The Economics of Cultural Transmission and Socialization

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Introduction

Preferences, beliefs, and norms that govern human behavior are partly formed as the result of heritable genetic traits, and are partly transmitted through generations and acquired by learning and other forms of social interaction.

Cultural transmission is an object of study of several social sciences: evolutionary anthropology, sociology, social psychology, and economics...

Introduction

Cultural transmission arguably plays an important role in the determination of many fundamental preference traits, like discounting, risk aversion and altruism

Pervasive evidence of the resilience of ethnic and religious traits across generations that motivates a large fraction of the theoretical and empirical literature on cultural transmission

Introduction

In the U.S., for instance, persistent ethnic and religious diversity in what social scientists until the 1960s expected to turn into a 'melting pot,' are very well documented. In fact, immigrants all over the world generally strive to maintain various traits of the culture of the country of origin

Several ethnic and religious communities in the U.S., e.g., Orthodox Jews, outside the United States, Basques, Catalans, Corsicans, and Irish Catholics in Europe, Quebecois in Canada, and Jews of the Diaspora have all remained strongly attached to their languages and cultural traits even through the formation of political states which did not recognize ethnic and religious diversity

Introduction

This article, concentrate on intergenerational transmission of culture.

Cultural transmission as the result of interactions between purposeful socialization decisions inside the family ("direct vertical socialization') and other socialization processes like social imitation and learning which govern identity formation ('oblique/horizontal socialization")

Cultural traits are then endogenous in this context. But how to think about agents who choose their children's and/or their own preferences?

Introduction

Bisin and Verdier, in a series of papers, introduce a imperfect empathy, which is sufficient to sustain a theory of cultural transmission by biasing parents towards their own cultural traits

Imperfect empathy requires that while parents are altruistic with respect to their children, they evaluate their choice using their own (the parents'-not the children's) preferences

For instance, religious parents care about the social and economic success of their children, but would regret their having to accept secular norms and attitudes to achieve it

Theory: Simple Model

Apply models of evolutionary biology to the transmission of cultural traits

Two cultural traits: $\{a, b\}$
Let q_i : be the fraction of people with trait i

$$
\begin{aligned}
P^{ii} &= d^i + (1 - d^i)q^i \\
P^{ij} &= (1 - d^i)(1 - q^i)
\end{aligned}
$$

P^{ii}: the probability that a child from a family with trait i is socialized to trait j

Vertical (direct): get parent's trait, say i, with probability d_i

Horizontal: If a child from a family with trait i is not directly socialized, which occurs with probability $1 - d_i$, he/she is horizontally/obliquely socialized by picking the trait of a role model chosen randomly in the population (i.e., he/she picks trait i with probability q_i and trait j with probability $q_j = 1 - q_i$)

Theory: Simple Model

Parental socialization choice is motivated by imperfect empathy, which is a form of altruism biased towards the parents' own cultural traits.

Parents care about their children's choices, but they evaluate them using their own (the parents'–not the children's) preferences.

Cultural traits are represented by preferences: each individual chooses $x \in \mathcal{X}$ to maximize

$$u^i : X \to \mathbb{R}$$

for cultural trait $i \in \{a, b\}$

For all i, j, $V^{ij} = u^i(x_j)$, where $x^j = \arg\max_{x \in \mathcal{X}} u^j(x)$

V^{ij} utility to a cultural trait i parent of a type j child

Theory: Simple Model

As long as V^{ii} and V^{ij} are independent of q_i, imperfect empathy immediately implies $V^{ii} \geq V^{ij}$

Socialization requires parental resources

$$W^i(q^i) = \max_{d^i \in [0,1]} -C(d^i) + P^{ii} V^{ii}(q^i) + P^{ij} V^{ij}(q^i)$$

Assuming quadratic socialization costs: $C(d^i) = \frac{1}{2}(d^i)^2$.

First-order condition implies

$$d^i = (1 - q^i)\left(V^{ii} - V^{ij}\right).$$

Define $\Delta V^i = V^{ii} - V^{ij}$, as the cultural intolerance of trait i

$$d^i = (1 - q^i)\Delta V^i$$

Population Dynamics

If we look at the continuous-time limit

$$dq_t^i = q_t^i(1 - q_t^i)(d_t^i - d_t^j)dt$$

This is a logistic differential equation

Mechanism more powerful (i.e., the speed of selection is higher) when there is enough variation in the population, which is captured by the term $q^i(1 - q^i)$

The stationary state of the population dynamics q^{i*} is culturally homogeneous if either $q^{i*} = 0$ or $q^{i*} = 1$

The stationary state of the population dynamics q^{i*} is culturally heterogeneous if $0 < q^{i*} < 1$

Population Dynamics

If (d^i, d^j) are exogenous and $d^i > d^j$ In this case, the stationary states of the population dynamics are culturally homogeneous, since $\lim_{t \to \infty} q_t^i \to 1$.

If $d's$ are determined endogenously by the FOC: the stationary states of the population dynamics are: $(0, 1, q^*)$, where

$$q^* = \frac{\Delta V^a}{\Delta V^a + \Delta V^b}$$

Moreover, q^* is globally stable.

Hence, Bisin and Verdier (2001) predicts then cultural heterogeneity and is therefore consistent with the observed resilience of cultural traits.

Cultural heterogeneity

Intuitively, we can obtain cultural heterogeneity when parents belonging to a cultural minority face relatively higher incentives to socialize their children to their own trait.

Cultural substitution: For any ΔV^i, $d^i(q^i, \Delta V^i)$ is a continuous, strictly decreasing function in q^i and moreover $d^i(1, \Delta V^i) = 0$.

Direct vertical transmission acts as a cultural substitute to oblique transmission, when parents have fewer incentives to socialize their children the more widely dominant are their traits in the population. In the limit of a perfectly homogenous populations of type i, parents of type i do not directly socialize their children.

Cultural heterogeneity obtains generally whenever direct vertical socialization is a substitute to oblique/horizontal socialization.

Cultural heterogeneity

If $d^i(q^i, \Delta V^i)$ is increasing in q^i, socialization efforts of parents of type i are typically larger the more frequent their trait in the population

Direct vertical and oblique transmissions are linked in some degree by cultural complementarity in this case.

Strong enough forms of cultural complementarity can drive the dynamics of the distribution of the traits in the population towards homogeneity

Cultural heterogeneity

A Village Example: Suppose children are exposed simultaneously to the parent's trait and to the trait of a role model from the population with which he/she is matched randomly.

If the parent and the role model are culturally homogeneous, the child is directly socialized to their common trait, otherwise the child is matched a second time randomly with a role model from the population, and adopts his/her trait.

Cultural heterogenity

Under quadratic socialization costs,

$$d^i(q^i, \Delta V^i) = (q^i)^2(1 - q^i)\Delta V^i$$

This socialization effort is clearly non monotonic in q^i and exhibits a range of q^i for which there is cultural complementary.

Note that

$$\lim_{t \to \infty} q_t^i(q_0) \to 0, \quad \forall q_0 \in [0, q^*)$$

and

$$\lim_{t \to \infty} q_t^i(q_0) \to 1 \quad \forall q_0 \in (q^*, 1]$$

Geographic spread

▶ Cultural traits diffuse geographically, e.g., because the population carrying the trait moves, typically while expanding economically or militarily.

Let $q(l, t)$ denote the fraction of agents of type i at location l, then we have the following PDE

$$\frac{\partial q^i(t, l)}{\partial t} = q^i(t, l)(1 - q^i(t, l))(d_t^i - d_t^j)dt + m^2\frac{\partial^2 q^i}{\partial l^2}$$

where m is the diffusion coefficient

Socialization mechanisms

This is Fisher-Kolmogorov equation has a constant traveling wave solution

$$q^i(t, l) = w^i(l - \alpha t)$$

which is monotonic and satisfies

$$\lim_{z \to -\infty} w^i(z) = 1 \quad \lim_{z \to \infty} w^i(z) = 0$$

Solution can be appromixated as

$$w^i(z) = \frac{1}{1 + e^{\frac{\alpha}{z}}}$$

where $\alpha = 2\sqrt{(d^i - d^j)m}$

Socialization mechanisms

- ▶ Homogamous marriages
  - ▶ Marriages are formed in the marriage market anticipating their role in the direct social ization of children
- ▶ Fertility
  - ▶ Fertility, as an endogenous choice of parents, also interacts with socialization, if for no other reason that socialization costs naturally increase with the number of children to socialize.
- ▶ Self-segregation
  - ▶ the cultural composition of society is at least partly under the control of parents: they in fact choose schools, neighborhood, peers,

Multidimensional cultural traits

Up to now model is one dimensional: abstracting from several interesting issues related to the cultural space.

Cultural traits are often multidimensional: for instance, a religious trait is composed of common ethical values and common preferences along many dimensions, from food to art.

Following is the model of Montgomery (2009)

$$dq_t^i = q_t^i \left(d_t^i - \sum_{j=1}^{N} d_t^j q_t^j \right)$$

$$d_t^i = \sum_{i}^{N} q_t^j \Delta V^{ij}$$

where $\sum_{i}^{N} q_t^j = 1$ and $\Delta V^{ij} = V^{ii} - V^{ij}$.

Multidimensional cultural traits

Focus on the symmetric model $\Delta V^{ij} = \Delta V^{ik}$ for all j and k

Abusing notation, we $\Delta V^{ij} = \Delta V^i$ without loss of generality

$$\Delta V^1 \geq \Delta V^2 \geq \cdots \geq \Delta V^N$$

F_k denote a subset of k-dimensions of $\{1, 2, \cdots, N\}$ and $q(F_k)$ denote stationary distribution over F_k

A stationary distribution which supports F_k exists if

$$\Delta V^i > [k-1]G^{F_k}, \forall i \in F_k$$

where $\frac{1}{G^{F_k}} = \sum_{i \in F_k} \frac{1}{\Delta V_i}$

Multidimensional cultural traits

Any culturally homogeneous distribution is locally unstable

Furthermore, the stationary distribution $q(F_k^*)$, where F_k^* is the largest subset of cultural groups $1, \ldots, N$ which is supported by a stationary distribution, is globally stable

Under Symmetry, following is a sufficient condition

$$\sum_{i=1}^{N} \frac{1}{\Delta V_i} > \frac{N-1}{Min_i \Delta V_i}$$

Multidimensional cultural traits: Continuum

Consider the following continuous traits models of cultural transmission B_t^i denote the

value of trait i associated to a representative individual at time t

$$dB_t^i = (1 - d_t^i)(\overline{B} - B_t^i) + \epsilon_t^i$$

ϵ^i an independently and identically distributed random shock with zero mean and
constant variance
d^i exogenous parameter which represents the speed of adjustment of the process to its
mean
$\overline{B}$ be the mean value in the population

Multidimensional cultural traits: Continuum Endogenous

Bisin and Topa (2003) suggest a model of endogenous transmission in a continuous trait setting with the following dynamics

$$dB_t^i = (1 - d_t^i)(\overline{B} - B^{i*}) + \epsilon_t^i$$

where B^{i*} is a target value

$$\max_{d^i} E(B^i) - C(d^i)$$

subject to

$$dB_t^i = (1 - d_t^i)(\overline{B} - B^{i*}) + \epsilon_t^i$$

Under quadratic cost $d^i = (B^{i*} - \overline{B})$

Hence, in general the dynamics of B_t^i is characterized as

$$dB_t^i = f(B_t^i, \overline{B}) + \epsilon_t^i$$

for some non-linear function f

Going Forward: My take

The cultural transmission is stylized and exogenously specified vertical + horizontal transmission

▶ Alternatively we can think of mean-field games or large-networks to endogenoize it

In the current models child is passive

▶ but one needs to take in to child's decision.

Can we embed the model to a larger model?

▶ Political Economy or growth model are obvious candidates?

Empirical Studies

Cultural transmission as a field of study in the social sciences is motivated by the observation that cultural traits in general, and religious and ethnic traits tend to be quite resilient in the population

The fundamental manifestation of this phenomenon is cultural heterogeneity, the world's geographical fractionalization by ethic and religious traits

Cultural heterogeneity is heavily correlated to many relevant socio-economic phenomena (from the provision of public goods to civil wars), so much so that the fractionalization index is now a constant feature e.g., of growth regressions; see Alesina and La Ferrara (2005) for a survey.

Empirical Studies

The categorization and analysis of different cultural traits is the object of study of cultural anthropology, as a separate discipline

Divery indexes exists for ethnic, language, and religion fractionalization

Cultural heterogeneity is not only a property of ethnic and religious traits. Tabellini (2008), for instance, constructs a cross-country index of social values, an aggregate of trust and respect.

The index is normalized to take values in [0,1], e.g., almost 0 for Brazil and 1 for Sweden.

Resilience of cultural traits

The resilience of cultural traits and cultural heterogeneity are two sides of the same coin

The evidence regarding the resilience of ethnic and religious traits across generations is quite pervasive and it nicely complements the evidence on cultural heterogeneity

For instance, the fast assimilation of immigrants into a 'melting pot', which many social scientists predicted until the 1960s (see, for example, Gleason, 1980, for a survey), did not materialize

The persistence of 'ethnic capital' in second- and third-generation immigrants has been documented by a vast literature on immigration and ethnic capital

Orthodox Jewish communities in the United States,Basques, Catalans, Corsicans, and Irish Catholics in Europe, Quebecois in Canada, and Jews of the Diaspora, Muslim population in Europe

Population dynamics

A large part of the empirical work on cultural transmission adopts a structural methodology, linking estimates to the theoretical models.

Structural population dynamics studies, for instance, exploit the observation of the population dynamics of a trait in history,

Population dynamics

Discrete time formulation adopted in empirical studies

$$q_{t+1}^i - q_t^i = q_t^i(1 - q_t^i)(d_t^i - d_t^j)$$

with

$$d_t^i = (1 - q_t^i)\Delta V^i$$

Identification Identification of $d^i - d^j$ at time t only requires observing two data points from a sequence of population shares q_t^i overtime

Longer sequence is needed for the identification of the deep preference parameters of the model ΔV^i

Population dynamics

In the literature, $d(d_t^i - d_t^j)$ is assumed constant over time (parental socialization conditions are typically disregarded)

Hence, we have the following

$$q_t^i = \frac{q_0^i}{(1 - q_0^i)e^{-(d^i - d^j)t} + q_0^i}$$

Stark (1984, 1997) adopts this method to estimate the spread of the Mormon Church and of early Christianity in the Roman Empire

The resulting estimates of $(d^i - d^j)$ are .43 per decade for Mormons and .4 for Christians.

Population dynamics

Botticini and Eckstein (2005, 2007) study the cultural transmission of preferences for education of the Jews

A potential explain to the historical occupational choices of Jews in favor of urban skilled trades rather than farming

Botticini and Eckstein (2007) estimated a small negative $(d^i - d^j)$ of the order of $.007, .003$ per decade, depending on the region, can be estimated from the $2nd$ to $7th$ century

According to Botticini and Eckstein (2007), negative net socialization rates are due to the cost of socializing children to Judaism (which required educating them) in subsistence farming economies

Population Dynamics

Cavalli Sforza and his coauthors study the Neolithic transition in Europe

$$q_{t+1,l}^i - q_{t,l}^i = q_{t,l}^i(1 - q_{t,l}^i)(d_t^i - d_t^j) - mq_{t,l}^i + \frac{m}{2}(q_{t,l+1}^i + q_{t,l-1}^i)$$

Identification of $d^i - d^j$ at time t at location l only requires observing $q^i t, l$ at two points in time t for three locations l

Population Dynamics

This method adopted by Ammerman and Cavalli Sforza (1971, 1984)

They used carbon dating estimates of early farming in 53 archeological sites

Analysis suggests that the statistical relationship between the advent of farming at a site and the distance of the site from the ancient city of Jericho, considered the center of diffusion of farming, is consistent with a constant radial speed of diffusion

More on Empirics

There is much more in the survey

- ▶ Immigration and assimilation
- ▶ Socialization
- ▶ Imperfect empathy
- ▶ Vertical vs. horizontal transmission

Conclusion

This literature offered possible models to explain cultural heterogeneity and the resilience of ethnic and religious traits

Next steps: interaction of cultural traits and institutions and its effect on present socio-economic condition of populations

References I