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by

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A note on fashion cycles, novelty and conformity

Federica Alberti*

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Abstract

We develop a model in which novelty and conformity motivate fashion behavior. Fashion cycles occur if conformity is not too high. The duration of fashion cycles depends on individual-specific conformity, novelty, and the number of available styles. The use of individual-specific novelty and conformity allows us to also identify fashion leaders.

Keywords: Novelty; Conformity; Fashion

JEL classification: B5; D1; L1.

1 Introduction

This paper is concerned with fashion cycles. Since Veblen [1899] many economists have tried to explain fashion life cycles, where new styles are introduced, gain popularity, and eventually disappear, and fashion items are acquired to signal social status (see, e.g., Pesendorfer 1995, Coelho and McClure 1993, Frijters 1998).[1]

Our main reference is the analysis of fashion style changes by the economist D. E. Robinson (1958, 1963, 1975, 1976) - hereafter Robinson - where fashion cycles are described as regular, predictable, and long. Robinson observes that some basic trends in fashion styles change following the pattern of regular movements. He notes that the periodic movements of fashion styles (of dress, housing, cars, hair) span and repeat themselves over long periods. He believes that regular fashion movements are 'inexorable' and 'foreseeable' and independent of external forces, including social change, technological progress, or the influence of fashion designers.

In his analysis of fashion cycles, Robinson speculates that novelty is the main force driving fashion change. He suggests that fashion is the pursuit of novelty for 'its own sake' and that novelty is a relative concept. Whether or not a style is intrinsically appealing, its value depends on its novelty, and this is defined in comparison with other styles.

Robinson also notes that along with novelty fashion is a 'passion' for conformity. Conformity leads to developing tastes which are similar but transient because, while people enjoy adopting the same styles as others, novelty decreases with repeated consumption. This is why, in a world of limited style choices, new designs are periodically modeled on the past.

In this paper, we propose a model that builds upon these features. We combine novelty with conformity to explain fashion cycles. Unlike many economists who have focused on short-lived characteristics of fashion cycles, we take a long-run approach and investigate the repetition and duration of fashion cycles. We consider a potentially large but limited set of possible styles and individual-specific novelty and conformity, which capture the ideas that novelty is not the same for all and that some individuals may be more socially oriented and therefore more conformist than others.[2]

We show that, unless individuals are too conformist, fashion cycles that repeat themselves exist and are uniquely defined, and we demonstrate that individual-specific novelty and conformity and the number of available styles determine the duration of fashion cycles. The use of individual-specific novelty and conformity enables us to also study fashion cycles in the presence of non identical individuals. Our results

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[1] See Sproles [1981] for a definition of fashion life cycle.

[2] Andreozzi and Bianchi [2007] consider action-specific novelty and conformity in their model. It incorporates the idea that some consumption activities are intrinsically more appealing or engaging than others and more prone to be shared by others.

indicate that fashion cycles in which some individuals take the lead in fashion change can exist, and that their duration depends on the appeal of individual-specific novelty to a majority of individuals.

The remainder of the paper is organized as follows. In Section 2, we explain the details of our model. In Section 3, we present the results for identical individuals. Section 4 shows the results for non identical individuals, and Section 5 concludes.

2 The model

Our model captures some basic features: 1) novelty is relative and decreases with repeated consumption, 2) conformity increases when more individuals adopt a style, and 3) individuals choose from a limited set of possible choices the style that maximizes their (expected) utility.

The following model incorporates these features and accommodates individual-specific novelty and conformity.

2.1 Consumption history

We describe consumption as a stock that increases when a style is chosen. Likewise, consumption stock will decrease when a style is not chosen.[3]

Let m be the number of individuals and n be the number of possible styles. We define a statistic $H^i_{j,t-1}$ which denotes an individual i's consumption history of style j at period $t-1$. $H^i_{j,t-1}$ is the weighted average of the proportion of individual i's choices of style j up to period $t-1$. This is equal to 1 if the style was *always* chosen up to period $t-1$, and 0 otherwise. Furthermore, let $\sum_j H^i_{j,t-i} = 1$. Let $I^i_{j,t-1}$ denote the decision by individual i to adopt style j at period $t-1$. $I^i_{j,t-1} = 1$ indicates that style j was chosen at $t-1$; otherwise, it is $I^i_{j,t-1} = 0$. In order for consumption history to (decrease) increase when a style is (not) chosen, we consider for an individual i at period $t-1$:

$$H^i_{j,t-1} = \alpha^i \cdot H^i_{j,t-2} + (1-\alpha^i) \cdot I^i_{j,t-1} \tag{1}$$

where $H^i_{j,t-2}$ is the history of style j at period $t-2$ and α^i, $0 \leq \alpha^i < 1$, is an individual-specific parameter that measures the impact of i's choice on consumption history and is assumed to be style-invariant.

Figure 1 shows the graphs of consumption history of style j, for individuals with low and high α values. This kind of history function fits the idea that consumption stock (decreases) increases when a style is (not) chosen, and it (decreases) increases faster when individuals put more weight on more recent choices, i.e., when α is low. Furthermore, given a certain α value, choices made in the last period have the largest impact on consumption.[4]

2.2 Utility

We assume backward-looking reasoning and that each individual has a linear conformity function with respect to and equal to the proportion of choices by all individuals and bears a cost to repeat the same style choice due to increasing boredom, which is measured by consumption history.[5][6] As a result, for an individual i utility of style j at period t is defined by:

$$U^i_{j,t} = \beta^i \cdot p_{j,t-1} - (1-\beta^i) \cdot H^i_{j,t-1} \tag{2}$$

where $p_{j,t-1}$, $0 \leq p_{j,t-1} \leq 1$, is the proportion of choices of style j by all individuals in the last period, H^i_{jt-1} is the consumption history of style j of individual i, as defined in Equation 1, and β^i, $0 \leq \beta^i < 1$ is an individual-specific, style-invariant parameter that captures the degree of 'openness' to others. Thus, an individual who has, for instance, a high β value is more socially-oriented and tends to follow others.

Note from Equation 1 that boredom in Equation 2 is increasing more rapidly when α is low. In addition, note that the α value in the history function in Equation 2 is independent of β. This assumption is plausible, given the lack of evidence, as far as we are aware, of a correlation between social orientation and boredom.

In line with feature 3, we assume that each individual chooses the style that maximizes her utility.

[3] The idea that consumption is a stock that 'accumulates' with experience was introduced by Becker and Murphy [1988].

[4] Rizvi and Sethi [1998] use a similar history function in which consumption stock depreciates at discount rate δ and more recent choices are weighted more heavily when δ is small.

[5] The assumption of backward-looking reasoning implies that interaction is *non strategic*, i.e., individuals do not try to predict one another's future choices.

[6] We also considered a non linear conformity function in which individuals enjoy adopting the same styles but only up to a certain extent. While such an assumption is certainly more realistic, the overall results do not change substantially.

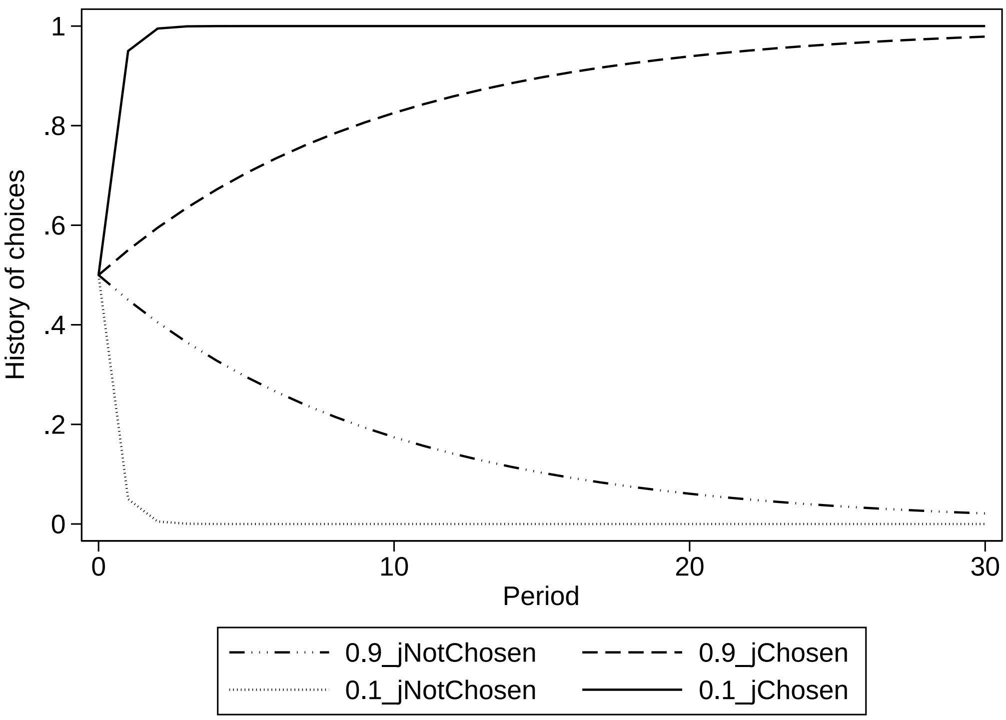

Figure 1: The consumption history of style j for individuals with $\alpha = 0.1$ and $\alpha = 0.9$ and initial consumption history of 0.5

3 Results for identical individuals

In this section, we restrict our attention to the case in which all individuals share the same novelty and conformity characteristics, i.e., they all have the same α and β values. For simplicity, we begin by also assuming $m = 1$, i.e., all individuals have the same initial consumption state, i.e., the same initial proportions of choices of styles. This guarantees that choices are perfectly synchronized.[7]

3.1 Existence of fashion cycles

Let $n = 2$, style 1 be the *incumbent*, i.e., style 1 was chosen in the last period, and style 2 be the non incumbent. It is straightforward to prove that:

Proposition 1. *If $\beta > 0.5$, for any arbitrary initial consumption history the incumbent is chosen forever.*

Proposition 1 states that if $\beta > 0.5$, the style that was chosen in the last period is chosen forever. The reason for this is that the conformity component of utility overweights any possible differences in consumption history between the incumbent and the non incumbent (see Fig. 1). The same conclusion is reached if $n > 2$. Note that if $\beta > 0.5$, it does not matter whether α is high or low.

In the following proposition, we consider the more relevant case where $\beta < 0.5$:

Proposition 2. *If $\beta < 0.5$, for any arbitrary initial consumption state the incumbent is not chosen forever.*

Note that if $n = 2$, $\beta < 0.5$, and style 1 is the incumbent, style 1 cannot be chosen forever because its consumption history will eventually reach unity (see Fig. 1). The same conclusion is met if $n > 2$. In this case, the non incumbent with the lowest history will be chosen to replace style 1.[8]

[7] Note that in this model it is not the absolute number of individuals but the proportion of individuals that matters. For instance, if one 'clones' every individual of the m-individuals model to produce a $2m$-individuals model, the results are unchanged except for scale. However, if one takes $m = 1$ literally, conformity should be interpreted as 'inertia' or 'status quo bias' (see Samuelson and Zeckhauser 1988).

[8] This requires that no two styles have the same consumption history. Otherwise, choice will be indetermined. For the same reason, the current model cannot explain what happens if $\beta = 0.5$.

Table 1: Maximum duration of fashion cycles

	$n=2$				$n=3$			
α / β	0.1	0.2	0.3	0.4	0.1	0.2	0.3	0.4
0.1	(1, 1)	(1, 1)	(1, 1)	(1, 1)	(1, 1)	(1, 1)	(1, 1)	(1, 1)
0.2	(1, 1)	(1, 1)	(1, 1)	(2, 2)	(1, 1)	(1, 1)	(1, 1)	(1, 1)
0.3	(1, 1)	(1, 1)	(1, 1)	(2, 2)	(1, 1)	(1, 1)	(1, 1)	(2, 2)
0.4	(1, 1)	(1, 1)	(2, 2)	(2, 2)	(1, 1)	(1, 1)	(1, 1)	(2, 2)
0.5	(1, 1)	(2, 2)	(2, 2)	(3, 3)	(1, 1)	(1, 1)	(2, 2)	(2, 2)
0.6	(1, 1)	(2, 2)	(3, 3)	(4, 4)	(1, 1)	(2, 2)	(2, 2)	(3, 3)
0.7	(2, 2)	(2, 2)	(3, 3)	(5, 5)	(1, 1)	(2, 2)	(3, 3)	(4, 4)
0.8	(2, 2)	(3, 3)	(5, 5)	(8, 8)	(2, 2)	(3, 3)	(4, 4)	(6, 6)
0.9	(3, 3)	(5, 5)	(9, 9)	(16, 16)	(3, 3)	(4, 4)	(7, 7)	(11, 11)

Note: The first and second component are the maximum number of periods when $m = 1$ and $m = 2$, respectively.

Thus, if $\beta < 0.5$, there will be no style that is chosen forever. In addition, there cannot be a style that is *never* chosen, because if it continues not to be chosen its history will eventually reach 0 and must therefore have a higher utility than the incumbent and any other styles with a non-zero history.

Propositions 1 and 2 convey an important message, namely that conformity must not be too high for fashion change to occur. If conformity is too high, fashion cycles will not occur.[9]

3.2 Duration of fashion cycles

We now consider the case of a sequence of style choices that *repeats* itself, when, after N periods, the initial consumption state is reproduced.

Let $n = 2$ and T denote the duration of one fashion cycle, i.e., $T = {}^{N}/_{n}$. It is possible to demonstrate that, if $\beta < 0.5$, there is only one fashion cycle; this is uniquely defined by N, and its duration is determined by α and β:[10]

Proposition 3. *If $\beta < 0.5$ and $n = 2$, only one fashion cycle exists; T is incresing with respect to α and β. The proof is in the Appendix.*

The result below generalizes Proposition 3 to any possible n:

Proposition 4. *If $\beta < 0.5$, only one fashion cycle exists; T is increasing with respect to α and β and decreasing with respect to n (but it tends to a finite limit as n tends to infinity). The proof is in the Appendix.*

In other words, the time spent with each style is increasing with conformity and decreasing with boredom. Meanwhile, an increase in the number of possible styles leads to a decrease in the time spent with each style. This is in line with the evidence that fashion cycles have become shorter in modern societies, where the range of fashion items has been increasing.

So far we have assumed synchronized play, i.e., $m = 1$. This assumption is restrictive because it assumes that all individuals exhibit the same initial consumption. In Table 1, we therefore report the results of simulations for $m = 2$ and $m = 1$ and a random initial consumption history for each individual. For both $m = 1$ and $m = 2$, we find convergence to a regular pattern of style variation. For $m = 2$, we find convergence to a synchronized pattern when α and β are sufficiently high. The results are consistent with Propositions 3-4.

Summing up, novelty leads to a style change because of boredom no matter whether α is high or low. Conformity has two effects: i) it introduces 'inertia' in the system, which extends the time when a given style is adopted before a new fashion is embraced, and ii) it coordinates choices of two (or more) individuals with arbitrary consumption patterns.

[9] This is when fashions become 'customs' (see Blumer 1969).

[10] Note that this does not explain the specific *order* of fashion styles, i.e., whether it is 1-2-3 or 1-3-2, for example.

4 Results for non identical individuals

We now relax the assumption that individuals are identical and consider the possibility of fashion cycles in the presence of differences in novelty, i.e., when individuals have different α values. For simplicity, we consider $n = 2$ and two different groups of individuals and assume that novelty (and conformity) parameters are the same within each group.

We are interested in leadership and in the duration of fashion cycles in situations where choices are synchronized *between* the groups.[11] Our first conclusion is summarized in the following proposition:

Proposition 5. *If individuals with low α are the majority, they set T. Otherwise, the α value of low α individuals must be sufficiently close to the α value of high α individuals for low α individuals to set T. The proof is in the Appendix.*

Proposition 5 states that whenever individuals with low α are the majority, the duration of fashion cycles is determined by their α value. Otherwise, parameter values of low α individuals and high α individuals must be sufficiently close for low α individuals to set the duration of fashion cycles. This result is important because it allows us to unambiguously know who is a fashion leader. Note, however, that individuals with low α are fashion leaders by virtue of being the *first ones* to adopt a new style.

In the next proposition, we consider the different case where individuals with high α are the majority and set T:

Proposition 6. *If individuals with high α are the majority and set T, low α individuals have shorter cycles and spend even less time with the style which is not chosen by the majority. The proof is in the Appendix.*

This proposition suggests that, while high α individuals set the duration of fashion cycles, individuals with low α are still fashion leaders. In this situation, we have a society in which a minority of novelty-seeking individuals coexists with a majority of more conservative individuals. In such a society, conformity creates a 'common fashion culture' by allowing for some coordination between the two types.

5 Conclusions

Our simple model has several implications. In line with Robinson, novelty drives fashion change while conformity leads to developing similar tastes. With a limited set of style choices, novelty leads to the old styles being recovered. The duration of fashion cycles depends on individual-specific novelty and conformity as well as on the number of styles. Furthermore, individual-specific novelty allows us to determine who is a fashion leader.

In our model, novelty and conformity can explain long-lived characteristics of fashion cycles such as the repetition and duration of fashion styles. However, novelty and conformity can also explain short-lived characteristics of fashion behavior. In this sense, our approach is flexible, and can be viewed as complementary to the short-run, life cycle approach, which has been adopted by many economists.

We conclude that both novelty and conformity are important ingredients of fashion behavior. To better understand fashion cycles both novelty and conformity should be taken into account. A better understanding of the essence of novelty and conformity from the point of view of consumer psychology can help economists to develop more realistic models.

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[11] With different novelty (or conformity) parameters, two groups are synchronized if, for a sufficiently large number of periods, individuals in the two groups make the same choices. This is possible if the novelty (and conformity) parameters in the two groups are not too different.

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Appendix

Proof of Proposition 3

Let $n = 2$, style 1 be the incumbent, and style 2 be the non incumbent. Since $H_{1,t-1} + H_{2,t-1} = 1$, utility at period t can be written as:

$$U_{1,t} = \beta - (1-\beta) \cdot H_{1,t-1} \tag{3}$$

$$U_{2,t} = -(1-\beta) \cdot (1 - H_{1,t-1}) \tag{4}$$

Let $U_{2,t} > U_{1,t}$, thus style 2 is chosen at period t. Rearranging from Equations 3-4, $U_{2,t} > U_{1,t}$ can be written as:

$$\frac{1}{H_{1,t-1}} < 2 \cdot (1-\beta) \tag{5}$$

Let T be the duration of a fashion cycle. Rearranging from Equation 1, $H_{1,t-1}$ in Equation 5 can be written as:

$$H_{1,t-1} = \frac{1}{(1+\alpha^T)} \tag{6}$$

Substituting Equation 6 into Equation 5, we obtain:

$$\alpha^T < 1 - 2\beta \tag{7}$$

Taking the log of Equation 7, we obtain:

$$T > \frac{ln(1-2\beta)}{ln\alpha} \tag{8}$$

Applying the same reasoning for period $t-1$, we obtain:

$$T - 1 < \frac{ln(1-2\beta) - ln[(1-\alpha)\cdot(1-2\beta)+1]}{ln\alpha} \tag{9}$$

Combining Equation 8 with Equation 9, we obtain:

$$\frac{ln(1-2\beta)}{ln\alpha} < T < 1 + \frac{ln(1-2\beta) - ln[(1-\alpha)\cdot(1-2\beta)+1]}{ln\alpha} \tag{10}$$

It is straightforward to verify that, given the shape of the log function, T is increasing with α and β. ■

Proof of Proposition 4

Let $n=3$, style1 be the incumbent, and styles 2 and 3 be non-incumbents. Utility at period t is:

$$U_{1,t} = \beta - (1-\beta)\cdot H_{1,t-1} \tag{11}$$

$$U_{2,t} = -(1-\beta)\cdot H_{2,t-1} \tag{12}$$

$$U_{3,t} = -(1-\beta)\cdot H_{3,t-1} \tag{13}$$

Let $H_{2,t-1} < H_{3,t-1} < H_{1,t-1}$ and $U_{1,t-1} < U_{2,t-1}$, thus style 2 is chosen at period t. Since $H_{1,t-1} + H_{2,t-1} + H_{3,t-1} = 1$, rearranging from Equations 11-13, $U_{1,t-1} < U_{2,t-1}$ can be written as:

$$-(1-\beta)\cdot(1 - H_{1,t-1} - H_{3,t-1}) > \beta - (1-\beta)\cdot H_{1,t-1} \tag{14}$$

Let T be the duration of a fashion cycle. Rearranging from Equation 1, $H_{1,t-1}$and $H_{3,t-1}$in Equation 14 can be written, respectively, as:

$$H_{1,t-1} = \frac{1-\alpha^T}{1-\alpha^{3T}} \tag{15}$$

$$H_{3,t-1} = \frac{\alpha^{2T}\cdot(1-\alpha^T)}{(1-\alpha^{3T})} \tag{16}$$

Substituting Equation 15 and Equation 16 into Equation 14 gives:

$$-(1-\beta)\cdot\left[1 - \frac{(1-\alpha^T)}{(1-\alpha^{3T})} - \frac{\alpha^{2T}\cdot(1-\alpha^T)}{(1-\alpha^{3T})}\right] > \beta - (1-\beta)\cdot\frac{(1-\alpha^T)}{(1-\alpha^{3T})} \tag{17}$$

Applying the same reasoning, the analogous expression when $n=4$ becomes:

$$-(1-\beta)\cdot\left[1 - \frac{(1-\alpha^T)}{(1-\alpha^{4T})} - \frac{\alpha^{2T}\cdot(1-\alpha^T)}{(1-\alpha^{4T})} - \frac{\alpha^{3T}\cdot(1-\alpha^T)}{(1-\alpha^{4T})}\right] > \beta - (1-\beta)\cdot\frac{(1-\alpha^T)}{(1-\alpha^{4T})} \tag{18}$$

Given Equation 17 and Equation 18, the analogous condition for n styles is:

$$-(1-\beta)\cdot\left[1 - \frac{(1-\alpha^T)}{(1-\alpha^{nT})} - \frac{\alpha^{2T}\cdot(1-\alpha^T)}{(1-\alpha^{nT})} - ... - \frac{\alpha^{(n-1)T}\cdot(1-\alpha^T)}{(1-\alpha^{nT})}\right] > \beta - (1-\beta)\cdot\frac{(1-\alpha^T)}{(1-\alpha^{nT})} \tag{19}$$

As $n \to \infty$, Equation 19 tends to:

$$\alpha^T < \frac{(1-2\beta)}{(1-\beta)} \tag{20}$$

Taking the log of Equation 20, we obtain $T > \frac{ln(1-2\beta)-ln(1-\beta)}{ln\alpha}$, which is smaller than Equation 8, since given $\frac{ln(1-2\beta)}{ln\alpha} - \frac{ln(1-\beta)}{ln\alpha} < \frac{ln(1-2\beta)}{ln\alpha} \therefore \frac{ln(1-\beta)}{ln\alpha}$ and $0 \le \alpha < 1$and $0 \le \beta < 1$, $\frac{ln(1-\beta)}{ln\alpha} > 0$ is always true. ■

Proof of Proposition 5

Let p^L and p^F be the proportions of L and F individuals, where $0 \leq p^L < 1$, $0 \leq p^F < 1$, and $p^L + p^F = 1$. Let $\alpha^L < \alpha^F$, so that, at any given period t, $H^L_{j,t} > H^F_{j,t}$ if L and F choose style j.

Let $n = 2$, style 1 be chosen by F and 2 be chosen by L at period $t-1$. Thus, $p_{1,t-1} < 1$ and $p_{2,t-1} > 0$, and $p_{1,t-1} = p^F$ and $p_{2,t-1} = p^L$. Let style 2 be chosen by F and L at period t. Thus, for both F and L, $U_{2,t} > U_{1,t}$. Let β^F, $0 \leq \beta^F < 1$, characterize F. $U^F_{2,t} > U^F_{1,t}$ implies:

$$\frac{(1-\beta^F)\cdot(1-H^F_{2,t-1}-H^F_{2,t-1})+\beta^F}{2\beta^F} > p^F \tag{21}$$

Adding 1 to both sides of Equation 21, we obtain:

$$0.5 - \frac{(1-\beta^F)\cdot(1-H^F_{2,t-1}-H^F_{2,t-1})}{2\beta^F} < 1 - p^F \tag{22}$$

Since $(1-H^F_{2,t-1}-H^F_{2,t-1}) > 0$, and $\frac{(1-\beta^F)\cdot(1-H^F_{2,t-1}-H^F_{2,t-1})}{2\beta^F} > 0$, it must be $1-p^F > 0.5$ for L to set T. However, a smaller $1-p^F$would be necessary for L to set T if $\alpha^F \to \alpha^L$, since $(1-H^F_{2,t-1}-H^F_{2,t-1})$ is small when $\alpha^F$is low. ■

Proof of Proposition 6

Let p^L and p^F be the proportions of L and F individuals, where $0 \leq p^L < 1$, $0 \leq p^F < 1$, and $p^L + p^F = 1$. Let $\alpha^L < \alpha^F$, so that, at any given period t, $H^L_{j,t} > H^F_{j,t}$ if L and F choose style j.

Let $p^F > p^L$, $\alpha^L < \alpha^F$, $n = 2$, and for F individuals $T \to \infty$. Let style 1 be (always) chosen by F. Let style 2 be chosen by L at period t' and style 1 be chosen by L at period $t'-1$. Thus, at period $t'-1$, $p_{1,t'-1} = 1$ and $p_{2,t'-1} = 0$. $U^L_{2,t'} > U^L_{1,t'}$ implies:

$$H^L_{1,t'-1} > \frac{1}{2\cdot(1-\beta^L)} \tag{23}$$

Suppose now that style 1 is chosen at period t'' by L. At period $t''-1$, $p_{2,t''-1} = p^L$ and $p_{1,t''-1} = p^F$. $U^L_{1,t''} > U^L_{2,t''}$ implies:

$$H^L_{2,t''-1} > \frac{1-2\beta^L\cdot p^F}{2\cdot(1-\beta^L)} \tag{24}$$

Since $1-2\beta^L\cdot p^F < 1, \frac{1-2\beta^L\cdot p^F}{2\cdot(1-\beta^L)} < \frac{1}{2\cdot(1-\beta^L)}$, $H^L_{2,t''-1} < H^L_{1,t'-1}$.■