

**Scuola Degli Studi Superiori di Torino**

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Interazione e Meccanismi di decisione nelle società umane  
complesse

# Consumer Racism & Cooperation

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# INTRODUCTION

## **Ethnic Prejudice and Economics: Consumer Racism**

Paradigms of standard economics have led to the image of an “economic being” whose choices are totally rational and out of whatever social context, claiming the independence from others fields of study (Terna, Boero, Morini, & Sonnessa, 2006). A new perspective of economics is facing the challenge to cooperate with and learn from other fields of study, namely social sciences, in order to understand how economic phenomena are not the intentional effect of the rational choice of each person, but the emergent outcome of the interaction of many of them, which occurs in their social interactions (Boero & Terna, 2011). Psychology, and even more social psychology, can be one of the most relevant sciences in this project, as one feature of the social context of people’s existence nowadays is becoming its multiculturalism, due to migratory movements that occur in all over the world.

One issue of social psychology which could be highly important in this *scenario* is the *phenomenon* of In-group - Out-group relations and their degenerations into Ethnic Prejudice. An In-group is the totality of people of our same group. Usually, in their relation with someone “different from us” people refer to their own In-group as the “dominant group” which “hosts in his place” the Out-group, which is a group of “others” (Palmonari, Cavazza, & Rubini, 2002). Their relation generates, and is affected by, the attitude, that is, a cognitive representation and valuation of an object (Fazio, 1986). Taken alone as a concept, attitude is neither negative nor positive, these features are gained through the way the attitude is generated, which are namely personal experience and communication (media, chatting with others), the former with a higher influence.

The degenerative aspect of attitude within In-group-Out-group relations is Ethnic Prejudice. This is a negative attitude towards a group or a social

object, taken *a priori* without an empirical evidence of its reason (Palmonari, Cavazza, & Rubini, 2002). Several studies have tried to understand how to reduce ethnic prejudice due to its dangerous effects on social relations, and one of the most followed hypothesis is that of the *contact*, led by Pettigrew and Troop (2008). They suggest that prejudice, due to its root into attitude, is made up of three factors, which are a decreased knowledge of each other, a decreased empathy and, conversely, an exaggerated anxiety. These are dynamics which can easily occur in neighborhoods where, due to immigrations, native live together with foreign people. The consequences could be good, as a multicultural experience, or negative, e.g. episodes of violence due to a negative quality of life of the Out-group. And, in a world of continuous information, as our is, people can always have some communicative influence on these topics, e.g. from Internet or tv news. This has lead some authors to pay attention towards a new *phenomenon* in economics, that is, Consumer Racism. Quellet (2007) refers to it as a reluctance of consumers to buy products from immigrants, or use any service they offer, because of their prejudice. This happens at a deeper level when they have to interact in their trades with Out-groups (Level of Interactions, LOI), when prejudice can have the most evident effects, e.g. in a market square.

## **Simulation “Consumer Racism and Cooperation”**

The aim of this simulation is to study the effect of Consumer Racism (CR) on a market place. The world represents a city were a market square, which is the market place at stake, takes place. In the Interface, the quality of communication and experience can be modified, and this will affect CR, which will be multiplied by the number of social units of immigrants in their neighbors (e.g. buildings, schools etc...), because it is expected that the more negative the prejudice is, the highest CR will be if many immigrants live there. The combination of positive experience and bad communication leads to a High CR, while negative experience and good communication to a Low CR. Medium CR is gained through positive experience and bad communication, or negative experience and good communication.

In the market place there are stalls of In-groups (colour red) and Out-groups (colour blue) retailing apples. They have the same price per kilo, and their strategy is to decrease it, but Out-groups, due to an experience of rejection, do it at a higher percentage, so that they are always the cheapest

for the buyers. These ones cannot know the price of all retailers, so they walk through the market knowing only the price of the neighbors they are in, and are affected in their choice by their level of CR. High CR consumers will buy only from In-groups even though they are too expensive, Medium CR have a preference for In-groups, but move towards Out-groups if can't afford In-groups or they're not in the neighbors. Low CR consumers, instead, will choose the cheapest retailer in the neighbors, not taking into account their ethnicity. The condition 0 runs the model without the variable CR, that is, with not any neighbors inhabited by immigrants. Due to their strategy, Out-groups are the cheapest retailers, but just a few of them will earn a lot, while others will soon have to leave the market square. In this circumstance, they can adopt a strategy of cooperation, paying a tax to help who of them will need.

Through the Interface, it's possible to manipulate and see the effect of interactions among consumers' CR level, strategy of cooperation or not, and other options, e.g. level of money consumers can spend.

# MOST IMPORTANT ALGORITHMS

## CONSUMERS' BEHAVIOUR

### ► To consumers\_setting

This algorithm will set the level of CR of consumers, using namely the command “ifelse”. If experience or communication lead to a negative attitude, anxiety is activated and knowledge and empathy are not, *vice versa* with good experience and communication. The effects of experience are double, and CR level is multiplied by the social units of immigrants in their neighbors. Anxiety, knowledge and empathy are the sum of their communication related and experience related part. The CR formula is

$$CR = [anxiety - (knowledge + empathy)]$$

Once their CR is set, Low CR (-9 to -24) will be green, the same as Condition 0, Medium CR (-8 to 8) will be yellow and High CR (9 to 24) will be brown.

```

ask consumers [run [ifelse communication = "bad" [set anxiety_comm (1 * count neighbors with [pcolor = cyan])
set knowledge_comm 0 set empathy_comm 0] [set anxiety_comm 0 set knowledge_comm (.5 * count neighbors with [pcolor = cyan])
set empathy_comm (.5 * count neighbors with [pcolor = cyan])]]]
ask consumers [run [ifelse experience = "negative" [set anxiety_exp (2 * count neighbors with [pcolor = cyan])
set knowledge_exp 0 set empathy_exp 0] [set anxiety_exp 0 set knowledge_exp (1 * count neighbors with [pcolor = cyan])
ask consumers [run [set anxiety (anxiety_comm + anxiety_exp)] set knowledge (knowledge_comm + knowledge_exp)
set empathy (empathy_comm + empathy_exp)]
ask consumers [set consumer_racism ( anxiety - (knowledge + empathy))]
ask consumers with [consumer_racism >= -24 and consumer_racism <= -9] [set color green]
ask consumers with [consumer_racism = 0] [set color green]
ask consumers with [consumer_racism != 0 and consumer_racism <= 8 and consumer_racism >= -8] [set color yellow]
ask consumers with [consumer_racism != 0 and consumer_racism >= 9 and consumer_racism <= 24] [set color brown]

```

## ► Trade of consumers

Trades occur when consumers happen to the stall of a retailers. If they can afford (the price for a kilo of apple is less than their cash), they will make a “request”, spending all their money dividing their cash by the price of apples, otherwise they will have to move. If their request is lower than the “offer” (that is, all the apples) of retailers, the money they have to spend is their request multiplied by the price of apples. But, if they can buy all the apples, money they have to spend will be “offer” of retailers multiplied by price of apples. The example given is the behaviour towards In-groups, as all can deal with them.

```

ask consumers with [cash > 0 ] [if [pcolor] of patch-here = red [if [offer] of patch-here > 0
[ifelse [price_per_kilo] of patch-here <= [cash] of self
[set request floor (cash / [price_per_kilo] of patch-here)] [run [back 1] left 90 fd 1 ]]]]
ask consumers with [cash > 0 ] [if [pcolor] of patch-here = red [if [offer] of patch-here > 0
[ifelse [request] of self < [offer] of patch-here
[set cash cash - ( [price_per_kilo] of patch-here * (request))]
[set cash cash - ( [price_per_kilo] of patch-here * [offer] of patch-here)]]]]]

```

## ► To consumers\_behaviour

**Behaviour of Low CR** Low CR will move through the market square going towards the cheapest of retailers. The commands used here are “min-

one-of” and “neighbors”

```
ask consumers with [color = green] [ifelse any? neighbors with [pcolor = blue or pcolor = red]
[move-to min-one-of neighbors with [pcolor = red or pcolor = blue] [price_per_kilo]] [fd 1 rt 360]]
```

**Behaviour of Medium CR** Medium CR will move towards to In-groups in their first steps, and then towards Out-groups. Of course, they follow the general rule of trade, so they’ll leave the retailers if they can’t afford them. “Min-one-of” and “neighbors” commands are used in the same way.

```
ask consumers with [color = yellow][ifelse any? neighbors with [ pcolor = red]
[move-to min-one-of neighbors with [pcolor = red] [price_per_kilo]]
[ ifelse any? neighbors with [pcolor = blue]
[move-to min-one-of neighbors with [pcolor = blue] [price_per_kilo]] [fd 1 rt 360]]]
```

**Behaviour of High CR** High CR will move only towards the cheapest of In-groups, walking around if they can’t find them. “Min-one-of” and “neighbors” commands are used in the same way.

```
ask consumers with [color = brown][ifelse any? neighbors with [ pcolor = red]
[move-to min-one-of neighbors with [pcolor = red] [price_per_kilo]] [fd 1 rt 360]]
```

## RETAILERS’ BEHAVIOUR

### ► To price\_taking

All retailers have the same capital they can invest, plus the costs of stall rent and carriage cost of apples. After they face these costs, what is left can be spent to buy apples, which will be referred to as “offer”. The cost of a kilo of apples is made by total costs divided by the number of kilo sold plus the earning expected, which is the same for all of them.

```

ask patches with [pcolor = blue or pcolor = red] [run [set capital capital_retailers]
set offer floor ((capital - stall_rent - carriage_cost) / market_price)
if offer <= 0 [set pcolor black]
ask patches with [pcolor = red or pcolor = blue] [set earning_per_kilo earning_level]
ask patches with [pcolor = blue or pcolor = red] [run [set total_costs ((stall_rent + carriage_cost) +
(market_price * offer))]
set cost_per_kilo ( total_costs / offer) set price_per_kilo (cost_per_kilo + earning_per_kilo)]
ask patches with [pcolor = blue or pcolor = red] [set earning 0]
ask patches with [pcolor = blue or pcolor = red] [set income 0]

if Cooperation [ask patches with [pcolor = blue] [set social_tax 0]]

```

## ► Trade of retailers

When a consumer comes to the stall and can afford to buy the apples, if they can afford all of them, the earning of retailers will be the price of a kilo of apples multiplied by all their own offer, which will become 0 as they have sold of all them. If consumers can't buy all the apples, the earning of retailers will be the price of a kilo of apples multiplied by the request of the consumer and this will be detracted by their offer. In the example given, Out-groups can trade just with Medium CR and Low CR, in order to respect High CR prejudice.

```

ask patches with [ pcolor = blue] [if any? consumers-here with [color = green or color = yellow]
[run [ifelse mean [request] of consumers-here >= [offer] of self
[run [set earning earning + (price_per_kilo * [offer] of self)] set offer 0 ]
[run [set earning earning + (price_per_kilo * mean [request] of consumers-here)]
set offer floor ( offer - mean [request] of consumers-here)]]]]

```

## ► Social Tax for Out-groups

If Cooperation is on, only Out-groups will pay a social tax as a percentage of their “income”, which otherwise will be simply “earning” less total costs.

```

ask patches with [pcolor = blue and offer = 0] [ifelse Cooperation [run [set income earning - total_costs]
if income >= 0 [set social_tax (%_social_tax * (income / 100))]
[set income earning - total_costs]]

```

## ► Positive income of Out-groups

If Cooperation is on and income is positive, Out-groups will set capital equal to their income less the social tax they have paid. The difference will be invested again. Stall-rent is not anymore in their costs, just the carriage of apples they will buy. If they can't afford other apples, they will leave the market and their colour will become darker (the same for In-groups). If Cooperation is not run, their capital is equal to their income and they can invest all this. In-groups have the same mechanism but without the Cooperation option.

```
ask patches with [pcolor = blue and offer = 0] [if income > 0 [ifelse Cooperation [run [set capital (income
- social_tax)]
set offer floor ((capital - carriage_cost ) / market_price) ifelse offer > 0 [ set total_costs ((carriage_cost
+ (market_price * offer))
set cost_per_kilo ( total_costs / offer) set price_per_kilo cost_per_kilo + (earning_per_kilo)
set earning 0] [set pcolor blue - 3]] [run [set capital income] set offer floor ((capital - carriage_cost ) /
market_price)
ifelse offer > 0 [run [ set total_costs ((carriage_cost) + (market_price * offer))] set cost_per_kilo (
total_costs / offer) set price_per_kilo cost_per_kilo + (earning_per_kilo)
set earning 0] [set pcolor blue - 3]]]]
```

## ► Negative income of Out-groups

If Cooperation is on and Out-groups fail, they can rely on the social tax. Their failure is shifted with a new capital, which is the equivalent of the percentage they deserve from the social funding. So, they have a new capital to invest, but they still have to pay for the stall rent, because they have failed earlier. If “offer” is equivalent to 0, they have to leave the market (the colour gets darker), the same way if Cooperation is not on.

```
ask patches with [pcolor = blue and offer = 0] [if income <= 0
[ifelse Cooperation [run [set capital (sum [social_tax] of patches with [pcolor = blue] / count patches with
[pcolor = blue])]
set offer floor ((capital - (carriage_cost + stall_rent ) / market_price))
ifelse offer > 0 [run [ set total_costs ((carriage_cost + stall_rent) + (market_price * offer))]
set cost_per_kilo ( total_costs / offer) set price_per_kilo cost_per_kilo + (earning_per_kilo)
set earning 0] [set pcolor blue - 3]] [ set pcolor blue - 3]]]]
```

## ► Strategy of retailers

Using the command “every”, each second all retailers will decrease their prices at a percentage (higher for Out-groups). If the price of a kilo decreased becomes less than the cost of the same kilo, they have to leave, as no earning can be expected. If when they are leaving “earning” is higher than total costs, they will have a positive outcome and their colour will become brighter, otherwise, they will have failed, and their colour will become darker. Just for Out-groups, if Cooperation is on, there’s the opportunity to continue even though “earning” is less than total costs, because if they fail they can use the part of social funding they deserve to continue.

```
every 1 [ask patches with [pcolor = blue] [if not any? consumers-here [set price_per_kilo price_per_kilo
- (%_reduce_blue * (price_per_kilo / 100))]]]
ask patches with [pcolor = blue] [if price_per_kilo <= cost_per_kilo [ifelse Cooperation [ ] [ifelse earning
<= total_costs [set pcolor blue - 3] [set pcolor blue + 3]]]]]
```

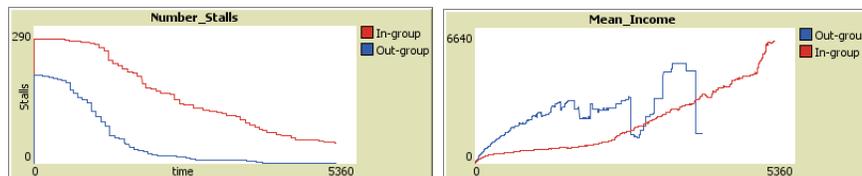
# EXPERIMENTS AND CONCLUSIONS

Several interactions among variables can be done, here are the most interesting.

## Case 1

This is the Condition 0, where the variable Consumer Racism is not taken into account and Cooperation is not on. Regarding the number of stalls which can survive (Number\_stalls), In-group are more, while Out-group will easily die. But, regarding their average income (Mean\_Income) Out-groups have an initial greater amount of income, until the point they fail, as they can't stand their strategy of decreasing their prices more and more. It means that without Cooperation few earn more, but all of them risk highly to fail.

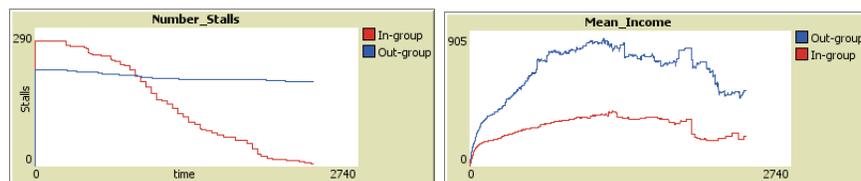
CR Level	Repopulation	Cooperation	Cash_consumers	Outgroup_neighbors
0	✓	✗	100	0



## Case 2

In the Condition 0, if Cooperation is on, Out-groups will survive at a greater level, and their income will be higher than In-groups, because they are always cheaper, but will find a balance at a lower level, meaning that thanks to Cooperation, all will earn something and will survive, even though they will be less rich than in the condition without Cooperation.

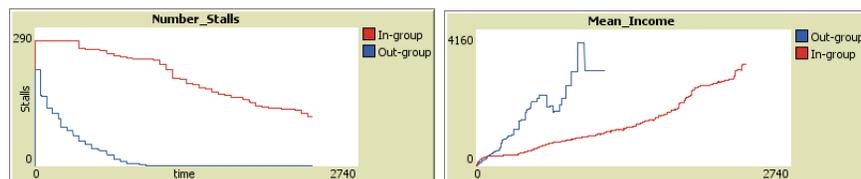
CR Level	Repopulation	Cooperation	Cash_consumers	Out-group_neighbors
0	✓	✓	100	0



## Case 3

With Medium CR consumers, if they have a great amount of cash and can easily afford the costs of apples, they will move first to In-groups, due to their preference, then, after spending their money, they will move towards Out-groups, who will be more affordable now. As a result, they can register a peak, but soon will lose it because the strategy used is not Cooperation, and the market place will be overcome by In-groups back.

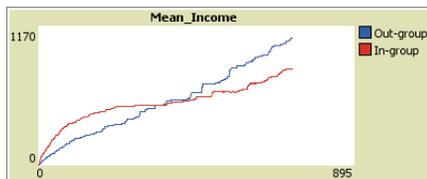
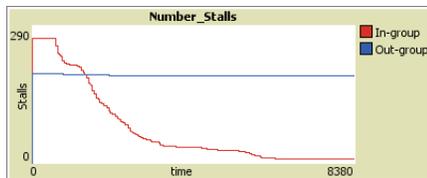
CR Level	Repopulation	Cooperation	Cash_consumers	Out-group_neighbors
Medium	✓	✗	100	1089



## Case 4

With Medium CR consumers and Cooperation on, the situation will be more complex. There will be a first moment when In-groups are the most required, due to the preference of Medium CR towards them, then Out-group will have their peak, but are consequently overcome by In-groups again, because, in the meanwhile, their prices have decreased and this fits Medium CR's preference. But, in the end, due to Out-groups being always the cheapest, and consumers being always spending their money, Out-groups will always overcome the market.

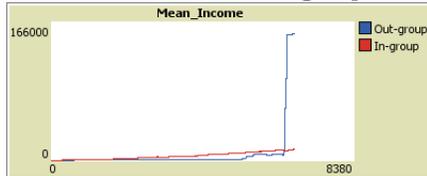
CR Level	Repopulation	Cooperation	Cash_consumers	Out-group_neighbors
Medium	✓	✓	100	1089



**In-group initial peak and In-group first overcome after.**



**Medium come back to In-groups.**

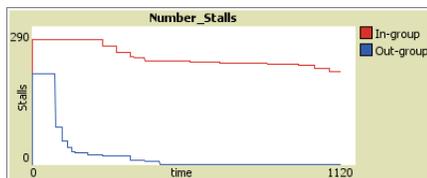


**Out-group finally overcome the market.**

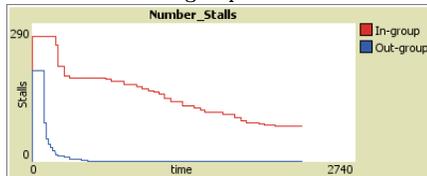
## Case 5

With High CR consumers, Out-groups will have to die and In-groups will overcome the market place. This might appear quite trivial, but the most interesting aspect is that the same outcome appears if consumers have few cash. They can't afford neither In-groups, the best choice would be to move towards Out-groups, but they refuse, and, as a consequence, In-groups too will die in the meanwhile they decrease their prices to become more affordable to consumers.

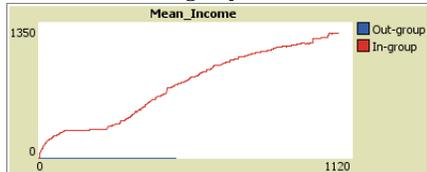
CR Level	Repopulation	Cooperation	Cash_consumers	Out-group_neighbors
High	✓	✓ but irrilevant	100 or 5	1089



The number of In-groups stalls when consumers' cash is 100.



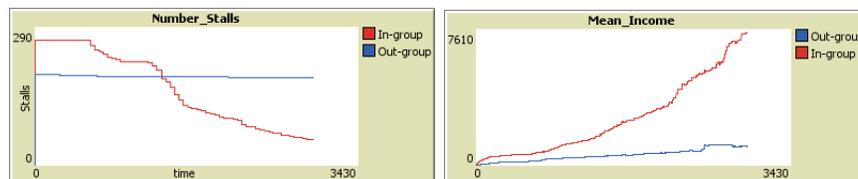
The number of In-groups stalls when consumers' cash is 5.



## Case 6

Thanks to the presence of Medium CR consumers, as neighbors are not all lived by immigrants, Out-groups can survive, as they will be chosen by the former after they have spent their money becoming poorer. But the income of In-groups, and consequently their number, will always be higher.

CR Level	Repopulation	Cooperation	Cash_consumers	Out-group_neighbors
High	✓	✓	100	500



## Conclusions

This model has simulated the dynamics of a market square where relationships between consumers and In-group and Out-group retailers took place, trying to analyze the effects of consumers' prejudice under the shape of Consumer Racism (CR) on this *scenario*. What deserves to be paid attention is how a cooperative strategy can be the best solution to survive into a racist context of discrimination. This has been highly evident with Medium CR consumers, and even more when these came across the market together with High CR consumers. These have shown how a high level of CR can be destructive to ourselves, refusing *a priori* a trade because of the ethnicity of the retailer, and also destructive to the general outcome of the market. In a some way, we can state that those who have a prejudice are "victims" of their same prejudice. This simulation, through the proved effects of communication and experience within a neighborhood, could demonstrate how these psychological issues must be taken into account not only within economic studies, but also by the stakeholders of any community, to reach a good level of well-being for all the society.

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