

Emergence and instability of Identity

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The starting point

The dominating view in particular in economics, is based on a postulate: individuals are endowed with an identity (preferences, attitudes and beliefs) that explains their behavior.

This postulate is hard to reconcile with a host of experimental evidence that behavior shapes identity.

Moreover the the reverse proposition has been present in people's mind throughout history and has been addressed in philosophy, psychology as well as more recently in economics.

This paper is a follow-up of last year's QI 2011

Psychologists developed several theories to account for the experimental facts challenging the direction of causality.

Self-perception theory based on two postulates:

1. *"individuals come to "know" their own attitude and other internal states partially by inferring them from observations of their own behavior and/or the circumstances in which behavior occurs.*
2. *Thus the individual is functionally in the same position as an outside observer, an observer who must necessarily rely upon those same external cues to infer the individual inner state."*

Self-perception theory does not clearly give up the classical postulate. But its own postulates are fully consistent with the hypothesis of (quantum) indeterminacy which overturns the classical postulate of pre-existing identity, attitudes and preferences.

In economics Benabou and Tirole address the issue of identity in a series of paper.

They depart from homo economicus by assuming

- incomplete information about own (deep) preferences
- incomplete recall about past action and
- incomplete self-control.

We argue that 3 assumption fully consistent with Quantum indeterminacy.

A formal alternative to the classical dogma

We propose that the motivational underpinning of behavior is intrinsically uncertain i.e., indeterminate.

We use the TI-model and consider dynamic individual optimization \Rightarrow a game among potential incarnations of the individual (the selves).

The selves are linked to each other through two channels:

- i. they share a common interests in the utility of the future incarnations of the individual;
- ii. they are connected to each other in a process of state transition (which captures indeterminacy).

\Rightarrow We define a Markov Perfect Equilibrium among the selves with individual identity as the state variable.

Our results

1. Identity emerges as the "corollary" of individual action which itself obtains as the equilibrium outcome of the interaction between conflicting selves in a given decision context.

⇒ Identity (preferences in a particular context) is "a relational property" that does *not pre-exist* the decision context but is created each time the individual is called upon to act:
emergence of identity

2. We characterize personality traits that link together e.g., extremeness of views and time inconsistency.

Elements of the model

A sequence of (at least two) consecutive decision situations (DS).

Example:

1. Alice must decide whether to keep to her rutin work or accept a challenging task.
2. The second decision situation is between a week of thalasso therapy or a week vacation in the family house.

The first DS appeals to her preference toward risk: cautious (θ_1) risk loving (θ_2).

The second DS to her attitude toward others: (τ_1) egoistic versus generous/empathetic (τ_2).

By assumption these are different but related (connected) type characteristics (cf non-orthogonal atomic states).

The players

A DS A^t is an operator that coarsely measures preference. The possible preferences over the profiles of actions $e_{M,i} \in E_M$ the selves or the "eigentypes" of M .

They are the players of our game.

In each period t the individual is represented by his state or type

$$|s^t\rangle = \sum_{i=1}^n \lambda_i^t |e_{M,i}\rangle, \lambda_i \in \mathbb{R}, \sum_i (\lambda_i^t)^2 = 1.$$

The individual cannot generally be identified with a single true self. He does not have a single true preference, instead he is intrinsically "conflicted" which is expressed by the *multiplicity of the potential selves*.

State transition process

In each period, the selves form *intentions* to play and eventually one action is taken by the individual.

Because DS can be *non commuting* decision-making is associated with a transition process from the initial state and (intended) actions to a new state.

The rules that govern the state transition process reflect the intrinsic indeterminacy of the individual's type or preferences.

$$|s^t \rangle = \sum_i \lambda_i^t |e_{M,i} \rangle \text{ transits onto } |s^{t+1} \rangle = \sum_{j=1} \lambda_j^{t+1} |e_{M,j} \rangle = \sum_i \eta_i^{t+1} |e_{N,i} \rangle.$$

where $\lambda_j^{t+1} = \frac{\lambda_j}{\sqrt{\sum_{k^t} \lambda_k^2(s_k^* = a_j)}}$ and $\sum_{k^t} \lambda_k^2(s_k^* = a_j)$ is the sum over the probabilities for the selves who pool in choosing a_j .

According to Bohr's rule the probability for eigentype $|e_{N,1}\rangle$ (if the agent is confronted with DS A^{t+1} that (coarsely) measures type characteristics N is

$$TP : p(e_{N,1}|s^{t+1}) = \left(\sum_i \lambda'_i \gamma_{1i} \right)^2 \quad \#$$

If more than one self chooses one and the same action (pool) we have the square of a sum which generates cross terms i;e., interference effect.

⇒ By choosing (intending to choose) to pool or to separate the player (the selves) affect

- the resulting state (identity)
- the future probability for the different eigentype (future behavior).

New features of the interaction between the selves due to indeterminacy.

A word about utility

The utility of self (or player) $e_{M,i}$ of playing of a_i^t when the $-i$ other t -period players play \mathbf{a}_{-i}^t

$$U_{e_{M,i}}(a_i^t; s^t) + \delta_{e_{M,i}} EU^T(s^{t+1}(\mathbf{a}^t; s^t | a^t = a_i^t))$$

The formulation above means that he maximizes utility conditional on surviving.

The selves are assumed *aware of indeterminacy* and fully rational (easy to modulate) - *bounded rationality* is captured by individual *indeterminacy*.

The equilibrium: emergence of identity

In each period, the current selves "move" simultaneously.

Definition *A Markov Perfect Equilibrium of the game is characterized by a_i^{t*} :*

$$a_i^{t*} = \arg \max_{a_i \in A^t} U_{e_{M,i}}(a_i^t; s^t) + \delta_{e_{M,i}} \sum_{\tau=t+1}^T EU^*(s^\tau(\mathbf{a}^t; s^t)).$$

in all periods $t = 1, \dots, T$ and for all $e_{M,i}$, $M \in M$, $i = 1, \dots, n$.

The novelty lies in the technology for the state transition process which captures indeterminacy.

In equilibrium we get an "identity path".

Remark *For the case all DS commute with each other, the model is the one of an individual who does not initially know his preferences and learns through Bayesian updating as he observes the actions he takes.*

Remark *For the special case with $\delta_{e_{M,i}} = 0$ for all selves in all periods, we are back in the basic TI-model. There is no concern for identity no self-control.*

Remark *For $\delta_{e_{M,i}} \neq 0$ for some selves in some periods, the equilibrium path of action may exhibit some extent of self-control. The model suggests a classification of individual traits and behavior as we show below.*

Generic personalities

The 2 types, two actions and two periods case with non-commuting DS allows to illustrate some basic comparative statics results.

$$|\theta_1\rangle = \alpha_1|\tau_1\rangle + \alpha_2|\tau_2\rangle$$

$$|\theta_2\rangle = \beta_1|\tau_1\rangle + \beta_2|\tau_2\rangle$$

where $\begin{pmatrix} \alpha_1 & \alpha_2 \\ \beta_1 & \beta_2 \end{pmatrix}$ is a rotation matrix.

Our focus will be on the behavior of the θ_i –eigentypes. In the second period the τ_i eigentypes are associated with a utility corresponding to their optimal choice, $U^*(\tau_1)$. Let us assume that $U^*(\tau_2) > U^*(\tau_1)$.

Self-Control by inner agreement

In this section we assume, that the interference effects (IE) favor the high utility option x_2 . As we shall see a positive IE is a factor that favors behavioral (and intertemporal) consistency.

Definition *A balanced individual is characterized by a MPE that is a pooling equilibrium. It obtains whenever*

$$U_{\theta_1}(a_1) + \delta_1 EU(\theta_1) \leq U_{\theta_1}(a_2) + \delta_1 EU(t) \quad \#$$

or

$$U_{\theta_2}(a_2) + \delta_2 EU(\theta_2) \leq U_{\theta_2}(a_1) + \delta_2 EU(t) \quad \#$$

or both. Otherwise, the individual is conflicted i.e., her inner equilibrium is characterized by separation.

⇒The balanced individual remains superposed: no state transition. His selves pool. No clear cut preferences, remains "hesitating", values option from different perspectives

⇒The identity of a conflicted individual changes, his selves separate. Clear-cut preferences, determination, behavioral inconsistencies.

In a general model, the identity of conflicted individual is not fully transformed at each step. Only with respect to the type characteristics actualized by the current choice and those non compatible with it. So there is a lot of inertia in the process of emergence of identity.

About interference effects

The sign of the interference effect is key to the value of pooling respectively separation.

The sign of the interference is a property of the operators not of the individuals (at least of a group of comparable individuals).

Our conjecture is that Evolution hardwires human beings to sometimes be time consistent some time not: flexibility is an advantage in some circumstances and stability in others.

People who behave fully inconsistently tend to have a hard time in society (die out). Those too rigid as well.

Concluding remarks

- We developed a theory of the emergence of identity.
- Our results including some comparative statics are in many respects similar to those in Benabou and Tirole and consistent with a host of empirical data.
- The contribution of this paper is to propose an alternative explanation in terms of a fundamental characteristics of the mind: its intrinsic indeterminacy.