Value Formation: The Role of Esteem

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Abstract

The values people hold play an important role in shaping their behavior, but our understanding of how values form is incomplete. We consider a model in which players choose values, motivated by economic considerations and, crucially, also by the desire for esteem. The comparative statics are driven by the following tension: players obtain more esteem from peers if they conform in their choice of values; but they may obtain more self-esteem if they differentiate. This tension explains why, for instance, peer effects are sometimes positive and sometimes negative. We discuss three illustrations, related to: schools, inner cities, and organizational "resistance." (JEL: Z10, J01.)

1   Introduction

The values people hold are critical determinants of outcomes in many different contexts: for instance, in schools, in inner cities, and in firms. But, how do they form? What causes them to change? This paper provides an approach to answering these questions. It has applications to many disparate problems: to give three examples, why some schools fail, while others succeed; why US inner cities suffer from persistent high unemployment; and why workers, in many firms, put up resistance.

We assume that values are (at least to some extent) the product of choice.[1] The choice of values in our theory is motivated by economic considerations, but crucially, also by the desire for esteem. The key assumption is that there are two components of esteem; these components result in conflicting desires. On the one hand, people have a desire to be esteemed by peers, which is satisfied by conforming to them. On the other hand, people have a desire for self-esteem, which is often best satisfied by differentiating. This basic tension – between the desires to conform and differentiate – drives our results.

The main insights are captured by a simple two-player, simultaneous-move game. Players make three choices. First, they choose effort at two activities. We will carry the example of a school throughout the paper. Corresponding to two traditional categories in US schools – "nerds" and "burnouts" (who are sometimes in rock bands) – we will refer to these activities as academics and rock music (music for short). Achievement at academics (music) depends both upon a player's effort and upon his ability. Second, players choose whether or not to value achievement at academics and achievement at music. Third, players also choose whether to initiate social interaction (potentially at a cost). Social interaction takes place if either player initiates it.

The model has three main assumptions. Assumption 1: the basis upon which a player confers esteem depends upon his values. A player who only values academics (music) confers esteem only on the basis of academic (musical) achievement. Assumption 2: players are esteemed for their relative achievement. Assumption 3: players value self-esteem; when they interact, they also value the esteem of the other player. There is an extensive discussion below of how these

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[1]The assumption that people select values is consistent with a large literature in social psychology, discussed below. Note that we do not mean to suggest people are fully conscious of choosing values, just as agents in standard models make choices more or less consciously.

assumptions match the psychology literature.[2]

The equilibria of the model resolve the tension between the desire to conform and the desire to differentiate. Equilibria have the following properties. Players focus their effort on a single activity (whichever has the highest esteem-returns to effort). They may or may not focus on the same activity. Players choose to value the activities they focus on when their achievement is sufficiently high. Players with the same (different) values tend to seek (avoid) interaction: a property known as "value homophily."[3] Values can be said to shape players' behavior, since they affect the esteem-returns to effort.

The model's comparative statics show how different policies and shocks affect values and behavior. Consider the effect in the model of encouraging social interaction (an example would be putting students in the same classroom). Players have a greater desire to conform when they interact, since only when they interact do they care about receiving the other player's esteem. Thus, encouraging interaction – reducing its cost – makes players more likely to focus on – and value – the same activities. Our model also allows us to examine the effects of changes in ability: such as, for example, the consequences of an increase in peer academic ability on own academic achievement. On the one hand, there is a desire to conform to a peer who is now more academically able. For this reason, own academic achievement might improve. On the other hand, an increase in peer academic ability makes it harder to obtain self-esteem through a focus on academics. Thus, a player might decide, when his peer's academic ability increases, to switch from a focus on academics to a focus on music (i.e., differentiate from his peer). For this reason, academic achievement might decline. Our model predicts that own achievement will be increasing in peer ability when peer ability is low and decreasing in peer ability when peer ability is high.

In many organizational contexts, including schools, we observe disagreement regarding the status hierarchy (see, for instance, our later discussions of Coleman (1961) and Willis (1977)). It is also noteworthy that our model captures such disagreement: since players who value acad-

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[2]While one approach to these issues is to derive status/esteem preferences from economic primitives (e.g., Cole, Mailath, and Postlewaite (1992)), the approach in this paper allows for simple comparative statics and further insights into policy changes. The present paper bases its "reduced form approach" on robust findings in psychology and thus affords insights into the implications of preferences for esteem and status on economic outcomes.

[3]For a survey of work on value homophily, see McPherson et al. (2001). There is considerable evidence that people have a tendency to sort into groups according to values.

emics ("scholars") consider themselves superior to players who value music ("musicians") while musicians consider themselves superior to scholars.

As an extension to the basic two-player model, the paper presents a version with many players. This extension also allows for more than two activities. Analogous to the basic model, players divide into subgroups with distinct values.

The model's assumptions accord with the theoretical perspectives and empirical findings of a large literature in social psychology on esteem. Dating back at least to William James (1890), esteem has been seen as related to values. In *Principles of Psychology*, James observed that a person's self-esteem depends not only upon his achievements but also upon the value he places upon them. Contemporary approaches assume that people implicitly choose values, placing more value on domains where they perform well, so as to enhance self-esteem (see Crocker and Wolfe (2001) and Osborne and Jones (2011) for reviews).[4] A variety of findings are seen as providing empirical confirmation. For instance, developmental studies find that as children grow older, they increasingly describe as "important" those activities at which they excel (see Harter (1986)); the esteem of poorly performing students has been shown to improve when they adopt deviant values (see Rosenberg (1979), Gold (1978), Kaplan (1978, 1980), and Rosenberg, Schooler, and Schoenbach (1989)); when individuals become disabled, they typically devalue physical attractiveness and physical accomplishments (see Wright (1960)); and values have been shown to change in old age as competencies decline (see Brandtstätder and Greve (1994)).[5]

It has also long been recognized that self-esteem depends upon individuals' comparisons with peers: the seminal paper being Festinger (1954). In our model, agents devalue activities when they compare unfavorably to peers; and they value activities when they compare favorably. Several experiments have demonstrated such behavior (see, in particular, Tesser and Campbell (1980, 1982)). They find, consistent with our model, that subjects value activities less not only when they perform worse themselves, but also when their peers perform better. Additionally, recent work by Marsh and coauthors argues that students find it harder to achieve high self-esteem

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[4]In their *Psychological Review* article, Crocker and Wolfe (2001) note that: "the view that people are selective in the domains on which they stake their self-esteem has shaped theory and research on self-esteem for decades." (p. 598)

[5]Crocker and Major (1989) also argue that the low observed correlation between esteem and achievement is, in large measure, explained by individuals' "selectively devaluing. . . those performance dimensions on which they. . . fare poorly." (p. 616)

through a focus on academics when peer academic ability is higher (see especially Marsh et al. (2008) and Seaton, Marsh, and Craven (2009)).

Our model also accords with a third important idea in psychology: that people seek the esteem/approval of peers and are motivated, in consequence, to conform. Psychologists refer to this as "normative social influence" (see, for instance, Latané (1981), Lerner and Tetlock (1999), Cialdini and Goldstein (2004), and Zaki, Schirmer, and Mitchell (2011)). Experiments on normative social influence date back to Asch (1951); he showed subjects a line and asked them to judge which of three other lines was of equal length; they answered after observing seven other participants – confederates of the experimenter – give an identical, wrong answer. Most subjects followed suit with the wrong answer on at least one occasion. In contrast, when subjects' responses were kept private, in a slight modification of the experiment, conformity significantly decreased (see Asch (1956)): suggesting that subjects had conformed in the original experiment largely because they sought peer esteem/approval, rather than because of changes in their beliefs. Neurological evidence is in line with this interpretation. In a further replication of the Asch experiment studying subjects' brain activity with fMRI, Berns et al. (2005) found subjects who failed to conform (by answering correctly) showed heightened activity in areas of the brain devoted to negative emotion and to the modulation of social behavior (the right amygdala and the right caudate nucleus).[6]

Following a discussion of the formal model, we will consider three illustrations. In each case, detailed observations correspond to the workings and predictions of the model.

Schools. The current sociology of education, following Coleman's (1961) *Adolescent Society*, emphasizes students' values and their group interactions as major determinants of school outcomes (see Eckert (1989), Barber, Eccles, and Stone (2001), Milner (2004), Frank et al. (2008), Crosnoe (2011), and Paluck and Shepherd (2012)). In Coleman's original study, he concludes, based on rich evidence, that students face a tradeoff between conforming to the leading crowd and adhering to their values, or differentiating. This exactly corresponds to the academics-music distinction in our model; moreover, our model captures the exact pattern in Coleman's data. With its conflict between conformity and differentiation, the model also explains numerous other findings.

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[6]Following Asch, psychologists have explored the role of normative influence in many different contexts. See, for example, Schultz (1999) regarding recycling campaigns and Nolan, Schultz, Cialdini, Goldstein, and Griskevicius (2008) regarding reduction in energy use.

For instance, it explains the low dropout rates of Catholic – relative to public – schools. It also reconciles conflicting results on peer effects. While most studies report positive peer effects (see, for instance, Hanushek et al. (2003)), a significant number report negative peer effects. For example, Carrell et al. (2013) find that low-ability students at the US Air Force Academy perform worse academically when they are placed in higher-ability squadrons.

The Inner City. Leading explanations for the decline of US inner cities since the 1970s have emphasized the role of cultural change (see Wilson (1997, 2009), Massey and Denton (1993), Waters (1999), Patterson (2000), Harding (2010), and Small, Harding, and Lamont (2010)). William Julius Wilson, in particular, has argued that the widespread absence of work, brought about by deindustrialization and middle-class flight, led to the emergence of a street culture in opposition to mainstream values. This altered culture served to further block opportunities. In consequence, what might have been just a temporary shock turned into a permanent one. As we will see, our model captures the mechanisms whereby adverse changes in culture occur; it especially formalizes Wilson's argument regarding the cultural impacts of deindustrialization and middle-class flight.

Resistance in the Workplace and in Schools. Resistance – such as by workers or by students – is a major theme in sociology (see, for instance, Gouldner (1954), Juravich (1985), Collinson and Ackroyd (2005), and Vallas (2006)). Forms of resistance that have been studied include absenteeism, cheating, pilfering, sabotage, and hazing. Scholars such as Hodson (2001, 1995) and Cavendish (1982) stress that denial of esteem is a key reason for resistance. In our later discussion, we will show that the model explains the presence – or absence – of resistance in a variety of settings: since equilibria in the model arise in which player 1 (corresponding to a worker or student) feels entitled to more esteem than he receives from player 2 (corresponding to a manager or teacher).

Related Literature

This paper studies the process by which culture/values form and change. While this topic is understudied in economics, its importance for understanding organizational and societal dysfunction has been widely recognized (see Collier (2015) and Guiso, Sapienza, and Zingales (2006) for

a discussion).[7] One theoretical approach is offered by Bisin and Verdier (2000, 2001), who study the parental decision to instill values in their children. This paper considers a distinct mechanism, whereby the conflict between conformity and differentiation drives the process of cultural formation.

The paper brings together three forces – (1) flexible values, (2) social comparison, and (3) the desire for peer esteem/approval – which give rise to a conflict between conformity and differentiation. These forces have appeared in separate treatments in previous literature.

The paper relates to cognitive dissonance models (see especially Benabou and Tirole (2011, 2002), Oxoby (2003, 2004), Rabin (1994), and Akerlof and Dickens (1982)) since they assume agents' beliefs or values are flexible (Assumption 1). The work of Oxoby (2003, 2004) is particularly related as he also assumes agents make social comparisons (Assumption 2). Agents consequently differentiate in his model; however, they lack a desire to conform. Neither Assumptions 2 nor 3 are present in Benabou and Tirole (2011); however, they generate conformity by a complementary mechanism.[8]

Another class of related models is based on the concept of identity (see especially Akerlof and Kranton (2000, 2002)). The choice of identity is effectively a choice of values, so we can view these as flexible values models as well (Assumption 1). These models typically make a variant of Assumption 3: that the utility from adopting an identity depends upon the number of adherents. This assumption gives rise to conformity. However, players in existing identity models lack a desire to differentiate.[9]

There are also several related models in which values are fixed (Assumption 1 is absent). In particular, Bernheim (1994) and Frank (1985) assume players seek esteem from peers (Assumption 3); they also assume peers' views of a player are based upon social comparison (Assumption 2).[10]

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[7] The model captures a set of interactions – between behavior, values, and social networks – that Collier (2015) argues are critical for understanding the process of cultural formation.

[8] Unlike our model, in which values are chosen, values are inferred in Benabou and Tirole (2011). Players conform in their model because they infer their own values from others' behavior.

[9] The model in Akerlof and Kranton (2000) unambiguously predicts, in contrast to our model, that own academic performance improves when peer academic ability increases. Akerlof and Kranton (2002) make a distinct argument as to why low ability students might be more inclined to adopt deviant identities in higher ability schools. They consider the possibility schools/teachers might set the "prescriptions" associated with holding an academic identity. Teachers set tougher prescriptions in higher ability schools; these tougher prescriptions increase the inclination of low ability students to adopt deviant identities.

[10] In Bernheim's model, players are esteemed when they are believed to have high ability. Since high relative achievement signals high ability, esteem is effectively conferred based upon relative achievement. In Frank's (1985) *Choosing the Right Pond*, players compare themselves to those in their pond. Frank's model is primarily concerned

Cicala, Fryer, and Spenkuch (2011) relates to our predictions regarding peer effects. They have suggested that a Roy model might explain why we see both positive and negative peer effects. However, values – and their determination – are not a focus. Our model additionally speaks to the possible convergence or divergence of values within a population.

Finally, the paper relates to the literature on contests. Our model – which is effectively a contest for esteem – shows how ideas from this literature can be applied to yield new insight into how values form and change. Our results are reminiscent of those in existing contest models: in particular, just as contest models find that competition is most intense when players are closely matched (see, for instance, Lazear and Rosen (1981) and Nalebuff and Stiglitz (1983)), we find players exert the most effort at academics (compete most intensely) when they possess similar academic ability. Our model, with its choice of activities, particularly relates to the literature on multi-battlefield contests, such as Borel's (1921) Colonel Blotto Game (see Kovenock and Roberson (2012) for a review).

The paper proceeds as follows. Section 2 presents the basic model, with two players and two activities, and describes its comparative statics. Section 3 considers an extension with many players and more than two activities. Section 4 discusses the three illustrations mentioned earlier, related respectively to: schools, the inner city, and resistance. Section 5 concludes.

2   The Model

2.1   Setup

The model is a two-player, simultaneous-move game. The players also compare their actions to the fixed behavior of a background population of n agents.[11]

The players ($i \in \{1, 2\}$) make three choices. They choose (1) effort at two activities ($e_{i1}, e_{i2} \geq 0$), (2) whether to value achievement at those activities ($\theta_{i1}, \theta_{i2} \in \{0, 1\}$), and (3) whether to initiate interaction with the other player ($x_i \in \{0, 1\}$). Interaction takes place if either player initiates it (if $x_1 = 1$ or $x_2 = 1$).[12]

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with players' choice of ponds (comparison groups) – a choice that is absent in our model.

[11] The model naturally extends to a many-player game, in which the behavior of an entire population is endogenous. We consider such an extension in Section 3.

[12] In our model, players directly observe one another's values. In reality, values cannot be directly observed;

We will carry the example of a school throughout the paper. Corresponding to two common categories in US schools – "nerds" and "burnouts" – we will refer to activity 1 as academics and activity 2 as rock music (or, music for short). Players' achievement at activities depends upon both effort and ability. More specifically, achievement at academics is given by: $a_{i1} = \alpha_i e_{i1}$, where $\alpha_i > 0$ denotes player i's ability at academics. Players may differ in their academic ability; for simplicity, we assume players have the same musical ability, which we normalize to 1: so that $a_{i2} = e_{i2}$.

The players' have the following utility function:

$$U_i = -\frac{1}{2}(e_{i1} + e_{i2})^2 - kx_i + E_i.$$

There is an economic component to the utility function and a non-economic component. The first two terms are the economic component. They reflect the cost of exerting effort and the cost k of initiating social interaction. We allow k to be positive or negative. The final term, E_i, which we will discuss presently, reflects players' desire to be esteemed. To simplify the analysis, we assume players do not exert effort at music if they are otherwise indifferent; nor do they value activities when otherwise indifferent.

There are two sources of esteem utility (E_i). Players value self-esteem (E_i^i). When players interact, they also value being esteemed by the other player (E_i^j). More precisely:

$$E_i = E_i^i + G(x_1, x_2) \cdot E_i^j,$$

where $G = 1$ if social interaction takes place (if x_1 or $x_2 = 1$) and $G = 0$ otherwise. Observe that players may derive positive or negative esteem utility from social interaction depending upon whether they are esteemed by the other player $(E_i^j > 0)$ or disesteemed $(E_i^j < 0)$.

Let us now discuss the basis upon which esteem is conferred. The esteem player i grants a player l – l may refer to himself or to the other player – depends upon player l's achievement relative to others at activities valued by player i. More precisely, player i's esteem for player l is

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they are, instead, inferred. Nonetheless, our assumption may be reasonable. Work by psychologists on "theory of mind" shows that people have a talent for intuiting values from behavior (see Baron-Cohen (1995)).

given by:

$$E_l^i = \sum_{s=1}^{2} \theta_{is}(a_{ls} - \bar{a}_s).$$

We see that esteem is only conferred for achievement at valued activities (activities for which $\theta_{is} = 1$ rather than 0). We also see that esteem is conferred based upon relative achievement $(a_{ls} - \bar{a}_s)$. $\bar{a}_s$ denotes the average achievement of a comparison group or "reference group" at activity s.

We assume players compare themselves to one another (i.e., both players are in the reference group). Players also compare themselves to the background population of n agents. A higher value of n reduces the extent to which the players compare themselves to one another. Our results do not depend critically upon what we assume regarding the achievement of the background population. For simplicity, we assume the background population has 0 achievement at both activities. Under this assumption, $\bar{a}_1 = \frac{a_{11}+a_{21}}{n+2}$ and $\bar{a}_2 = \frac{a_{12}+a_{22}}{n+2}$.

Our focus will be on pure-strategy Nash equilibria, henceforth referred to as the equilibria of the game.

2.2 Discussion of the Model

Let us pause briefly to discuss a number of modeling choices we have made.

First, we made a particular assumption regarding how interaction is initiated. In the model, players can unilaterally initiate interaction. We might, alternatively, have assumed both players must agree in order for interaction to take place. The choice of one assumption over the other does not reflect a strict preference. Regardless of which assumption we make, the comparative statics of the model (which are our main focus) look similar.

Second, we included an economic cost in players' utility functions (an effort cost) but we excluded economic benefits. For instance, we might have assumed players are economically incentivized to perform well academically. While benefits are not explicitly included, we can think of the effort cost function as the cost of effort *net of any benefits*. Under this interpretation, incentivizing players to perform well academically is like increasing their academic abilities (α_1, α_2).

Third, we assumed the effort cost function takes a particular form: $\frac{1}{2}(e_{i1} + e_{i2})^2$. This

functional form has the special property that the marginal cost of effort is the same at both activities. A consequence is that players focus all their effort on one activity (whichever has the higher esteem-returns). We chose this functional form precisely because it has this property: our results are thus simpler to state and discuss. But, it may be worthwhile to consider alternative functional forms. A different effort cost function (for instance, $\frac{1}{2}e_{i1}^2 + \frac{1}{2}e_{i2}^2$) allows for the possibility players will exert effort at – and value – multiple activities.

Fourth, we assume, in addition to comparing themselves to one another, players also compare themselves to a background population of n agents. As an extension, in Section 3, we consider a many-player version of the model. In that case, the behavior of the entire population is made endogenous. We need a background population ($n > 0$) for the two-player version of the model because, if $n = 0$, it is impossible for both players to be above average at an activity. This rules out equilibria in which the agents focus on the same activity. The effect of an increase in n, as mentioned above, is that it decreases the extent to which players compare themselves to one another and, consequently, makes them more willing to conform to one another.

Fifth, in the model, there is a discrete choice whether to value an activity or not. It might be more realistic had we assumed players can value activities more or less: for instance choose $\theta_{is} \in [0, 1]$ rather than $\theta_{is} \in \{0, 1\}$. In fact, we can allow agents to choose values from the unit interval. Doing so, has no effect on the outcome/equilibria: since players will always choose to place maximal or minimal value on activities. We would see players valuing activities more or less, however, if, additionally, we assumed it is costly to value an activity more. It would be a worthwhile extension to consider this case.

Sixth, just as players' values might be made less discrete, it might also be worthwhile as an extension to consider a case in which interaction is more continuous. In such an extension, the amount player i cares about how he is esteemed by player j would depend upon the intensity of interaction.

Seventh, values are completely flexible in the model. In reality, though, values are not completely flexible. In particular, some values are probably universal and hard-wired. We consider the case of complete flexibility for simplicity, but we might capture such lack-of-flexibility by placing constraints on players' choice of values.

Finally, the model is static. We consider changes to the system – but through comparative

static exercises. The comparative statics correspond to a dynamic setup in which agents can change values from one period to the next at low cost. This approach has the benefit of simplicity; and it produces results we consider sensible. It is possible, however, that some insight could be gained from a dynamic version of the model, in which the cost of changing values is high rather than low.

2.3   Properties of Equilibria

The rest of Section 2 is organized as follows. First, we will relate four properties possessed by equilibria, regarding respectively: values, effort, esteem, and interaction. The constraints imposed by these properties will enable us to succinctly describe the equilibrium set; at the same time, they yield intuition regarding many aspects of the equilibria. In Section 2.4 we will characterize the set of equilibria and relate our main results.

Values

In equilibrium, players only value activities when their achievement is above average. It is optimal for them to value activities when their achievement is above average: since that boosts self-esteem. Correspondingly, it is not optimal for them to value activities when their achievement is below average: since that lowers self-esteem. The following lemma summarizes. Formal proofs are given in the Appendix.

Lemma 1. *In equilibrium, players value activities ($\theta_{is}^* = 1$) if and only if their achievement is above average ($a_{is}^* - \bar{a}_s^* > 0$).*

As we will see presently, players value at most one activity in equilibrium. We will refer to players who value academics as "scholars" and players who value music as "musicians."

Effort

Players focus their effort exclusively on one activity in equilibrium (whichever has the highest esteem-returns to effort). They do not necessarily choose to focus on the same activities.[13]

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[13]As mentioned in Section 2.2, this result can be weakened with only slight amendment to the model. We focus on the case where players focus all their effort on one activity for simplicity.

Players may or may not value the activities that are their focus (it depends upon whether their achievement is above or below average). They never value the activities that are not their focus: since their achievement at those activities is always below average. The following lemma gives further detail.

Lemma 2. *Let M_{i1} and M_{i2} denote the marginal esteem-returns to effort at academics and music respectively. An equilibrium must satisfy the following conditions:*

(1) If $M_{i1} \geq M_{i2}$, player i focuses on academics and does not value music:

$$e_{i1}^* = M_{i1}, \ e_{i2}^* = 0,$$

$$\theta_{i2}^* = 0.$$

(2) If $M_{i1} < M_{i2}$, player i focuses on music and does not value academics:

$$e_{i1}^* = 0, \ e_{i2}^* = M_{i2},$$

$$\theta_{i1}^* = 0.$$

Furthermore:

$$M_{i1} = \left(\theta_{i1}^* + G(x_1^*, x_2^*) \cdot \theta_{j1}^*\right)\left(\tfrac{n+1}{n+2}\alpha_i\right) \ and \ M_{i2} = \left(\theta_{i2}^* + G(x_1^*, x_2^*) \cdot \theta_{j2}^*\right)\left(\tfrac{n+1}{n+2}\right).$$

Lemma 2 shows formally what we asserted earlier: that players focus on the activity with the highest esteem-returns to effort (M_{is}). It also shows that the esteem returns to effort at an activity are higher when: (1) a player is more able at the activity; (2) a player personally values the activity ($\theta_{is}^* = 1$); and (3) a player interacts with another player who values the activity ($\theta_{js}^* = 1$ and $G = 1$).

Observe that it will not be necessary when we describe equilibria to specify how much effort players exert (e_1^* and e_2^*): since, if we know the values players hold (θ_1^* and θ_2^*) and whether they interact ($G(x_1^*, x_2^*)$), Lemma 2 allows us to deduce e_1^* and e_2^*.

Esteem

Self-esteem is always positive in equilibrium ($E_i^i \geq 0$), since players are above average at activities they value. Players' esteem for one another, on the other hand, may be positive or negative. When players hold the same values ($\theta_1^* = \theta_2^*$), they positively esteem one another

$(E_i^j \geq 0)$. In fact, esteem judgments exactly coincide $(E_i^1 = E_i^2)$. When players hold different values $(\theta_1^* \neq \theta_2^*)$, achievement is below average at activities valued by the other player. So, players negatively esteem one another $(E_i^j \leq 0)$. This means that players who value academics will look down on players who value music (and vice-versa). The following lemma gives more detail.[14]

Lemma 3. *In equilibrium:*

(1) *Players have positive self-esteem $(E_i^i \geq 0)$. Players have strictly positive self-esteem $(E_i^i > 0)$ when they value academics or music.*

(2) *Players positively esteem one another $(E_i^j \geq 0)$ when they hold the same values $(\theta_1^* = \theta_2^*)$. Their esteem judgments also coincide $(E_i^1 = E_i^2)$. They have strictly positive esteem for one another when, additionally, they value academics or music.*

(3) *Players negatively esteem one another $(E_i^j \leq 0)$ when they hold different values $(\theta_1^* \neq \theta_2^*)$.*

Interaction

When both players value academics or when both players value music, they positively esteem one another and are therefore inclined to interact. If there is a positive but negligible cost of initiating interaction $(k = 0^+)$, they will interact in equilibrium. On the other hand, when one player values academics and the other values music, they will be disinclined to interact. If there is a positive but negligible cost of initiating interaction, they will not interact in equilibrium. The following lemma summarizes.

Lemma 4. *Suppose there is a positive but negligible cost of initiating interaction $(k = 0^+)$. If both players value academics or both value music $(\theta_{i1}^* = \theta_{j1}^* = 1$ or $\theta_{i2}^* = \theta_{j2}^* = 1)$, they will interact in equilibrium $(G(x_1^*, x_2^*) = 1)$. If one player values academics and the other values music $(\theta_{i1}^* = 1$ and $\theta_{j2}^* = 1)$, they will not interact in equilibrium $(G(x_1^*, x_2^*) = 0)$.*

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[14]Since, in reality, some people seem to suffer from negative self-esteem (see, for instance, Owens (1994)), it is worth commenting briefly on the model's prediction that players will have positive self-esteem $(E_i^i \geq 0)$. The model assumes players face no constraints in their choice of values. As we mentioned in Section 2.2, realistically, people probably face some. In an amended version of the model, in which players face constraints, they could have negative self esteem $(E_i^i < 0)$: since they might then value activities where their achievement is below average.

More generally, there is a tendency for players with the same values to interact: since they positively esteem one another. Whether players interact will also be governed, though, by the cost of interaction (k).

2.4 Equilibria and Comparative Statics

We will now characterize the equilibria of the game and consider the model's comparative statics. First, we will discuss the case in which there is a negligible cost of initiating interaction ($k = 0^+$). We will consider comparative statics in players' ability. Then, we will examine the more general case, in which the cost of initiating interaction (k) may be positive or negative. The more general case allows us, additionally, to consider comparative statics in k.

2.4.1 Negligible Cost of Interaction ($k = 0^+$)

We begin by examining the case in which there is a positive but negligible cost of initiating interaction ($k = 0^+$). Let us develop some intuition before describing the results.

As mentioned in the introduction, there is a basic tension in the model: between players' desire to conform, on the one hand, and players' desire to differentiate, on the other. To illustrate, suppose the first player chooses to become a scholar. The first player's choice might incline the second player to conform and become a scholar as well: since doing so would earn him more esteem from the first player. However, the first player's choice might disincline the second player to focus on academics: since it is harder to obtain self-esteem at an activity on which others are focused. More generally, concern about self-esteem drives players to differentiate; concern about receiving peer esteem drives players to conform.

Our results are driven by this tension. In particular, players are relatively willing to conform when they possess similar ability. But, when one player's ability far exceeds the other's, there is a strong temptation on the part of the less able player to differentiate.

Figure 1 illustrates the equilibria that arise as a function of the players' abilities (α_1 and α_2) for a representative case in which $n = 4$ (blank spaces are regions where equilibria do not exist). Corresponding to Figure 1, Proposition 1, stated at the end of the section (on page 16), formally characterizes the set of equilibria. We see that if one player is considerably more able than the other at academics, the more able player becomes a scholar, the less able player becomes a

14

musician, and they do not interact. If, on the other hand, the players possess similar ability (α_1 close to α_2), they focus on and value the same activity. If both have high academic ability, they become scholars and interact. If both have low academic ability, they become musicians and interact. If both have intermediate ability, they either become scholars or musicians and interact. Either is an equilibrium in this case, because of the players' desire to conform to one another.
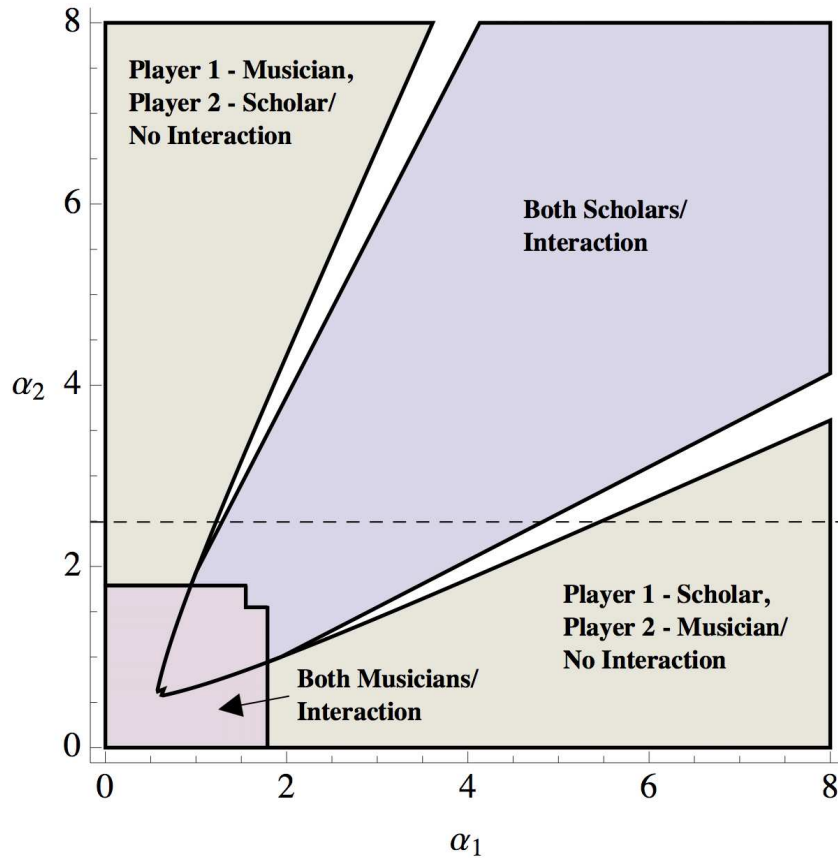

Figure 1: Players' equilibrium behavior. (Blank spaces are regions where equilibria do not exist; the dotted line is used in the discussion of comparative statics.

Several observations are worth making. First, equilibria exist in which a player who is more able at academics than music ($\alpha_i > 1$) nonetheless becomes a musician out of a desire to differentiate from the other player, who is a scholar.

Second, equilibria arise in which *both* players are superior at academics ($\alpha_1, \alpha_2 > 1$) but both,

nonetheless, become musicians. In such equilibria, each player chooses to become a musician out of a desire to conform to the other. We also see equilibria in which both players become academics despite superior musical ability.

Third, multiple values can arise. More specifically, for some (α_1, α_2) pairs, equilibria exist in which both players value academics *and* equilibria exist in which both players value music. These values almost always differ in the welfare they give to players. If the players are more able at academics (music), they are both better off in the equilibrium in which academics (music) is valued.

Finally, it should be noted that two cases covered by Proposition 1 – the $n = 0$ and $n = 1$ cases – look different from Figure 1. The players' have a strong desire to differentiate from one another when the population is small. As a result, when $n = 0$ or 1, players always differentiate in equilibrium. Furthermore, when $n = 0$, the desire to differentiate is sufficiently intense that equilibria arise in which the player who is more able at academics becomes a musician while the player who is less able becomes a scholar.

Proposition 1. *Suppose there is a positive but negligible cost of initiating interaction: $k = 0^+$. And suppose, without loss of generality, player 2 is more able than player 1 at academics ($\alpha_2 \geq \alpha_1$).*

(1) *When the players have low academic ability, equilibria exist in which both are musicians and interact. More specifically, existence requires: $\alpha_2^2 \leq 4(\frac{n}{n+1})$ and $\alpha_1^2 < 4(\frac{n-1}{n+1})$.*

(2) *When the players have high academic ability and their academic abilities do not differ too much, equilibria exist in which both are scholars and interact. More specifically, existence requires: $\frac{2\alpha_1^2}{n+1} + \frac{1}{4} < \alpha_2^2 < \frac{3}{4}(n+1)\alpha_1^2$, and $\alpha_2^2 \leq (n+1)(\alpha_1^2 - \frac{1}{4})$.*

(3) *When player 2 has relatively high academic ability and player 1 has relatively low academic ability, an equilibrium exists in which player 1 is a musician, player 2 is a scholar, and they do not interact. More specifically, existence requires: $\alpha_2^2 \geq \max\left(\frac{4n}{n+1}, (n+1)(\alpha_1^2 - \frac{1}{4})\right)$.*

(4) *When $n = 0$ and $\alpha_1^2 \geq \alpha_2^2 - \frac{1}{4}$, an equilibrium exists in which player 1 is a scholar, player 2 is a musician, and they do not interact.*

Comparative Statics

We will now examine the effects of changes in own ability and changes in peer ability on behavior.

The dotted line in Figure 1 gives the key comparative static. It shows the effect of a change in the first player's academic ability (α_1) on the equilibrium. Player 2 is a scholar when α_1 is low, while player 1 is a musician. An increase in α_1 from a low level to an intermediate level causes player 1 to become a scholar as well. With α_1 in this intermediate range, players interact and share the same values. If α_1 increases further, however, player 2 switches from scholar to musician since he finds it hard to compete against player 1.
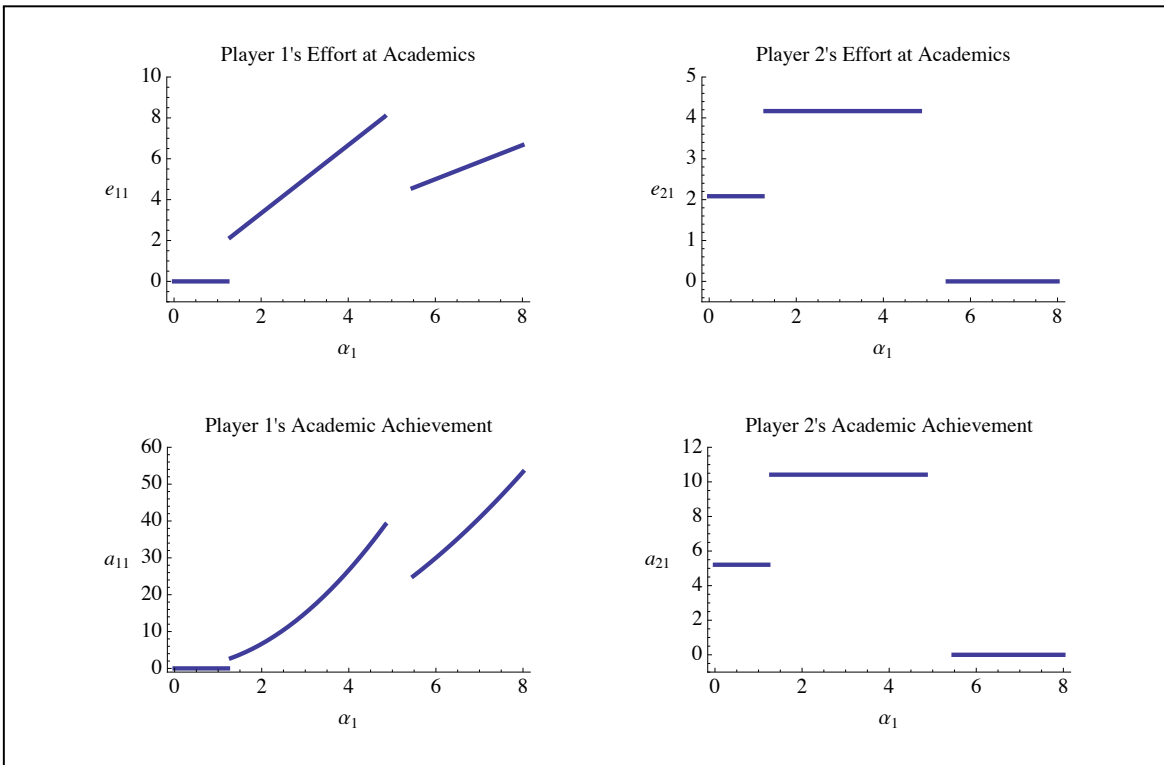

Figure 2: How players' effort and achievement change with α_1 (along Figure 1's dotted line).

Figure 2 shows how players' effort and achievement at academics change with α_1 along Figure 1's dotted line.[15] Player 1's effort and achievement at academics are increasing in his ability with one exception: both drop discontinuously when player 2 becomes a musician. Player 2 exerts

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[15]Recall that we can deduce players' effort and achievement from Lemma 2.

some effort at academics when α_1 is low (since he is a scholar); he exerts more effort at academics when α_1 is in the intermediate range (since, additionally, he has a peer who is a scholar); he exerts no effort at academics when α_1 is high (since he is a musician).[16] His academic achievement, in consequence, is increasing in his peer's ability when α_1 is low and decreasing in his peer's ability when α_1 is high.

This nonmonotonicity, it should be noted, can be understood in terms of the competing desires to conform and differentiate. Achievement is increasing in peer ability when α_1 is low because the desire to conform dominates, while achievement is decreasing in peer ability when α_1 is high because the desire to differentiate dominates.
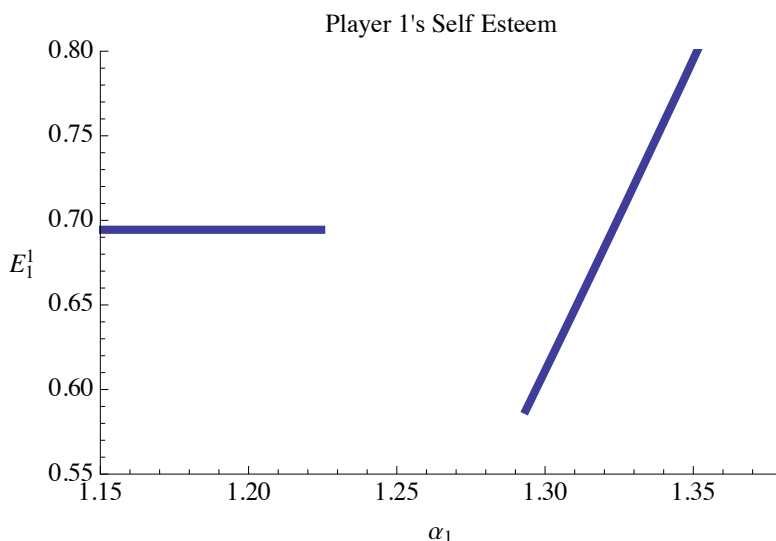

Figure 3: How player 1's self-esteem (E_1^1) changes with α_1 along Figure 1's dotted line (in the region where player 1 switches from music to academics).

Perhaps contrary to intuition, self-esteem is non-monotonic in own ability. Figure 3 illustrates. It shows player 1's self-esteem (E_1^1) along Figure 1's dotted line, focusing on the region in which player 1 switches from music to academics. We see that self-esteem initially drops when player 1 switches from music to academics, even though his ability increases. The reason for this drop is

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[16]A natural question is why, in Figure 2, player 2's effort at academics is constant in the middle interval. We might expect player 2's effort to rise over the interval, as player 1's academic achievement rises. Player 2's effort would be rising over the interval if U_i were a concave function of E_i. However, when U_i is a linear function of E_i, as we have assumed for simplicity, the marginal esteem returns to effort at academics (M_{i1}) do not depend upon the other player's academic achievement (see Lemma 2), which results in constant effort over the interval.

that player 1 is willing to sacrifice self-esteem because he receives something else in return: more esteem from his peer.

2.4.2 Positive or Negative Cost of Interaction

We turn now to the general case, in which the cost of initiating interaction (k) may be positive or negative. The general case allows us additionally to consider comparative statics in k (i.e., the consequences of encouraging/discouraging interaction between players).

Once again, the results are driven by players' competing desires to conform and differentiate. When k is high, players will not interact, and thus will be unconcerned about receiving the other player's esteem. They will, in consequence, be inclined to differentiate. When k is low, they will interact, and will therefore be more inclined to conform.[17] As we will see presently, the result is that encouraging interaction (decreasing k) makes it more likely players will focus on and value the same activities.

Our analysis is divided into three cases. First, we will characterize the equilibria when one of the players has high academic ability; then, we will characterize the equilibria when one of the players has low academic ability; finally, we will consider the case in which both players have intermediate ability.

Case 1. *One of the players has high academic ability.*

Suppose one of the players – for instance, player 2 – has high academic ability ($\alpha_2 > \bar{\alpha}_H$, where $\bar{\alpha}_H$ is defined as follows: $\bar{\alpha}_H = \sqrt{\frac{4n}{n+1}}$ for $n > 2$; $\sqrt{3}$ for $n = 2$; and ∞ for $n < 2$). Player 2 will always be a scholar. The behavior of player 1, in contrast, depends upon α_1 and k.

Figure 4 illustrates the equilibrium behavior of player 1 as a function of α_1 and k for a representative case (in which $\alpha_2 = 3$ and $n = 2$). Corresponding to Figure 4, Proposition 2, stated at the end of the section (on the next page), formally characterizes the set of equilibria.

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[17]The preceding intuition can be stated more formally, as follows. Consider a modification of the two-player game of this paper in which players do not choose whether to initiate interaction: instead x_1 and x_2 are exogenously given. (1) If the players do not interact ($G(x_1, x_2) = 0$), the game exhibits strategic substitutability. (2) If the players do interact ($G(x_1, x_2) = 1$), the game does not exhibit strategic substitutability; in the limit as the size of the background population $n \to \infty$, the game exhibits strategic complementarity. The game exhibits strategic complementarity in the limit because players' desire to differentiate from one another decreases as the population size increases.
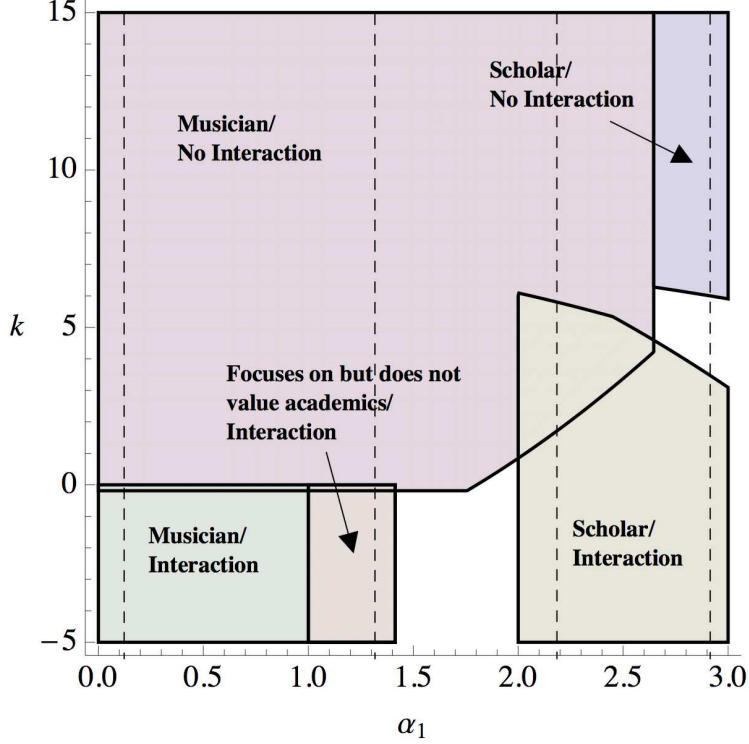
Figure 4: Player 1's equilibrium behavior. (Blank spaces are regions where equilibria do not exist; the dotted lines are used in the discussion of comparative statics.)

As one might expect, the players do not interact when it is costly to do so (k is high); they do interact when it is not costly (k is low). Player 1 becomes a musician when his academic ability is low (α_1 low); and he becomes a scholar when his academic ability is high (α_1 high). When k is low – so that the players interact – and player 1's ability is in an intermediate range, player 1 exerts effort at academics so player 2 will esteem him more highly. However, he chooses not to value academics, since his achievement is below average.

Proposition 2. *Suppose, without loss of generality, player 2 is more able than player 1 at academics ($\alpha_2 \geq \alpha_1$). If $\alpha_2 > \bar{\alpha}_H$, player 2 will always be a scholar in equilibrium. If, additionally,*

(1) The cost of interacting is sufficiently high ($k \geq \bar{k}_1$) and player 1's academic ability is sufficiently low ($\alpha_1^2 \leq 1 + \frac{2}{(n+1)}\alpha_2^2$): equilibria exist in which the players do not interact and player 1 is a musician.

(2) The cost of interacting is sufficiently high ($k \geq \bar{k}_2$) and player 1's academic ability is suf-

20

ficiently high ($\alpha_1^2 \geq 1 + \frac{2}{(n+1)}\alpha_2^2$): equilibria exist in which the players do not interact and player 1 is a scholar.

(3) *The cost of interacting is sufficiently low ($k \leq 0$) and player 1's academic ability is sufficiently low ($\alpha_1^2 \leq \frac{1}{4} + \frac{1}{2(n+1)}\alpha_2^2$, $\alpha_1 < 1$): equilibria exist in which the players interact and player 1 is a musician.*

(4) *The cost of interacting is sufficiently low ($k \leq \bar{k}_3$) and player 1's academic ability is sufficiently high ($\alpha_1^2 \geq \frac{1}{4} + \frac{1}{n+1}\alpha_2^2$, $\alpha_1^2 > \frac{4}{3(n+1)}\alpha_2^2$): equilibria exist in which the players interact and player 1 is a scholar.*

(5) *The cost of interacting is sufficiently low ($k \leq 0$) and player 1's academic ability is in an intermediate range ($1 < \alpha_1^2 < \frac{2}{3(n+1)}\alpha_2^2$): equilibria exist in which the players interact and player 1 focuses on but does not value academics.*

where:

$\bar{k}_1 = \frac{1}{2}\left(\frac{n+1}{n+2}\right)^2 \max\left(4\alpha_1^2 - \frac{4}{n+1}\alpha_2^2 - 1, -\frac{2}{n+1}\right),$

$\bar{k}_2 = \left(\frac{n+1}{n+2}\right)^2 \left(\frac{3}{2}\alpha_2^2 - \frac{1}{n+1}\alpha_1^2\right),$

$\bar{k}_3 = \left(\frac{n+1}{n+2}\right)^2 \min\left(\frac{3}{2}\alpha_2^2 - \frac{2}{n+1}\alpha_1^2, 2\alpha_2^2 - \frac{1}{2} - \frac{4}{n+1}\alpha_1^2\right).$

Comparative Statics

The four dotted lines in Figure 4 represent the possible consequences of encouraging interaction (decreasing k). If player 1's academic ability is sufficiently low, player 1 will be a musician regardless (see the first dotted line). Encouraging interaction has no effect on the behavior of either player.

If player 1's academic ability is slightly higher (the second dotted line), player 1 will choose to focus on academics – rather than become a musician – when interaction takes place. But, player 1 chooses not to value academics, since his achievement is below average.

If player 1's academic ability is higher still (the third dotted line), player 1 switches from being a musician to a scholar when interaction takes place. Interaction causes player 1 to value academics as well as focus on it, in contrast to the second dotted line. Player 2 is also affected by interaction in this case: he exerts more effort at academics, motivated as he is by the desire

to be highly esteemed by his peer (who also values academics).[18,19]

Finally, if player 1's academic ability is sufficiently high (the fourth dotted line), both players will be scholars regardless of whether they interact. But, interaction does affect players' effort. Both exert more effort at academics: since they are motivated by a desire to obtain the other player's esteem.

Case 2. *One of the players has low academic ability.*

The second case closely mirrors the first, so we will cover it in less detail. Suppose one of the players – say, player 1 – has *low* academic ability ($\alpha_1 < \bar{\alpha}_L$, where $\bar{\alpha}_L$ is defined as follows: $\bar{\alpha}_L = \sqrt{\frac{n+1}{4n}}$ for $n > 2$; $\sqrt{\frac{1}{3}}$ for $n = 2$; and 0 for $n < 2$). Then, player 1 will always be a *musician.*
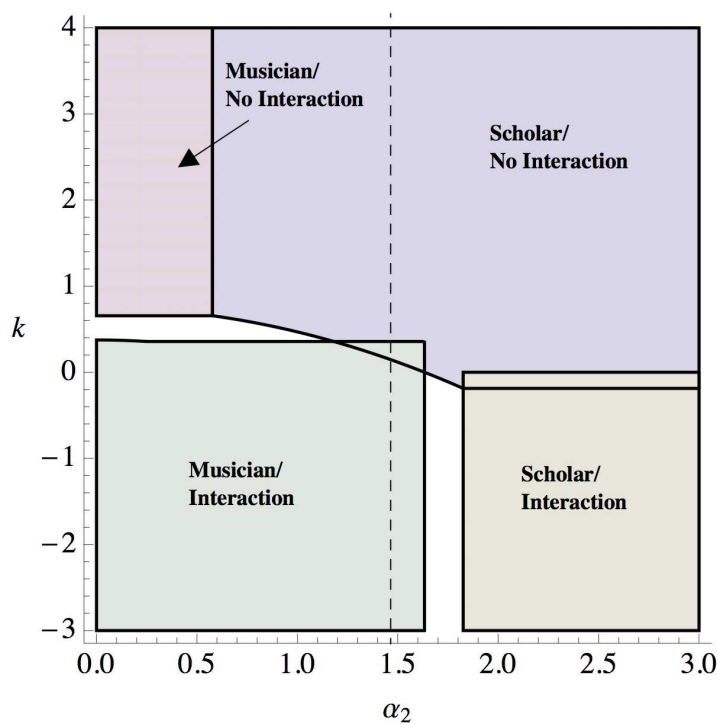

Figure 5: Player 2's equilibrium behavior. (Blank spaces are regions where equilibria do not exist; the dotted line is used in the discussion of comparative statics.)

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[18] According to Lemma 2, when the players do not interact, player 2 exerts effort $\left(\frac{n+1}{n+2}\right)\alpha_2$ at academics and his achievement is $\left(\frac{n+1}{n+2}\right)\alpha_2^2$; when the players do interact, player 2 exerts effort $2\left(\frac{n+1}{n+2}\right)\alpha_2$ at academics and his achievement is $2\left(\frac{n+1}{n+2}\right)\alpha_2^2$.

[19] Goffman (1959) would call this a form of "presentation of self." One contribution of this paper is to capture such motivation and show some of its consequences.

Just as Figure 4 illustrated the equilibrium behavior of player 1 when player 2's academic ability was high, Figure 5 illustrates the equilibrium behavior of player 2 when player 1's academic ability is low. It depicts a representative case in which $\alpha_1 = \frac{1}{4}$ and $n = 2$. Proposition A1, stated in the Appendix, corresponds to Figure 5 and formally characterizes the set of equilibria.

The comparative statics are analogous to those in the first case. In the first case, interaction made it more likely player 1 would focus on and value academics. In this case, interaction makes it more likely player 2 will focus on and value *music*. The dotted line in Figure 5 shows that interaction causes player 2 to switch from a scholar to a musician when he has intermediate academic ability.

The one (small) difference between this case and the previous is that no equilibria arise in which player 2 focuses on an activity but does not value it. The reason for this difference is that, in contrast to academics, the players have the same musical ability.[20]

Case 3. *Both players have intermediate academic ability.*

When both players' abilities are in an intermediate range ($\bar{\alpha}_L \leq \alpha_1, \alpha_2 \leq \bar{\alpha}_H$), it is not possible to draw a representative picture – in two dimensions – of the equilibrium set. However, we can still characterize the equilibrium set fully and examine the model's comparative statics. Importantly, as in the previous two cases, encouraging interaction makes it more likely players will focus on and value the same activities. This is stated formally in the following lemma.

Lemma 5. *Hold α_1 and α_2 fixed. Suppose a decline in k causes the players to move from an equilibrium in which they were not interacting (equilibrium 1) to an equilibrium in which they do interact (equilibrium 2). Such a decline in k makes it more likely that the players will focus on the same activity and will hold the same values. More specifically, if players do not focus on the same activity (hold the same values) in equilibrium 2, they definitely do not focus on the same activity (hold the same values) in equilibrium 1.*

Proposition A2, stated in the Appendix, fully characterizes the equilibrium set for the case where $\bar{\alpha}_L \leq \alpha_1, \alpha_2 \leq \bar{\alpha}_H$.

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[20]The logic is simple. Because the players have identical musical ability, they will have the same level of achievement whenever they both focus on music. It follows that player 2 will always value music when he focuses on it – since his achievement will never be below average.

3   An Extension: Many Players

In this section, we extend the basic model to consider a game with many players and $M \geq 2$ activities. In contrast to the basic model, in which there was a background population whose actions were fixed, in this case, the behavior of the entire population will be determined endogenously.

We assume there is a continuum of players ($i \in [0,1]$). As before, players make three choices: (1) effort at M activities ($e_{is} \geq 0$), (2) whether to value achievement at activities ($\theta_{is} \in \{0,1\}$), and (3) whether to initiate interaction ($x_i^j \in \{0,1\}$, $j \neq i$). x_i^j denotes i's choice whether to initiate interaction with j; players interact if either initiates it. We will focus on a simple case, in which all of the players have ability of 1 at all activities. Therefore, player i's achievement at activity s is equal to his effort: $a_{is} = e_{is}$ for all i and s.

The players have the following utility function, the terms of which are analogous to those in the basic model:

$$U_i = -\frac{1}{2}\left(\sum_{s=1}^{M} e_{is}\right)^2 - k\bar{x}_i + E_i.$$

The first term is the cost of effort. The second term is the cost of initiating interaction: $\bar{x}_i$ denotes the share of the population with whom player i initiates interaction. The final term is esteem utility.[21]

Esteem utility, in this case, is given by:

$$E_i = \beta E_i^i + \int_{j \neq i} G(x_i^j, x_j^i) \cdot E_i^j dj$$

where $G(x_i^j, x_j^i) = 1$ if interaction takes place between players i and j (if x_i^j or $x_j^i = 1$) and $G(x_i^j, x_j^i) = 0$ otherwise. The first term reflects player i's concern about self-esteem (E_i^i). The second term reflects player i's concern about peer esteem (E_i^j). β parameterizes the weight player i places on self-esteem relative to peer esteem. As before, the esteem player i grants a player l – l may refer to himself or another player – is given by: $E_l^i = \sum_{s=1}^{M} \theta_{is}(a_{ls} - \bar{a}_s)$, where $\bar{a}_s$ denotes the average achievement of the whole population at activity s.

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[21] For the sake of simplifying analysis, we assume players prefer not to exert effort at activities or value activities when they are otherwise indifferent.

Equilibria

Once again, we will consider pure-strategy Nash equilibria. We will characterize the equilibrium set when there is a positive but negligible cost of initiating interaction ($k = 0^+$). It is easy to show that all equilibria have the following two properties: (1) players value one activity in equilibrium and interact exclusively with those who value the same activity; (2) players who value activity s exert effort $\lambda_s + \beta$ at activity s, where λ_s denotes the fraction of players who value activity s; they exert zero effort at other activities; and they receive utility $\left(\frac{1}{2} - \lambda_s\right)(\lambda_s + \beta)^2$.[22,23] Given these equilibrium properties, we can refer to the players who value an activity s as a "group of size λ_s."

We will focus, for simplicity, on characterizing the equilibria in which the players divide into groups of equal size.[24]

Proposition 3. *Suppose there is a positive but negligible cost of initiating interaction ($k = 0^+$). The following is a characterization of the equilibria in which all groups are of equal size.*

(1) Equilibria exist in which the players divide into M groups, each of size $\frac{1}{M}$.

(2) If $\beta < 1$ and $\bar{m} < m < M$: equilibria exist in which the players divide into m groups, each of size $\frac{1}{m}$. $\bar{m}$ solves: $\left(\frac{1}{2} - \frac{1}{m}\right)\left(\frac{1}{m} + \beta\right)^2 = \frac{1}{2}\beta^2$.

According to Proposition 3, players may divide across all M activities in equilibrium, or across a subset. As concern about self-esteem (β) increases, $\bar{m}$ increases. In this sense, the equilibrium number of groups is rising in β. This result follows intuitively, since players have a stronger desire to differentiate when β is higher.

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[22]It is easy to show that players in a group of size λ_s receive utility $\left(\frac{1}{2} - \lambda_s\right)(\lambda_s + \beta)^2$. Since a fraction λ_s of the population has an achievement level of $\lambda_s + \beta$ at activity s, and the rest of the population has zero achievement at activity s, the average achievement is: $\bar{a}_s = \lambda_s(\lambda_s + \beta)$. It follows that, if player i is in a group of size λ_s, his self-esteem is $E_i^i = (1 - \lambda_s)(\lambda_s + \beta)$. Player i is accorded the same esteem by those in his group as he accords himself, since they share the same values: $E_i^j = (1 - \lambda_s)(\lambda_s + \beta)$ for all j in i's group. Therefore, the total esteem utility received by player i is: $E_i = (1 - \lambda_s)(\lambda_s + \beta)^2$. Player i's overall utility is equal to his esteem utility (E_i) minus the cost of effort, which is $\frac{1}{2}(\lambda_s + \beta)^2$. Hence: $U_i = \left(\frac{1}{2} - \lambda_s\right)(\lambda_s + \beta)^2$.

[23]More precisely, players who value activity s will interact in equilibrium with all players who hold the same values (except perhaps a set of measure 0); players who value activity s will not interact with players who hold different values (except perhaps a set of measure 0). Furthermore, when $M = 2$, it is possible that a set of players of measure 0 values no activity in equilibrium.

[24]More generally, there can be at most two group sizes in equilibrium. Suppose one group is of size $\bar{\lambda}$. This group gives members utility $\bar{U} = \left(\frac{1}{2} - \bar{\lambda}\right)(\bar{\lambda} + \beta)^2$. In equilibrium, all groups must yield the same utility: otherwise, players would want to switch groups. Observe that there is at most one other value of λ that yields $\bar{U}$.

The group size that maximizes players' utility is: $\lambda^* = \max\left(\frac{1-\beta}{3}, \frac{1}{M}\right)$. It follows from Proposition 3 that group size may be larger than, or smaller than, the optimum. It should be noted that, while the prediction groups may be suboptimally large is quite robust, the prediction that groups may be suboptimally small is not. This finding depends upon players having zero mass. If players had non-zero mass, they would deviate to form larger groups when the groups are suboptimally small. Hence, these equilibria disappear under a suitable equilibrium refinement.

4 Illustrations

We will now consider three illustrations of the model.

Schools

James Coleman's (1961) *Adolescent Society*, based upon research conducted in ten Illinois schools, demonstrated the importance of student culture – their values and interactions – for academic achievement. In so doing, he opened up a new area in the sociology of education. Coleman understood that students face a conflict between conforming and differentiating. His empirical findings in *Adolescent Society* provide strong evidence of such a conflict; they also closely match the model's predictions. More recent studies such as Milner (2004) and Crosnoe (2011) – appropriately titled *Fitting in, Standing Out* – also stress the importance of the tension between conforming and differentiating.

Using questionnaires, Coleman looked at the self-esteem of students at the ten schools he studied. As one might expect, students in the "leading crowd" had high self-esteem. Students distant from the leading crowd, it turns out, also had high self-esteem. The students in the middle, who were associated with, but not solidly members of, the leading crowd, had the lowest self-esteem.[25]

Coleman's explanation for this pattern is exactly in line with our model. He argues that students who are distant from the leading crowd restore self-esteem by adopting different values (differentiating): "Rather than continuing to hold a negative image about himself, the adolescent...will focus his interest on [activities] where he can feel good about himself." He finds, in

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[25] Coleman measured self-esteem by asking students whether they would prefer to be someone else.

line with this view, that only a small fraction of students distant from the leading crowd want to be part of it (in senior year, just 12 percent). Furthermore, Coleman argues that students in the middle – who conform to the leading crowd's values, but receive only limited acceptance – are willing to suffer low self-esteem because, in exchange, they receive more esteem/status within the school as a whole.

Our model is capable of reproducing precisely the pattern Coleman observed. Suppose we think of α in the model as ability to fit into the leading crowd rather than ability at academics. Then, Figure 3 looks just like Coleman's findings. The high-α types in Figure 3 are like a leading crowd (and have high self-esteem); the low-α types adopt different values (and also have high self-esteem); those in the middle try somewhat unsuccessfully to fit in with the high-α types (and have low self-esteem).

Coleman believed – and our model predicts – that students sometimes conform to peers and sometimes differentiate. If true, it reconciles seemingly contradictory results on peer effects in schools. Many studies report large, positive effects of having peers with higher academic ability. For instance, looking at a large matched panel of third-to-sixth graders in Texas public schools, Hanushek et al. (2003) find that a one standard deviation increase in average peer test score leads to a 0.20 standard deviation increase in own test score. But a significant minority of studies, instead, report negative effects. Carrell et al. (2013), for example, find negative peer effects in an experiment conducted at the US Air Force Academy. Some students were put into squadrons that were positively sorted by academic ability while others were put into squadrons that were negatively sorted. The lowest ability students – those in the bottom third – performed worse under negative assortment (i.e., when they had more able peers). Their GPAs were 0.061 points lower. Carrell et al. also examined social interactions within squadrons: looking, specifically, at friendships, roommate selection, and choice of study partners. In keeping with the model's predictions (see Figure 1), students avoided interaction with peers of different ability. The negatively selected squadrons divided into homogeneous subgroups.[26]

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[26]Hoxby and Weingarth (2005) report results similar to those of Carrell et al. (2013). They find that the worst students (those in the bottom decile) benefit more from having additional mediocre peers (peers in the 15th percentile) than they do from having additional high ability peers (peers in the 85th percentile). A ten percentage point increase in the share of peers scoring in the 15th percentile generates 4.5 more test points than the same size increase in the share of peers in the 85th percentile. 4.5 test points translates to 0.185 standard deviations: a substantial difference.

Other studies that have found negative peer effects include: Kling et al. (2005, 2007), who study the Moving to

27

The social organization of students, following *Adolescent Society*, has become a major focus of education scholarship. Numerous studies document subgroups within schools and describe their distinct values (see, for example, Eckert (1989), Milner (2004), and Crosnoe (2011)).[27] Other studies have explored the relation between the social structure and particular behaviors, including bullying (see Paluck and Shepherd (2012)), substance abuse (see Barber, Eccles, and Stone (2001)), and enrollment in math courses (see Frank et al. (2008)).[28]

The role of social organization in the success of Catholic – relative to public – schools has received particular attention. While public schools (see Powell et al.'s *Shopping Mall High School* (1985)) are somewhat comparable to the Catholic schools in educating students at the top, Catholic schools have greater success with students at the bottom. Altonji et al. (2005), for instance, found that attending a Catholic school, rather than a public school, substantially decreased the chance of dropout (by at least five percentage points).

The cohesiveness of the Catholic schools (relative to the public schools) is a frequently cited reason for their greater success (see especially Bryk et al. (1993), Lesko (1988), and Coleman, Hoffer, and Kilgore (1982)). This difference is due, in significant measure, to the public schools' greater permissiveness in choice of curriculum. Such choice allows the best students to separate themselves out (for example, into AP programs). Bryk et al. (1993) construct 23 separate measures of cohesiveness, all of which are greater for the Catholic schools.[29] It has been suggested that this cohesiveness especially makes students at the bottom more academically oriented, and, hence, less inclined to drop out.

The model captures this story. We can think of Catholic schools as an environment where k is low: since students of differing ability are more or less forced to interact. As we saw in Figure 4,

Opportunity (MTO) experiment; Cicala et al. (2011), who examine evidence from the New York Public Schools; and Lavy et al. (2012), who look at data on English secondary school students. Some studies, such as Kling et al. (2005, 2007), find negative peer effects for boys and positive peer effects for girls. The model suggests two possible explanations for these gender differences. The first explanation is that there may be differences between men and women in the economic part of the utility function. For instance, in the MTO experiment, the girls might be more attached to the labor force than the boys because of a need – or expected need – to support children. The second explanation is that there may be a difference between men and women in the non-economic part of the utility function. In particular, males may care more about self-esteem while women may care more about obtaining esteem from peers. Some social scientists, such as Gilligan (1982), Maccoby (1990), and Giordano (2003), have postulated the existence of such a difference.

[27] See also Brown and Klute (2003), Steinberg, Brown, and Dornbusch (1996), and Kinney (1999).

[28] See also Kreager (2008), Crosnoe, Muller, and Frank (2004), Watt (2003), Harris, Duncan, and Boisjoly (2002), and Bearman and Bruckner (2001).

[29] For example, Bryk et al. (1993) find that there is a higher likelihood in Catholic schools of a teacher knowing a given student; they also find that a greater fraction of students participate in extracurricular activities.

a low k can improve the performance of those at the bottom (the low-α types). Forced to interact with scholars, low-α types do not turn into musicians (i.e., they do not turn into likely dropouts). More generally, the model suggests that there is greater pressure to conform in Catholic schools; public schools allow more differentiation to take place.[30]

Thus, we have seen in this section the critical role of the tension between conformity and differentiation in "adolescent society," and its consequences for student performance. The predictions of the model seem to match empirical findings; remarkably, they are even consistent with rich micro-data on self-esteem and values.

The Decline of Inner Cities

One of the foremost problems in the United States has been the economic and social decline of the inner city. Many statistics are indicators: low rates of young male employment; high incarceration rates; and high incidence of out-of-wedlock births and single-parent households.

The leading explanation, given by William Julius Wilson, emphasizes the role of cultural change (see Wilson (1997, 2009)).[31] In Wilson's view, the decline of the inner city was primarily brought about by two shocks. One shock was deindustrialization, which began in the late 1960s. Manufacturing had been a locus of jobs especially well-suited for the low skilled, but willing-to-work. The other shock was middle-class flight: in the 1970s, significant numbers of middle-class African Americans left the inner city, as reduced discrimination made flight to the suburbs possible.

The resultant concentration of joblessness, in Wilson's view, led to the emergence of a street

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[30] Another strand of the education literature concerns the effects of tracking. A potential reason for tracking is that it allows teachers to tailor the curriculum to student abilities. But, there are also peer effects associated with tracking. For example, Kulik and Kulik (1992) suggest that being put in a low track allows low-ability students to avoid comparing themselves to more able peers, and therefore enhances their self-esteem. Thus, Kulik and Kulik (1992) believe tracking may increase the motivation of low-ability students. Other scholars (see Oakes (1985)) worry that a low track reduces student self-esteem, and as a result, decreases their motivation.

These competing peer effects can be understood in terms of the model. Kulik and Kulik's point corresponds to the potential positive effect on academic achievement in the model of having a less able peer (see Figure 2). Oakes' argument can be understood in an extension to the model, in which players have imperfect information about their relative achievement. In such an extension, receiving a negative signal about one's relative academic achievement could cause a decline in academic performance. Oakes' point is that being put in a low track might serve as just such a negative signal.

A recent experiment on tracking by Duflo, Dupas, and Kremer (2010), conducted in Kenya, finds positive effects of tracking for students in all quantiles.

[31] Other scholars who emphasize the role of culture include Anderson (1999), Massey and Denton (1993), Waters (1999), Patterson (2000), Wacquant (2008), Harding (2010), and Small, Harding, and Lamont (2010). Our model can also be seen as a response to Loury's (1998, 1999) view that economists need to incorporate values and social interactions into their analysis of the inner city.

culture, in opposition to mainstream values. This street culture allowed marginalized inner-city residents to retain a modicum of dignity; however, it further blocked opportunities. In Wilson's survey of 190 Chicago-area employers, for example, many indicate pessimism about the work ethic of inner-city workers and their consequent reluctance to hire there. Some even throw applications out solely on the basis of inner-city addresses.[32,33]

Our model captures the cultural response to concentrated joblessness described by Wilson.[34] Think of activity 1 in the model as working and activity 2 as street-related activity; and, think of player 1 as a low-skilled inner-city resident. Deindustrialization is a negative shock to player 1's ability to work (α_1). As we see in Figure 1, a reduction in α_1 can cause player 1 (the inner-city resident) to shift from an activity-1 (work) orientation to an activity-2 (street) orientation. In line with Wilson's story, player 1 changes his values in order to restore self-esteem.[35]

Middle-class flight operates differently in the model, but with similar effect. Additionally,

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[32] Waters (1999) finds that, among inner city residents, employers have a preference for hiring recent West Indian immigrants, whose values are less oppositional. In consequence, West Indian immigrants have a significantly higher rate of labor force participation. According to Waters, as West Indian immigrants assimilate, their differences relative to other inner city residents diminish: "Many of the children of the immigrants develop 'oppositional identities'....The cultural behaviors associated with these oppositional identities...erode the life chances of the children of the West Indian immigrants."

[33] As additional evidence of a cultural shift, Fryer and Levitt (2004) have found that, in the early 1960s, there was little difference between the types of names chosen by African Americans and whites for their children. But, a major shift took place in the late 1960s and early 1970s. The median African-American female in a segregated neighborhood in California went from receiving a name that was twice as likely to be given to African Americans as whites to receiving a name that was twenty times as likely to be given to African Americans as whites. At the same time, a subset of African Americans, comprising roughly one quarter of all African Americans and one half of African Americans living in predominantly white areas, moved towards names that were more white than those they had chosen previously. This latter finding suggests a cultural shift – in the opposite direction – among middle-class African Americans.

[34] Cognitive dissonance models (see especially Rabin (1994) and Benabou and Tirole (2011)) are also capable of capturing aspects of Wilson's story. They also predict a general decline in "work orientation" in response to the shocks described by Wilson. Importantly, however, there has not been a uniform decline in work orientation in the inner city. Many residents – perhaps the majority – have maintained a work orientation (see especially Harding (2007) and Newman (1999)). Our model differs in its predictions regarding which workers will retain a work orientation. In cognitive dissonance models, players lack a desire to differentiate; in consequence, having peers who are more work oriented always makes it more likely a person will hold a work orientation. A counterexample is found in the cases of Primo and Kyesha, discussed later in the section. Primo adopts a street orientation despite having coworkers who are highly work oriented; Kyesha adopts a work orientation even though her coworkers are less work oriented. Our model makes sense of these cases: Primo is inclined to differentiate because his ability is much lower than his coworkers' (see Figure 1); Kyesha is inclined to conform because her ability is similar to her coworkers'.

[35] The model suggests an explanation why amid the ups-and-downs of the business cycle, inner-city culture has not reverted back to the early 1960's. Think of both players 1 and 2 in Figure 1 as inner-city residents. Deindustrialization would have decreased the players' ability at activity 1 (work), causing a cultural shift. Imagine, though, that a reversion of employment opportunities returns the players to the region of Figure 1 where they were prior to deindustrialization. It is not a given that the culture will shift back: since, initially, the players might have been in a region of Figure 1 with multiple equilibria. Observe that a region exists in Figure 1 in which it is equilibrial for both players to hold an activity-1 (work) orientation and it is also equilibrial for both players to hold an activity-2 (street) orientation.

think of player 2 as middle-class. Correspondingly, we assume α_2 is relatively high. Middle-class flight is like an increase in the value of k: since it makes it more difficult for low-skilled inner-city residents to interact with the middle-class. Figure 4 shows that an increase in k can cause player 1 to shift from an activity-1 (work) orientation to an activity-2 (street) orientation.

Ethnographies show that motivations in the inner city comport with Wilson's story about inner-city culture and also our model's representation of it (see especially Bourgois (1996), Anderson (1999), Venkatesh (2006), and Liebow (1967)). Bourgois' classic *In Search of Respect*, for example, describes in especially fine detail the motivation of Primo, a Harlem crack dealer of the 1980s. In his early teens, Primo was highly motivated to pursue the "working-class dream of finding a... factory job and working hard for steady wages." He dropped out of junior high school to take a job in a garment factory: "I was just a kid, and it used to be stupid hot behind the steamer, but I liked'ed that job. The best job I had was in that factory." When the garment industry left New York, Primo had difficulty making the transition into the service sector and found it hard to deal with the lack of esteem he received in the jobs he managed to obtain. Working as a mailroom clerk, for instance, he is constantly humiliated by his boss: he is extremely upset, for instance, when he overhears her calling him illiterate; and she refuses to let Primo answer the phone because of his accent. Primo's response to his humiliation is to make a "cultural redefinition [whereby] crack dealing and unemployment [are] a badge of pride." Bourgois concludes: "by embroiling themselves in the underground economy and proudly embracing street culture, [people like Primo] are seeking an alternative to their social marginalization."[36],[37]

The model explains why some inner-city residents – those like Primo – shifted from work orientation to street orientation to restore self-esteem; it also predicts that, when people like Primo shift orientation, they will start looking down upon (assigning negative esteem to) inner-city residents with orientation towards work. This will put pressure on those inner-city residents to shift to a street orientation as well. Numerous scholars have described the existence of such social pressure. In particular, Fordham and Ogbu (1986) describe the use of the term "acting

[36]Primo is Dominican. Deindustrialization effected a cultural change among Dominicans living in inner cities, just as it did among African Americans.

[37]Significantly, Primo's interactions in the mailroom were largely with workers with much greater skill. The large gap between Primo's ability and the ability of his mailroom co-workers is an important reason why he differentiates, rather than conforms (see Figure 1).

white" as a pejorative.[38] Students who perform too well in school, for example, are so derided.[39]

Think of player 2 as an inner-city resident (rather than middle class with high α_2, as we did above). Figure 1 shows that a reduction in α_1 can cause both players – not just player 1 – to adopt a street orientation. Player 2 potentially adopts a street orientation in order to conform to player 1 (a type, like Primo, who is directly affected by deindustrialization). Importantly, it is less likely player 2 will adopt a street orientation if he is able to cut off interaction with player 1 (k is high): this is demonstrated by Figure 5.

In line with this prediction, Furstenberg et al. (1999) find that many parents deliberately practice a strategy of social isolation in order to keep their kids away from negative influences. Katherine Newman's (1999) portrait of workers at "Burger Barn" describes how their jobs protected them from negative influences. Burger Barn workers had a strong work orientation, according to Newman, which they were able to maintain despite being insulted and disrespected by street-oriented customers of their own age. Kyesha's story is particularly illustrative. When she first went to work at Burger Barn, she was a poorly-performing sophomore in high school, leaning towards a street orientation. Like the majority of her friends, she was at high risk of dropping out. She initially obtained the job only to pay for the clothes she wanted; but it profoundly changed her. Kyesha pulled away from her high school friends as Burger Barn became the center of her social life, and she ended up graduating (with a respectable average no less). She was able to hold a work orientation largely because Burger Barn provided an alternative group of friends (i.e., she had a high ability to cut off interaction with street-oriented types).[40]

The model thus captures the connection between deindustrialization, middle-class flight, cultural change, and subsequent joblessness in the inner cities, as posited by William Julius Wilson. We now turn to the topic of resistance.

Resistance in the Workplace and in Schools

Robert Ramsay's (1966) account of the merchant marines describes what might seem – at least to an economist – to be very strange scenes. It relates how: the catering staff would "heave a

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[38]See also Carter (2005), who tells a similar story in *Keepin' It Real.*

[39]Austen-Smith and Fryer (2005) construct a model of "acting white" in which some students obtain less education in order to signal loyalty to their peers. The mechanism they describe is very different from that in our model.

[40]Kyesha also has a desire to conform to the work orientation of other Burger Barn employees; this desire is particularly strong because these workers hold similar jobs and have similar training (i.e., their α's are similar). This contrasts with Primo, who differs considerably in ability from his mailroom coworkers.

whole pile of dirty dishes through an open port-hole instead of washing them"[41]; crewmen would intentionally foul up the tanks while cleaning them; stewards in charge of personal laundry would burn through shirts with an iron "by mistake"; and deck crews would "take a malicious delight" in painting over oil and water. According to Ramsay, these were acts of "resistance": just some of the ways in which the crew took out their anger at the ship's officers.

The types of acts that incensed the crew seem minor. Ramsay describes, for instance, their intense anger over a coffee percolator. The percolator in the crew mess broke; an old one was installed, in poor repair – retired from the officers' saloon. The reason for the anger, in Ramsay's view, was not the percolator itself but what it symbolized: "what enraged the crewmen was the knowledge that in the minds of those responsible [they] weren't even worth a cup of coffee."[42] In other words, the crew's anger and resistance stemmed from being denied the esteem they felt was due. Or, in terms of the model, E_i^i (the crew's self-esteem) exceeded E_i^j (the officers' esteem for them).

Workplace resistance has received relatively little attention in economics, but it is a major theme in sociology (for reviews, see Collinson and Ackroyd (2005) and Hodson (1995)). Forms of resistance include absenteeism (see Edwards (1986), Gouldner (1954)), pilfering (see Mars (1982), Westwood (1984)), sabotage (see Juravich (1985)), and hazing (see Vallas (2006)).[43,44] Scholars such as Hodson (2001, 1995) and Cavendish (1982) argue that denial of esteem is one of the primary reasons workers engage in resistance.[45] In *Dignity at Work*, for instance, Hodson argues that the search for dignity (E_i in the model) is one of the central motivations of workers; "resistance. . . is. . . a foundation for the defense and restoration of dignity."[46]

The model explains why workers would feel they had been denied the esteem they deserve

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[41]Ramsay (1966), p. 123.

[42]Op. cit., p. 99.

[43]Vallas (2006), for example, describes hazing at a paper mill, stemming from manual workers' anger at engineers, who accorded them low esteem. The manual workers taught a young engineer to press a particular black button whenever the paper machine went down, knowing full well that the button was not yet wired to the console. The manual workers "enjoyed the sight of this credentialed employee desperately pushing a useless button – a scene that went on for a period of several weeks."

[44]Some sociologists have used the term "resistance" to refer to shirking, which might be motivated by economic considerations (see, for instance, Burawoy (1979)). Nonetheless, the term is normally used to refer to behavior that is not purely economic in nature.

[45]Other scholars have stressed differences in values as a reason for resistance (see Scott (1985)). Observe that, in our model, a worker feels he has been denied the esteem due to him (that is, $E_i^j < E_i^i$) if and only if his values differ from those of management.

[46]Hodson (2001), p. 42.

$(E_i^j < E_i^i)$. In so doing, it accounts for the presence (or absence) of resistance in numerous settings. Let us consider two examples.

We have already examined, in terms of the model, the reasons Primo adopted a street orientation. When he worked in the mailroom, he felt entitled, because of his street orientation, to more respect than he received from coworkers $(E_i^j < E_i^i)$. Initially pleased to receive the mailroom job, Primo quickly became angry over his treatment: "So, you know, you try to do good, but then people treat you like shit...it's like, you get to hate your supervisor."[47] Primo engaged in numerous acts of resistance. For instance, he enjoyed putting on a thick accent and answering the phone – just to annoy his supervisor. Another act of resistance involved pocketing money he had been given to mail letters: "I used to do all the Express Mail. Yeah, it was nine dollars and thirty-five cents and they would give me ten dollars to take it to the post office. But instead, I would just slide the envelope through the Pitney-Bowes [postage-meter machine] and drop it in the nearest mailbox."[48] Not surprisingly, Primo's behavior quickly got him fired.

Resistance also occurs in schools. *Learning to Labor*, Paul Willis' (1977) study of "the lads" – a group of boys at a secondary school in the English Midlands – provides an example. The lads' working-class values stand in sharp contrast to the middle-class values of the teachers and other students (whom they pejoratively refer to as "ear'oles"). While the teachers' particularly stress the importance of academic achievement, the lads emphasize the importance of masculinity. They look down on the teachers, whom they consider effete.

The model helps us understand why the lads hold fast to working-class values. As Figure 5 shows, when one's peers are strongly attached to an activity-2 orientation and it is difficult to cut off interaction (k is low), one will feel pressured to adopt an activity-2 orientation as well. The lads face such pressure from their families. Spanksy, for example, describes how: "My old man called me an ear'ole once...It upset me it did...I'd like to be like him, you know."[49]

A consequence of their different values is that the lads feel the teachers accord them too little respect $(E_i^j < E_i^i)$. The disrespect they suffer provokes anger and resistance. They make it their aim to retaliate by defeating the school's "main perceived purpose: to make you 'work.'"[50] For

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[47]Bourgois (1996), p. 144.
[48]Op. cit., p. 155.
[49]Willis (1977), p. 74.
[50]Op. cit., p. 26.

instance, Fuzz (one of the lads) tries to thwart the teachers by never writing a single word: "I writ 'yes' on a piece of paper, that broke me heart."[51] During class, "there is a continuous scraping of chairs, a bad tempered 'tut-tutting' at the simplest request." Outside of class, the lads find other ways to make mischief. On one occasion, for example, they steal a fire extinguisher from the school and set it off in a local park. On another, they make a disturbance during a school assembly.[52]

Thus, while resistance is a phenomenon largely overlooked by economists, it is of considerable importance. As we have seen, the model accounts for the presence or absence of resistance in many settings.

5 Conclusion

Values play an important role in shaping behavior. But, our understanding of how they form and what causes them to change is far from complete. This paper makes progress towards that end. We assume people have the ability to choose their values. The choice of values in our model is motivated by economic considerations but, crucially, also by the desire for esteem. Since there is a strategic aspect to the choice of values, we consider this choice in the context of a two-player, simultaneous-move game.

A tension exists for players in the model between a desire, on the one hand, to conform in the choice of values and a desire, on the other hand, to differentiate. In conforming, a player obtains more esteem from his peer; in differentiating, a player may obtain more self-esteem.

The model's comparative statics are driven by this tension. Since players care more about conforming when they interact, encouraging interaction makes them more likely to focus on – and value – the same activities. An increase in peer ability can have a positive or negative effect on own achievement, depending upon whether the desire to conform, or the desire to differentiate, dominates. We find that own achievement is increasing in peer ability when peer ability is low and decreasing in peer ability when peer ability is high.

Our basic, two-player model naturally generalizes to a game with many players. We consider

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[51] Op. cit., p. 27.

[52] The students' anger at the teachers is in part due to being forced to interact with them. Interacting with the teachers, according to the model, makes the students care about how the teachers esteem them – and hence mind the low esteem they are accorded.

such a game as an extension. The results we obtain are analogous to those in the basic model; in particular, we find that players in the many-player game divide into subgroups with distinct values.

The model describes a wide range of social phenomena. Three specific illustrations are considered in the paper. First, the model fits especially well the motivation of students. It explains, for example, the success of Catholic schools in preventing dropout; why studies have found both positive and negative peer effects; and students' tendency to group according to values.

Second, the model captures – and formalizes – the role of culture in the decline of US inner cities. It especially elucidates William Julius Wilson's argument why deindustrialization and middle-class flight would have caused inner-city residents to shift from a work orientation to a street orientation.

Third, sociologists have emphasized the importance of "resistance" in organizations, which, in their view, frequently arises because of worker frustration over being accorded too little esteem. The model identifies the underlying factors that lead workers to feel they deserve more esteem. In so doing, it accounts for the presence or absence of resistance in many settings.

The paper suggests questions for future research, many relating to firms. Our focus has been on how values form, but a further question – relevant for firms – is: how might they be manipulated? How, for instance, might firms encourage obedience to authority (dependent as it is upon the formation of values that promote it)? How might firms structure the workplace so as to prevent workers from negatively influencing one another? And, how might firms reduce the likelihood of resistance? Understanding the answers to these questions will yield insight into firms – as well as other organizations.

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6   Appendix 1: Additional Results

Proposition A1. *Suppose, without loss of generality, player 2 is more able than player 1 at academics ($\alpha_2 \geq \alpha_1$). Suppose $\alpha_1 < \bar{\alpha}_L$, where $\bar{\alpha}_L$ is defined as follows: $\bar{\alpha}_L = \sqrt{\frac{n+1}{4n}}$ for $n > 2$; $\bar{\alpha}_L = \sqrt{\frac{1}{3}}$ for $n = 2$; and $\bar{\alpha}_L = 0$ for $n < 2$. Player 1 will always be a musician in equilibrium. If, additionally,*

(1) *The cost of interacting is sufficiently high ($k \geq \bar{k}_1$) and player 2's academic ability is sufficiently low ($\alpha_2^2 \leq \frac{n-1}{n+1}$): equilibria exist in which the players do not interact and player 2 is a musician.*

(2) *The cost of interacting is sufficiently high ($k \geq \bar{k}_2$) and player 2's academic ability is sufficiently high ($\alpha_2^2 \geq \frac{n-1}{n+1}$): equilibria exist in which the players do not interact and player 2 is a scholar.*

(3) *The cost of interacting is sufficiently low ($k \leq \bar{k}_3$) and player 2's academic ability is sufficiently low ($\alpha_2^2 \leq \frac{4n}{n+1}$): equilibria exist in which the players interact and player 2 is a musician.*

(4) *The cost of interacting is sufficiently low ($k \leq 0$) and player 2's academic ability is sufficiently high ($\alpha_2^2 \geq 4 - \frac{2}{n+1}$): equilibria exist in which the players interact and player 2 is a scholar.*

where:
$$\bar{k}_1 = \left(\frac{n+1}{n+2}\right)^2 \max\left(\frac{3}{2} - \frac{1}{n+1}, \frac{1}{2}\alpha_2^2 - \frac{1}{2}\right),$$
$$\bar{k}_2 = \left(\frac{n+1}{n+2}\right)^2 \max\left(-\frac{1}{n+1}, \frac{2n}{n+1} - \frac{1}{2}\alpha_2^2, 2\alpha_1^2 - \frac{1}{2} - \frac{2\alpha_2^2}{n+1}\right),$$
$$\bar{k}_3 = \left(\frac{n+1}{n+2}\right)^2 \min\left(\frac{3}{2} - \frac{2}{n+1}, 2\left(\frac{n-1}{n+1}\right) - \frac{1}{2}\alpha_1^2\right).$$

Proposition A2. *Suppose, without loss of generality, player 2 is more able than player 1 at academics ($\alpha_2 \geq \alpha_1$). Suppose further that $\bar{\alpha}_L \leq \alpha_1, \alpha_2 \leq \bar{\alpha}_H$. $\bar{\alpha}_H$ is defined as follows: $\bar{\alpha}_H = \sqrt{\frac{4n}{n+1}}$ for $n > 2$; $\bar{\alpha}_H = \sqrt{3}$ for $n = 2$; and $\bar{\alpha}_H = \infty$ for $n < 2$. $\bar{\alpha}_L$ is defined as follows: $\bar{\alpha}_L = \sqrt{\frac{n+1}{4n}}$ for $n > 2$; $\bar{\alpha}_L = \sqrt{\frac{1}{3}}$ for $n = 2$; and $\bar{\alpha}_L = 0$ for $n < 2$. If, additionally,*

(1) *The cost of interacting is sufficiently high ($k \geq \bar{k}_1$), and the players have high – and similar – academic ability ($\alpha_1^2 \geq 1 + \frac{2}{n+1}\alpha_2^2$): an equilibrium exists in which the players do not interact and both are scholars.*

(2) *The cost of interacting is sufficiently high ($k \geq \bar{k}_2$) and the players' academic ability is low ($\alpha_2^2 \leq \frac{n-1}{n+1}$): an equilibrium exists in which the players do not interact and both are musicians.*

(3) *The cost of interacting is sufficiently high ($k \geq \bar{k}_3$, $k > \bar{k}_4$) and player 2's academic ability is sufficiently high relative to player 1's ($\alpha_2^2 \geq \max(\frac{n-1}{n+1}, \frac{n+1}{2}(\alpha_1^2 - 1))$): an equilibrium exists in which the players do not interact, player 1 is a musician, and player 2 is a scholar.*

(4) *The cost of interacting is sufficiently high ($k \geq \bar{k}_5$) and the players both have an intermediate level of academic ability ($\alpha_1^2 \geq \max(\frac{n-1}{n+1}, \frac{n+1}{2}(\alpha_2^2 - 1))$): an equilibrium exists in which the players do not interact, player 1 is a scholar, and player 2 is a musician.*

(5) *The cost of interacting is sufficiently low ($k \leq \bar{k}_6$), the players have high – and similar – academic ability ($\alpha_1^2 \geq \frac{1}{4} + \frac{1}{n+1}\alpha_2^2$, $\alpha_1^2 > \frac{4}{3(n+1)}\alpha_2^2$), and $n \geq 1$: equilibria exist in which the players interact and both are scholars.*

(6) *The cost of interacting is sufficiently low ($k \leq \bar{k}_7$), the players have low academic ability ($\alpha_2^2 \leq \frac{4n}{n+1}$), and $n \geq 1$: equilibria exist in which the players interact and both are musicians.*

Two additional types of equilibria exist when $n \leq 1$. If:

(7) *The cost of interacting is sufficiently low ($k \leq 0$), player 2's academic ability is sufficiently high relative to player 1's ($\alpha_2^2 \geq \max\left(\frac{4n+2}{n+1}, (n+1)\left(2\alpha_1^2 - \frac{1}{2}\right)\right)$), and player 1 has low academic ability ($\alpha_1^2 < 1$): equilibria exist in which the players interact, player 1 is a musician, and player 2 is a scholar.*

(8) *The cost of interacting is sufficiently low ($k \leq 0$), player 2's academic ability is sufficiently high relative to player 1's ($\alpha_2^2 \geq \max(\frac{3}{2}(n+1)\alpha_1^2, 1 + \frac{2}{n+1}\alpha_1^2)$), and player 1 has high academic ability ($\alpha_1^2 > 1$): equilibria exist in which the players interact, player 1 focuses on but does not value academics, and player 2 is a scholar.*

where:

$\bar{k}_1 = \left(\frac{n+1}{n+2}\right)^2 \max(\frac{3}{2}\alpha_2^2 - \frac{1}{n+1}\alpha_1^2, \frac{1}{2} - \frac{1}{2}\alpha_1^2)$,

$\bar{k}_2 = \left(\frac{n+1}{n+2}\right)^2 \left(\frac{3}{2} - \frac{1}{n+1}\right)$,

$\bar{k}_3 = \left(\frac{n+1}{n+2}\right)^2 \max\left(\frac{2n}{n+1} - \frac{1}{2}\alpha_2^2, 2\alpha_1^2 - \frac{2}{n+1}\alpha_2^2 - \frac{1}{2}, \frac{-1}{n+1}\right)$,

$\bar{k}_4 = \left(\frac{n+1}{n+2}\right)^2 \left(\frac{1}{2}\alpha_1^2 - \frac{1}{n+1}\alpha_2^2 - \frac{1}{2}\right)$,

$\bar{k}_5 = \left(\frac{n+1}{n+2}\right)^2 \max(\frac{2n}{n+1} - \frac{1}{2}\alpha_1^2, 2\alpha_2^2 - \frac{2}{n+1}\alpha_1^2 - \frac{1}{2}, \frac{-1}{n+1})$,

$\bar{k}_6 = \max\left(0, \left(\frac{n+1}{n+2}\right)^2 \min\left(\frac{3}{2}\alpha_2^2 - \frac{2}{n+1}\alpha_1^2, 2\alpha_2^2 - \frac{4}{n+1}\alpha_1^2 - \frac{1}{2}\right)\right)$,

$\bar{k}_7 = \max(0, \left(\frac{n+1}{n+2}\right)^2 \min\left(2\left(\frac{n-1}{n+1}\right) - \frac{1}{2}\alpha_1^2, \frac{3}{2} - \frac{2}{n+1}\right)$.