicly visible signals are both easier to see and easier to copy. Signals must be visible to be received, but more visible signals are easier to poach. If Harley Davidson riders wear black leather jackets, it will be easier to associate jacket-wearing with Harley-riding than with some other, more private, signal (e.g., a tattoo that is hidden under clothing most of the time). But this visibility also makes it easier for posers to recognize the signal and copy it. Visible signals should lose meaning faster and consequently, we should see faster turnover in taste domains that are more public.

Visibility also interacts with opportunity costs. Some highly visibility signals may be less likely to be copied because they impede interactions with other types. Types may select high visibility, high opportunity cost signals if they strongly dislike interacting with other types (e.g. punkers who disdain the mainstream). Conversely, some types may select a low visibility signal to allow for easy interactions with other types but still identify each other. The subtle signals of homosexual men provide a good example: Rubinstein (1995) notes that before the 1980s, most gay men felt pressure to remain invisible to mainstream culture and consequently had to come up with subtle signals that could be identified by other gay men, but not by outsiders. To do so, they adopted what

has been termed the Old Clone look, wearing "jeans, lumber shirts, jackets, and heavy boots and sporting a mustache and sunglasses…instantly recognizable by other gay men, the look would not offend at work, for most non-gay colleagues would miss its significance" (p. 215). By selecting subtle signals, they were able to signal only to members of the same type.

Signaling identity is stable so long as there is no conflict of interests. In the first two models, all the actors were happy with the way others wanted to treat them. In the model of poaching, however, BA's want to be treated as if they were A's. This conflict between types makes signaling more difficult, forcing types to use different, more costly, signals. As the costs associated with signaling domains change over time, we observe the dynamics we associate with many kinds of fads and fashions.

General Discussion

We have proposed a signaling identity approach to divergence: people diverge to maintain clear signals of identity. Importantly, this process is socially driven. Instead of focusing on idiosyncratic individual drives, we focus on communication and the reception of meaning. Meaning is determined by social interaction: tastes acquire meaning when they are expressed by similar types of people and they lose meaning when they are adopted by other types.

Our approach answers a number of questions that have been unanswered by previous approaches to divergence. Divergence does not occur idiosyncratically by individuals, rather types of individuals diverge when signals of identity have been undermined. Divergence should be more prevalent in domains used to infer identity and these domains are likely to be ones in which choice is not based on function. Divergence is not driven by similar others, but occurs whenever adoption by other social types reduce a taste's signaling value.

Our approach is also broader than one focused on novelty, status or liking. Rather than focusing on individual boredom, high status individuals diverging from people of lower status, or people diverging from those they dislike, we suggest divergence will occur whenever signal value has been undermined.

Although the game theoretic model we use invokes the language of choice, we do not believe that divergence is necessarily conscious or intentional. Social influence can often occur nonconsciously (Pronin, Berger, & Molouki, 2005), and research on mere exposure (Kuntz-Wilson & Zajonc, 1980) and social mimicry (Chartrand & Bargh, 1999) suggests people may come to like things others like and imitate the behavior of others, all without awareness that they have been influenced by others. People may choose different tastes from other social types and abandon tastes when other types adopt not because they consciously want to diverge from those individuals, but because those tastes just don't seem "right" for them. Game theoretic models are useful in understanding animal behavior even though animals do not consciously choose their actions because an evolutionary process tends to favor certain kinds of behavior. Similarly, we assume that the evolution of cultural practices will tend to favor certain signals because they are better at enabling effective social coordination.

Divergence and Culture

Our approach also adds to discussions regarding cultural differences in self-expression. Cultural psychologists suggest that relative to Americans, members of East Asian cultures prefer less uniqueness (Kim & Markus, 1999; Kim & Drolet, 2003; Aaker & Schmitt, 2001), and thus uniqueness based explanations have trouble explaining why we still see much divergence in East Asian cultures (just as the U.S has skaters, surfers, punks, etc. Japan has kawaii-baby doll, yamamba-mountain witch, bodikon-skimpy skirts and high-heeled boots, Mead, 2002). A signaling approach, however, does not have such difficulty. Even though the self is less focal, members of East Asian cultures should diverge for the same reason Americans do, to signal clear identities as members of types or collectives. Indeed, if collectives are more important in East Asian cultures, then identity signaling dynamics may be even more important (Wong & Ahuvia, 1998).

The Dynamic Meaning System

The fact that meaning changes socially suggests that even if a given individual has a desired identity they want to express, the actual tastes that individual holds will vary over time as their meanings change. A rich white male may have originally worn Tommy Hilfiger to signal his upscale preppy identity, but the adoption of Hilfiger clothing by hip-hop artists in the early 1990's meant that continuing to wear those clothes signaled an entirely different identity.

While our discussion has focused on the active divergence when signals lose their value, the notion of signaling suggests convergence and divergence happen even in the absence of these drives. Thus people may end up conforming not because they want to imitate others, but because they *do not* want to send out the wrong signals. When hairstyles were trending longer in the 1960s, the typical person may have been forced to track the expanding length because they did not want to send a strong signal on either end--too short and they are considered stodgy and conservative, too long and they are considered to be hippies. The social nature of signaling means that even when individuals don't want to send a particular signal, they may need to alter their behavior to stay in step with the social dynamic.

Cycles of Fads and Fashions

Seeing tastes as signals of identity also helps understand why fads and fashions fluctuate. Rather than being restricted to certain taste types (e.g. Beanie Babies and Hula Hoops), labeling something as a "fad" or "fashion" refers to the taste's lifecycle (e.g. rapid fluctuations in popularity) rather than its underlying nature (Aguirre, Quarantelli, & Mendoza, 1988; Blumer, 1969; Fearon, 1998; Robinson, 1958). Similar processes of rapid adoption and abandonment occur in everything from management practices (e.g. Total Quality Management) to public policies (e.g. whole math) to academic literature (e.g., consider Strauss and Quinn's 1997, p. 12, comments about how theories rise and fall in anthropology). While lay theories of fads and fashion suggest people abandon practices because they just "get tired of them" (some disciplinary theories suggest the same, see Sproles, 1981) a signaling perspective provides more insight. Whenever tastes signal identity, and especially when they are visible and thus easy for posers to poach, we should see wild upswings in popularity followed by broad scale abandonment as taste holders diverge because the taste's signaling value has been diluted.

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Figure 1: Divergence in Taste Selection by Taste Domain

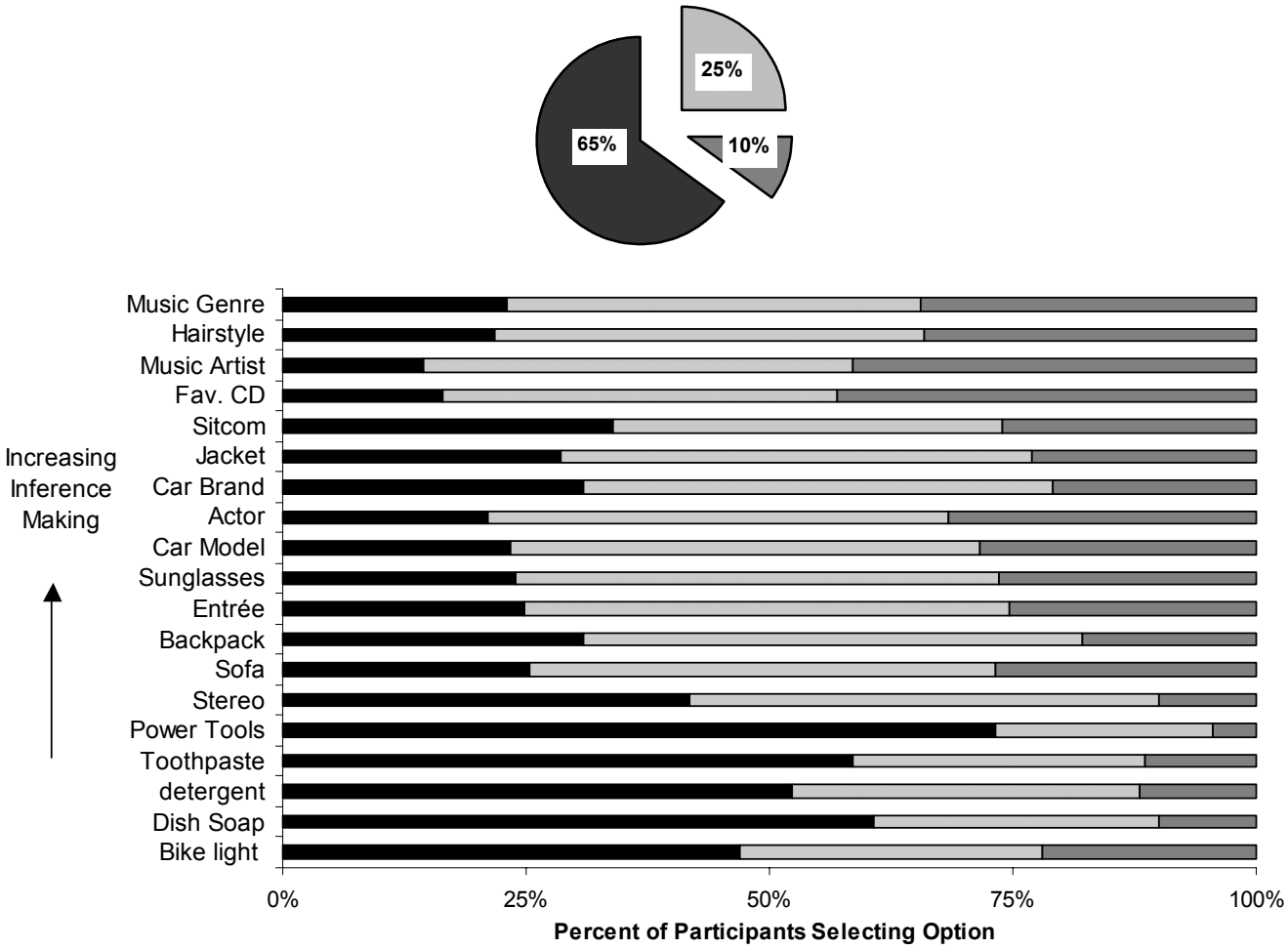


Figure 2: Change in Taste Expression Based on Similarity of the Adopting Group

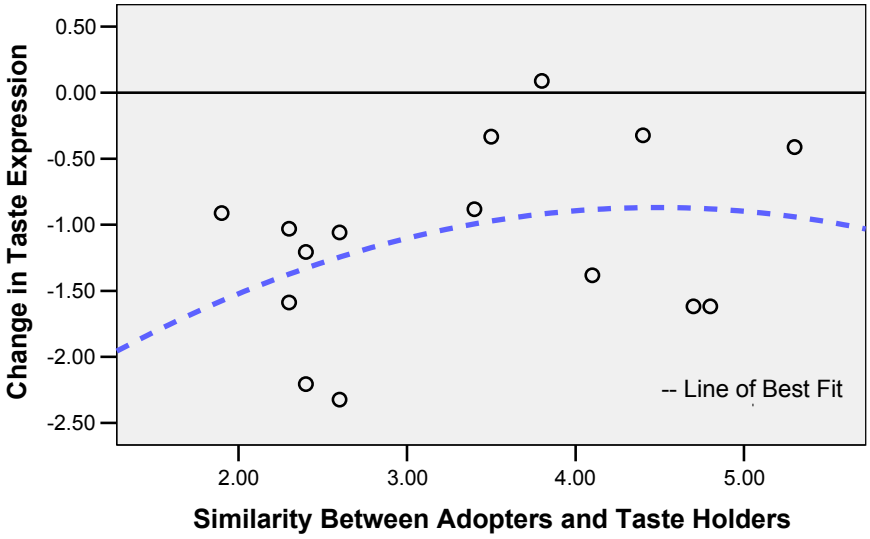
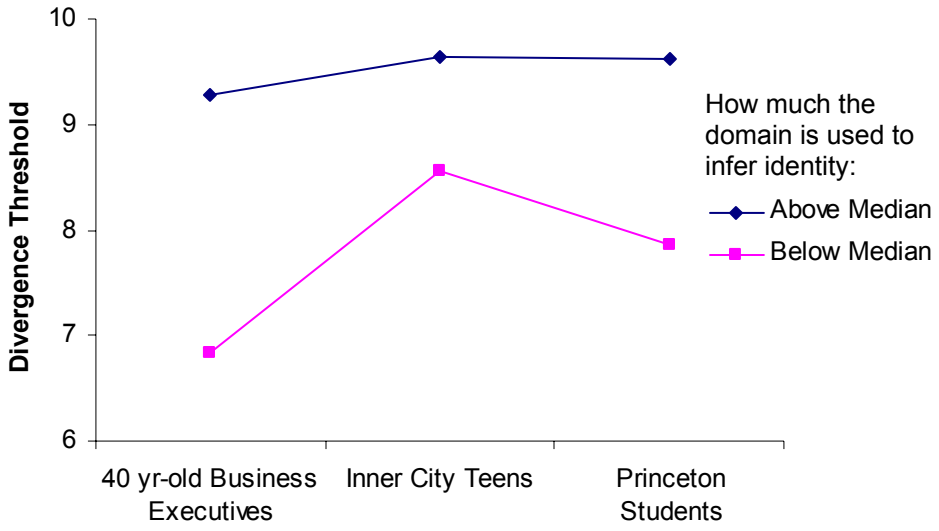


Figure 3: Divergence Threshold Based on Similarity of Adopters and How Much the Taste Domain is Used to Infer Identity



Mathematical Appendix Material

There have been a number of important economic theory papers on the subject of fads and fashion. Banerjee (1992) started an important line of research into conformity based on private information. Bernheim (1994) argues that the desire for status is a driver of conformity. By adding a monopolistic fashion industry that takes advantage of this impulse, Pesendorfer (1995) suggest some fads would decline as firms try to maximize profits. Becker and Murphy (2000) argue that leaders abandon old fashions in order to maintain distinction.

The contribution of this model is that the driver behind fads and fashion is not status, but identity, where identity is important for mediating social interaction. Furthermore, the driver of change is not from changes in the production technology, i.e. the fashion industry, but based on changes in behavior within the population. The richness of the model allows us to identify other properties of fashion, beyond just price, that allow us to predict what products and activities are likely to become fashion statements and thus suffer the ups and downs of fad-like behavior.

Presented below are the technical details of the models presented in the paper. Let there be a large community of actors, of different types, start with, A, B with population proportion fixed at p_A, p_B . Presume individuals with a sufficiently low discount rate to avoid folk theorem effects. In each stage, actors have preferences over interactions and over signals. Presume separability, so that in each sub-stage, an agent of type, x, who chooses signal $i \in \boldsymbol{Z}$, and has history of signal choice h, and interacts with another agent of type y with interaction z, receives stage utility of

$U_x = b_x(y, z) - c(i, x, h)$

where $b(-)$ represents the benefits of the interaction and $c(-)$ represents the costs associated with choosing that particular signal.

In the interaction stage, one party is randomly selected as sender, and the other as receiver. For simplicity, we focus on the sender's utility; the receiver's utility is essentially symmetric. We take the cost function to be given exogenously. We presume the cost of any given signal is the same for all members of the same type except for an individual specific normally distributed zero-mean error term. Also, each possible signal choice, i, has associated visibility, $v(i)$, the probability it will be properly observed.

Each period of the game proceeds as follows. In the first stage, all actors simultaneously choose a signal. In the second stage they are randomly paired with uniform probability (for simplicity). With equal probability, one is randomly assigned to be the signal sender, the other is the receiver. The receiver observes the sender's signal chosen in the first stage with probability $v(i)$, and then the receiver chooses how to interact. Assume for simplicity that if no signal is observed, then no interaction takes place.

Let there be two types of interactions, $\{\alpha, \beta\}$. The receiver always prefers to choose α if the sender is of Type A and always prefers to choose β if the sender is of Type B. That is:

$b_A(A, \alpha) > b_A(A, \beta)$ and $b_A(B, \alpha) > b_A(B, \beta)$

$b_B(A, \beta) > b_B(A, \alpha)$ and $b_B(B, \beta) > b_B(B, \alpha)$

Similarly, for the preferences of the sender, assume that Types A and B are happy with how other types want to treat them.

$b_A(A, \alpha) > b_A(A, \beta)$ and $b_A(B, \alpha) > b_A(B, \beta)$

$b_B(A, \beta) > b_B(A, \alpha)$ and $b_B(B, \beta) > b_B(B, \alpha)$

Here, however, for simplicity, assume that all types get utility $\sigma > 0$ when they are treated as they wish to be treated, and utility 0 when they are not. That is, let

$b_A(A, \alpha) = b_A(B, \alpha) = b_B(A, \beta) = b_B(B, \beta) = \sigma$
$b_A(A, \beta) = b_A(B, \beta) = b_B(A, \alpha) = b_B(B, \alpha) = 0$

One final simplifying assumption. For the purpose of this analysis, assume costs are history independent.

Solving the Model

We focus on pure strategy sequential Nash equilibria. By the myopia assumption, we can focus on just one period. We solve by backward induction, that is we describe what happens in the second stage of the game where individuals interact, and then, we use that to solve for what happens in the first stage, the choice of signal. In the second stage, receivers observe the signal, and update their beliefs regarding the sender's type. Based on the beliefs the receiver chooses the appropriate interaction. Beliefs are based on the signals actors choose in equilibrium in the first stage. Specifically, suppose some signal k is observed by the receiver. Let r be the proportion of actors of Type A who chose signal k. Let s be the proportion of actors of other types that chose signal k.

Then the receiver's belief that the sender is of Type A is equal to the actual probability the sender is that Type And is given by:

$$m(k) = \Pr[type = A \mid signal = k] = \frac{r}{r+s}$$

We could also call this expression, $m(k)$, the meaning of signal k. In a world with many people, r and s are ratios set by large populations. The change of signaling behavior by any one person has little impact on the meaning of a signal. Furthermore, if we make the reasonable assumption that r and s are not observed perfectly, but inferred from haphazard observations from past periods, then attempts to signal alone—choosing a

signal where *m(k)=0*—will be punished because individuals who send out novel signals will fail in their interactions. Note also, that if Type A's are the only type that choose this signal, that is, *s=0*, then the meaning of the signal *m* is 1. In other words, the receiver is sure of the sender's identity.

The first stage is essentially a coordination game, so nearly any set of signals can be part of a coordination game equilibrium. For our purposes, we are interested in the signals that would be picked if types were unitary actors. In this simple example, we have perfect alignment of preferences. If each type chooses a different signal, then there will be perfect identification whenever the signal is observed. Thus we would expect Type A to choose a signal *i* and Type B to choose a different signal *j*.

Utility for each individual is given by the benefits of interaction minus the cost of signaling. The benefits of interaction are equal to the probability of visibility times the expected payoff from interaction, where the expected payoff is the probability of correct identification times the benefit of a correct interaction plus probability of incorrect identification times the benefit of incorrect interaction (assumed to be zero).

$U_A = v(i)[\, m(i)\ \sigma + (1\text{-}m(i))\ 0] - c(i,A)$
$U_B = v(j)[\, m(j)\ \sigma + (1\text{-}m(i))\ 0] - c(j,B)$

However, since in this simple case, each signal identifies the other individual with probability 1, and the receiver will always treat the sender as she wants this simplifies to

$U_A = v(i)\ \sigma - c(i,A)$ and $U_B = v(j)\ \sigma - c(j,B)$

Thus, the optimization problem is given by

$max_{i \in Z}\ U_A = v(i)\ \sigma - c(i, A)$ and $max_{j \in Z}\ U_B = v(j)\ \sigma - c(j, B)$

We maximize by differentiating the actor's utility functions with respect to visibility, v_i, and cost, c_i.

$$\frac{\partial U_A}{\partial v} = \sigma$$
$$\frac{\partial U_A}{\partial c} = -1$$

Since the derivative with respect to visibility is positive, actors would choose signals with the highest possible visibility. Since the derivative with respect to costs are negative, actors would choose signals that minimized costs.[5]

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[5] Side note that is not discussed in the paper: Since there is often a trade off between high visibility and low costs, in point of fact, actors would choose a signal where these partial derivatives were equalized. If we

Choice of Domains

The above intuition can be applied toward the choice of domains. Potentially, we could have a model where visibility is determined endogenously, and actors had to choose which signals to look for. When there are more domains to signal in, each domain has lower visibility. Then signaling will only occur in certain domains, and there will have to be coordination so actors look for signals in the same domains other actors choose to signal in.

Formally, let us pre-pend another stage before the stages in the game above. Before signals are selected, actors select a domain in which to signal.

Define domain to be a set containing each of the possible signaling behaviors actors can choose to engage in. For example, the power saw domain contains the set of possible power saws on the market. The coat domain contains the set of coats one might wear. Each coat has a bundle of attributes each providing a different set of costs and benefits. The baseball cap wearing domain contains the set of possible ways to wear a cap, such as backwards or sideways

Assume for simplicity, that if more than one domain is selected, visibility goes to zero. Actors simultaneously choose a domain in which to signal, effectively determining the choice set of signals that are available to them in the signal selection stage. Formally, let *D* denote the set of possible domains, then the maximization problem becomes:

$max_{Za \in D}\, max_{i \in Za}\ \ U_A = v(i)[\, m(i)\ \sigma\,] - c(i,A)$
$max_{Zb \in D}\, max_{j \in Zb}\ \ U_B = v(j)[\, m(j)\ \sigma\,] - c(j,B)$

In equilibrium, actors will choose the same domain, $Z_b = Z_a = Z$, by our assumption that miscoordination on domain leads *v(-)* to go to zero. We see from the utility function that if signaling loses visibility, then actors are incurring costs but with no benefits. The maximization problem is over the same function, thus low cost and high visibility is still preferred. However, here the choice set is over domains. Thus, instead of choosing a signal with one associated cost, the groups are choosing sets of cost. The socially optimal choice maximizes some social welfare function, for instance, the simple sum of utilities

$Welfare = U_A + U_B = b(-,A) - c(i,A) + b(-,B) - c(j,B)$

We saw from the first model that groups A and B should optimally choose different signals, $i \neq j$, in order to effectively differentiate. Ignoring visibility for the moment, without loss of generality, let *i* be the signal that minimizes *c(i,A)* and normalize *c(i,A)* =

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assumed the various signals *i* were ordered continuously, then we would expect the marginal rates of substitution to be equalized:

$$\frac{\partial U/\partial v}{\partial U/\partial c} = \frac{\partial i/\partial v}{\partial i/\partial c}$$

$c(i,B) = 0$. Then, if i also minimizes costs for group B, then signal j can only be second best.

$i = argmin_{i \in Z}\ c(i,A)$
$j = argmin_{j \in Z,\, j \neq i}\ c(j,B)$

Since a welfare maximizer cares about the sum of $c(i,A)$ and $c(j,B)$, the second best is crucial. Thus the domains that are best suited for signaling are domains where the difference between the first best and second best are minimized.

There are two properties of domains that help minimize this difference. The first is to choose domains where the difference in tangible costs/benefits associated with any particular style are minimal. In domains were differences are primarily based on color or style, cost differences are minimized.

The second is to choose domains where costs are unlikely to be perceived in the same way by different groups. In functional domains, for example, the tangible costs and benefits will likely be the same for different groups such that

$c(s,A) = c(s,B)$ *for all* $s \in Z$

In these domains, the first best for both groups will be the same, and one will be forced to accept second best. In domains where groups differ in how costs are experienced, the problem of the second best is avoided.

In the domain of power saws, where different saws are mostly differentiated by functional attributes such as power or speed and people are more likely to agree on which saw is optimal: not choosing the optimal saw for a given task is potentially quite costly. However, in the domain of coats, different coats are largely differentiated on attributes such as color or style and people are less likely to agree on which is optimal: differences in costs and benefits across coats are quite minimal and likely outweighed by differences across people. Thus, the requirement that different groups choose different signals is only minimally costly.

As the number of types that wish to identify themselves increase, the problem becomes more pronounced. It is quite plausible that in the domain of cars, for any given individual, there are five different brands or models that are fairly similar in terms of the costs and benefits they provide. If we want to partition the world into more than five groups, we would require groups to start choosing models beyond that first five, models that actors would start to find highly unsatisfactory. Signaling motives would have to be strong enough to make it worthwhile for actors to choose models with reputation, price, fuel economy, etc., that differ markedly from first best. How actors deal with the allocation of scarce signals when there are more groups than signals is considered later in the appendix.

Though considering the functionality characteristics and cost minimization properties of domains explains a wide variety of domain choice, there are some domains where signaling is quite costly—e.g. body piercings, or arcane knowledge—domains whose cost functions defy these predictions. Some other mechanisms must be at work. Our proposed candidate is signal poaching.

Signal Poaching

Now, to consider the phenomenon of signal poaching, let us return to considering domains as being exogenously fixed, but now, add a third type, Type BA. BAs are actually B's and thus other types prefer treating them like B's, i.e. they would prefer to choose action β. However, type BA's would prefer treatment α.

$b_{BA}(A, \beta) > b_{BA}(A, \alpha)$ and $b_{BA}(B, \beta) > b_{BA}(B, \alpha)$

Or again, we simplify and say

$b_{BA}(A, \beta) = b_{BA}(B, \beta) = \sigma$ and $b_{BA}(A, \alpha) = b_{BA}(B, \alpha) = 0$

By introducing the BA types, things get more complicated. Type BA would like to choose signal *i* rather than signal *j* in the choice of signal stage, but would only do so if the benefits received from the interaction stage outweigh the costs.

Let π be the fraction of posers that adopt signal *i*. The fraction π is based on the random noise of the cost function. More precisely, π is the fraction of the poser population, where the net benefits of posing, $v(i)\, m(i)\, \sigma - c(i, BA)$, are greater than the net benefits of not posing, $- c(j, BA)$.

$$\pi = \Pr[v(i)m(i)\sigma - c(i, BA) > c(j, BA)]$$

Recall that p_A is the fraction of the population of Type A. Note that all actors of Type A will choose signal *i*. In that case, the probability that an actor showing *i* actually is of Type A would be given as

$$m(i) = \frac{p_A}{p_A + \pi}$$

Recall that receivers of Type A will treat the sender as a member of Type A so long as the benefits of choosing α outweigh the benefits of choosing β:

$$m(i)b_A(A, \alpha) + (1 - m(i))b_A(B, \alpha) > m(i)b_A(A, \beta) + (1 - m(i))b_A(B, \beta)$$

Rearranging we get

$$m(i) > \frac{b_A(B,\beta) - b_A(B,\alpha)}{b_A(A,\beta) - b_A(A,\alpha) + b_A(B,\beta) - b_A(B,\alpha)}$$

Rearranging again, and defining the right hand side of the above equation as ρ, we can say that the signal will remain meaningful so long as

$$\pi < p_A\left(\frac{1-\rho}{\rho}\right)$$

Note that ρ gets larger as the penalty from making a mistake increases. Then we can say that a given signal retains meaning so long as π is below some critical threshold that is decreasing in the penalty for a mistake, ρ, and increasing in the proportion of other A types in the population . We can now write sender of Type A's optimization problem as

$max_{i \in Z}\ v(i)\ [p_A/(p_A+\pi)]\sigma$ - $c(i, A)$

We can differentiate with respect to π to get

$$\frac{\partial U_A}{\partial \pi} = \frac{-p_A}{(p_A+\pi)^2} v(i)\sigma$$

This term is negative, so Type A wants to keep π as low as possible. One way to do this is by choosing a signal *i* that makes *c(i, BA)* as high as possible.

However, as before, Type A would still also want to choose a signal *i* that minimizes costs *c(i, A)*.

Combining these two results, we see that in the presence of poaching, the actor is no longer just minimizing costs, but instead, maximizing the difference in costs *c(i, BA) – c(i, A)*, incurred by the posers versus the real thing.

When signals are scarce

As in the paper, if we want to consider situations where there are many groups, and only a few signals available, actors have to budget their use of signals. It is reasonable to assume that actors would allocate those signals to applications with the highest payoffs.

To extend the model, let us fix one group A, but consider group A's possible interactions with other groups *g*, where *g* could be group B, but could also be group C, group D, etc. each with their own posers, of Type BA, CA and DA, etc. respectively. Define f_g to be the frequency of interaction with any given group.

Now, we can write total utility as

$$U_A = \sum_g f_g \left(v(i_g) m(i_g) b_A(g, \alpha) - c(i_g, A) \right)$$

Thus, if there were a limited number of signals available, the benefits to signaling would be highest when either frequency of interaction f_g was highest, such as the case when dealing with similar others, or when the consequences of failed identification are highest,

$b_A(g,\sim\alpha) << 0$.

Alternatively, there could be some exogenous probability of automatic recognition that varies by group dyads. College students from different schools would have a low chance of automatic recognition. Whereas teenagers compared to executives would have a high chance of automatic recognition. In cases where automatic recognition is low, the benefits to signaling are high.

A note on visibility

There are two other tensions introduced by visibility that this model implies that are beyond the scope of this appendix. Though even with poaching, this model predicts that agents always want high visibility, if we think about the dynamics of costs over time, Type A's may want to choose low visibility signals, if this impedes the ability of posers to copy.

Notice as well, that visibility interacts with how posers are treated by Type B's. If Type B's treat Type A's poorly, with disdain, in other words

$b_{BA}(B, \alpha) < 0$

Then a high visibility signal is good for raising the opportunity costs of posers when they copy. High visibility effectively reduces π, by reducing the benefits received from using Type A's signal.

It is important to appreciate that at any given time, there could be many of the interactions described here going on in parallel. It is possible for a poser to attempt to choose two signals in different domains, one that is more visible to A types, and one that is more visible to B types. A high visibility signal such as a mohawk, makes it difficult for posers to have it both ways.