Rationality, preferences and irregular war

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Summary

We suppose that civilians under threat prefer certain situations within a context of irregular war and endangered survival; they will prefer those situations associated with greater probabilities of survival. Using lexicographical preferences and belief systems, we have shown that civilians will choose not to remain in situations having a lower probability of survival. Linking into social networks allows for shorter deliberation processes, lower decision costs and faster convergence towards collective decision-making. Civilian displacement thus becomes the outcome of a rational decision-making procedure.

Certain basic theories have established by diverse means that war is fundamentally irrational. Agents who prefer using violence and war to institutional means in order to achieve their objectives are presumed irrational. It is also true that the use of violence offers no demonstrable benefits for the human species as a whole [Sampson 2001]; or at least in the long-term, not for the agents involved. In the context of the Colombian conflict, Cubides, Ortiz and Olaya define the irrationality of violence in the following terms:

> …the study of the logic behind the actions of social and individual actors, leads to a similar conclusion: the violence, the levels of irrationality which conflicts tend to deal in, is determined by the little value that is assigned to the institutional means created to resolve them [Cubides *et al.* 1998: 244].

This essay proposes, however, that it is possible to make a direct connection between war and rationality. To this end we will refer to the case of the irregular war that is being waged in Colombia today. We do not intend to prove the truth of statements such as, "war is rational" or "the irregular war in Colombia is rational". In this essay, the term rational is not considered to be an adjective nor attribute of war in general, or of any specific armed conflict. War *per se* is neither rational nor irrational, but rather those who participate in it, those who propitiate it, who coexist with war, who continue to prefer war to other alternatives in any given situation of conflict. Neither do we intend to establish the just or unjust character of war. We assume that the irregular war in Colombia is a specific situation in which the different agents involved –armed factions, civilians, the State– have to selected strategies designed to achieve certain fundamental aims. The main point in our line of reasoning is that the agents involved in this violent conflict adopt strategies that can be considered as rational within the existing institutional, historical, geographical, and information restrictions.

In order to determine more exactly the problem we wish to analyse here, we are only going to consider the behaviour of the civilian population within the context of the Colombian armed conflict. We are interested in understanding the rationality of individual and collective actions in a situation of irregular war. We base our reasoning on the concept of rationality as found in economic theory

and Game Theory. In *Ulysses and the Sirens*, John Elster [1979/1984] proposes that rational choice is the result of a process made up of two steps:

> To explain why a person in a given situation behaves in one way rather than in another, we can see his action as the result of two successive filtering processes. The first has the effect of limiting the set of abstractly possible actions to the feasible set, i.e. the set of actions that satisfy simultaneously a number of physical, technical, economic and politico-legal constraints. The second has the effect of singling out one member of the feasible set as the action which is to be carried out [1979/1984: 76].

This definition is compatible with the common use of rationality in microeconomics and in Game Theory. The first step of the filtering process implies interpreting rational action in a way that is compatible with the existence of different possible worlds, and with the introduction of explanations not dependent on the successful resolution of the optimisation problem relative to the situation in question. However, the second step brings us back to the rationality that is characteristic of economic theory: rational agents, in normal conditions of computation and inference, must be able to choose a single element from the range of attainable alternatives. We will begin by discussing the second step.

When selecting an element that guarantees a function's optimisation, be it in terms of utility or profits, the agent must have a complete and consistent order of preferences regarding the attainable alternatives. According to Little [1992: 3], the pertinent question in this type of interpretation is: "how should the agent act given this range of preferences?" The decisive intervention of Elster gives rise to a different question: how should the agent act if the range of preferences is not fixed and it changes endogenously in response to changes in the situation at hand? It is in this new context that we intend to discuss the rationality typical of agents in the civilian population, within the context of irregular war.

The problem that the population must solve, in a context such as that mentioned above, can be defined thus: what is the best course of action in a situation that poses an increasing threat to survival due to the violent actions of armed organisations? We are assuming that the population has not made ideologically clear choices; that they do not identify, in ideological or political terms, with any of the armed organisations or coalitions vying to control the territory and its population. Obviously, this is not always the case. However, it is true that in the Colombian situation, the degree of ideological or political identification that the population feels for one or other of the armed factions is very small. Indeed, it

becomes almost insignificant within the context that we are considering. In the language of Elster [1997], we would be ruling out one of the possible 'I' of the civilian agents, or better still, we would be applying a flexible, even opportunistic, interpretation of the political and ideological 'I' of civilian agents.

This stance is not arbitrary. In a war, civilians learn from experience. It is almost natural to consider their learning processes in a sequential way. When a war begins, economic opportunities and gains are important. It is even very likely that agents located in war zones, with higher economic opportunities, offer loyalty in exchange for protection and might very well identify themselves with one armed organisation or another. But war is a hard master. Agents learn that in disputed territories there is no such thing as full protection. The need to enforce the monopoly of violence and control leads to the use of violence. It might be discriminate or indiscriminate, random or deliberate, arbitrary or modulated. In any case agents learn that nobody living in disputed territories can escape the reach of violence. Kalyvas words it out in a precise way:

> Although material and non-material benefits matter in initial stages of the war, once violence escalates into the 'main game in town', individual survival becomes the main priority for most people irrespective of their political preferences. *Most civilians will come to increasingly value their own survival* and this consideration will weigh on the choices they will make [Kalyvas 2001: 6, our emphasis].

To respond to the question raised above, we need to define the set of opportunities or alternatives facing civilian agents, as well as their preferences. However which domain should be used to define the order of preferences: all the possible results of the agents' actions, and their interaction with the actions of the armed organisations? No. In reality agents, according to their perceptions, order their preferences in relation to existing, potential situations. In other words, they order their preferences according to the existing opportunities within each one. Here, obviously, various differences emerge with regard to the traditional stance on rationality. The first difference is that these preferences do not have the same domain as in conventional theory. Given the uncertainty of the result of the individuals' actions and of their interaction with the actions of the armed organisations, it would be very costly, almost impossible, to generate preferences based on these results. For this reason, the preferences operate on existing situations according to the perception of each of the agents.

How are these perceptions developed? In schematic terms, we can say that they are generated by personal, prior experiences, by the evaluation of the results of

past actions, by historical circumstances, and by social interaction with other individuals, networks, groups and organisations. Who is the agent that builds these perceptions? It is not the individual agent of conventional economic rationality. It is true that by looking at individual actions, we can understand the result of social interactions, but, due to the high cost of deliberation, a lone could not generate the perceptions necessary to construct an order of preferences and take the corresponding decisions. Instead, we propose that these perceptions are developed via social interaction; and that the individual then acts on them. It is an individual who decides to flee his or her land for fear of reprisal from an armed organisation, but it is interaction with other individuals, groups, organisations and social networks, that allows the individual to reduce the amount of deliberation necessary in order to arrive at a defined perception of the situation at hand.

In a first instance, individuals will prefer one situation to another if the economic opportunities are greater than those to be gained from the second situation. This criterion is compatible with that of the theory of utility: one situation is preferred to another if, and only if, the economic utility derived from it is greater than that obtainable from the second situation. However, there is a second criterion that reflects the type of choice an agent needs to make in a situation of irregular war: one situation is chosen over another if, and only if, it represents better economic opportunities and if the probability of survival is greater than a certain threshold p_u. In more formal terms: if x and y are situations perceived by an individual i in a context of irregular war, then,

$$x \succ_i y \Leftrightarrow u(x) > u(y) \text{ and } p^x_s > p_u, \ p_s, p_u \in [0,1]$$

Evidently, the problem that the individual needs to resolve in this situation is more complicated than the typical optimisation problem as defined by conventional theory. Here, the agent must correctly and simultaneously evaluate the economic opportunities and the probability of survival associated with a given situation, in a certain territory and at a particular moment in time. What is the basis of this evaluation? We have already mentioned their past life story and information available at the time about previous experiences in other territories. But this is not enough. An example would be appropriate. A situation in which agents are completely unsure of the outcome of the dispute between two armed factions, in which there is no indication as to which of the two factions will prevail in the near future, or in which the change in domination is perceived to be traumatic and violent, will lead to the perception of the probability of survival

being close to zero and result in the choice of action being to flee the territory in question.

On the other hand, the existence of a large coalition within a territory will guarantee the stable domination of that alliance and increase the probability of survival in that region. The appropriate action therefore will be to remain in that territory, ensure the power of the existing coalition and enjoy the economic opportunities in place. From the formal and descriptive perspective, however, this gives rise to an obvious difficulty: how to fix the minimum threshold of survival? By which process does a community, a group of individuals and social networks perceive that they are dangerously close to the survival threshold and that they should abandon the area? One way of broaching the problem is to postulate the existence of social processes that, through imitation and contagion, lead individuals to opt for a single alternative. Formalising of this kind of alternative is not easy and requires starting from local interaction [Morris 2000, Chwe 2000] in order to converge on, under certain circumstances, global results.

There is, however, an additional problem: those territories in which there are greater economic opportunities are the same territories where the armed factions prefer to base themselves. As such, the two variables are not independent. Relocation to areas with economic opportunities greater than those available in other places, goes hand in hand with the decrease in the probability of survival for individuals who have decided to settle in those regions. The set that represents the situation of individuals located in territories with greater economic opportunities is enlarged by the addition of a new element: a probability of survival that decreases over time and which reaches levels lower than those of the established, minimum threshold. It is the introduction of this new element that leads individuals to exercise what we could interpret as a form of self-control. Once the probability of survival is less than, or close to, the minimum threshold, individuals prefer to abandon a situation of danger, even if this means they have to accept inferior economic arrangements. Note, however, that the final result also depends on the early interactions and the decisions of the civilian population at the outset of the threat.

However, another analytical question remains: what is the rational bridge between the new order of preferences and the probability of survival? Here we propose a system that represents the beliefs of each agent i with respect to the beliefs of other agents (agent $-i$, his or her neighbour, for instance) with respect to the most probable action of the armed agent j. A new question emerges: how to

change the order of preferences $\succ_i$ so that i can choose the most adequate action, given the belief system of i and $-i$? Now everything revolves around the agents' belief system and the specific conditions for the epistemic interaction between civil and armed agents. Note that civilian agents' location used to depend exclusively on the economic opportunities available to them, but not any more. Agents' decisions now depend on that element and on the probability of survival, $p_s \in [0, 1]$. And p_s depends on the civilian agents' belief system.

Let's imagine that a rival armed organisation has threatened to dispute control of a territory in which a group of civilians live. It makes no difference if the information has been delivered via rumours or direct threats. The fact is that the set of situations on which they have to establish their preferences has changed. If an armed agent j threatens to dispute a territory, situation x becomes, in the context of the belief system, a potential state y, clearly inferior to x in economic and social terms, and with a $p_s^x > p_s^y$.

Remember that individuals located in an undisputed territory rank x over all other situations. That is, they prefer x over all other states potentially available to them at time t. Thus a dramatic transformation occurs. As we said before, the territory they live in becomes an object of dispute. How would individuals choose now? The first impact would be on their perceptions. As the perceived probability of survival decreases, situation x is no longer the same. Even if economic opportunities remained equal, a decreasing probability of survival would change one of the elements of the set that represents situation x. If x is no longer the same situation x, by what means would individuals choose an alternative in this new context? Individuals can introduce a new situation y to describe the fact that the original situation is deteriorating rapidly. Now they have to choose between a past situation that is deteriorating and a new, darker situation emerging before their eyes. The new, lexicographic[1], preferences could be written down as:

$$\{x'\} \succ_i \{x', y\} \succ_i \{y\}$$

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[1] A formal and intuitive definition of lexicographic preferences can be found in Mas-Collel *et al.* [1995: 46]. "Define $x \succ y$ if either "$x_1 > y_1$" or "$x_1 = y_1$ and $x_2 > y_2$". This is known as the *lexicographic preference relation.* The name derives from the way a dictionary is organized; that is, commodity 1 has the highest priority in determining the preference ordering, just as the first letter of a word does in the ordering of a dictionary". Within the context of irregular war, probability of survival has the highest priority in determining the preference ordering between situations.

Note that situation x has been replaced by x'[2]. The reason is straightforward: individuals cannot prefer situation x anymore because it is fading away. Now they have to choose a situation x' as close as possible in economic terms to x, but with a higher p_s. Individuals, of course, prefer any situation that offers a higher probability of survival and no territorial disputes. But if a territorial dispute erupts individuals prefer to choose between x' and y to stay in situation y, and do not dream of x anymore. As the probability of survival declines in y, and x is fading away, individuals choose not to stay in the disputed territory. Their new arrangements are always inferior in economic and social terms, but it is their only way to improve the odds of survival. It is important to note that improving chances of survival is not equivalent to maximising behaviour. As a matter of fact, the new situation x', in which agents have a larger probability of survival, is associated with poorer economic outcomes. Survival has economic and social costs.

The probability of survival within a given territory will be situated above the minimum threshold if and when an armed agent, or a coalition of armed agents and the civilian population exercise credible control over that territory. In other words, for as long as they can effectively exclude any offensive action by a rival armed organisation. However, this degree of control, in turn, depends on the choices of the civilian population (Who do they support? Via which networks? On the basis of which concrete history of relations with the armed agents?[3]). In general, peoples' preferences are not independent of their actions, which, in turn, depend on the actions of other individuals and their interaction with the armed agents and, as such, on the perceived results.

The whole process can be described as follows: the agents' perceptions of the situation are 'sent' to the set survival probabilities. Each perception has one and only one corresponding probability of survival, but the number of situations to be evaluated cannot be too many. Indeed, there are few situations or only one for each moment. The probability of survival associated with this situation leads,

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[2] We are following here ideas introduced by Gul and Pesendorfer [2000] in an unpublished paper.

[3] The so-called civil resistance has its origin in the different ways in which the civilian population has interacted with the different armed factions in different regions of the country. The case of Cauca is very different to that of Caquetá or Huila. In the first, indigenous organisations have always maintained a fierce independence in relation to the armed factions. This has not been the case in the other two regions, where relations with the FARC, for example, have been far reaching and close.

in turn, to a single, corresponding action: to remain in or abandon the territory –in the context of our problem. It is clear that civilian agents prefer situations with a high probability of survival, and that as far as possible they will strive to achieve this even if it means incurring very high social and economic costs. Their preferences have become lexicographic: in situations of increasing danger for survival, they always prefer a situation with a higher probability of survival. This can be translated into the language of possible worlds: agents have perceptions about different possible worlds. In one possible world, there is no such thing as stable authority, and uncertainty prevails. In another, a large coalition ensures stable authority, which reduces levels of uncertainty and increases the time available to make decisions.

The belief system associated with civilian behaviour in disputed territories may be explicitly represented as follows. Let φ be a proposition stating the following: "armed organisation j will exert violence on the civilian population of a specific territory T". Proposition φ can also be interpreted as the event "armed organisation j exerts violence on the civilian population at territory T". In both interpretations civilians must have beliefs about the potential actions of the incoming armed organisation. B is a belief operator describing the agents' beliefs with respect to each other and the armed agents' actions. We can thus state:

$$B_i \, B_{-i} \, \varphi \, (p > 0.5) \rightarrow p_s < 0.5$$

Which means that if agent i believes that agent $-i$ believes, with a probability larger than 0.5, that φ is true, then the probability of survival if they stay in the same territory is less than 0.5. The agents may enlarge this belief system with new conjecture or rationale about each other's beliefs. For instance,

$$B_{-i} \, B_i \, B_{-i} \, \varphi \, (p > 0.5) \rightarrow p_s < 0.5$$
$$B_i \, B_{-i} \, B_i \, \varphi \, (p > 0.5) \rightarrow p_s < 0.5$$

$$B_{-i} \, B_i \, B_{-i} \, \varphi \, (p = 1) \rightarrow p_s = 0$$
$$B_i \, B_{-i} \, B_i \, \varphi \, (p = 1) \rightarrow p_s = 0$$

In the same way we can describe other potential states of the belief system and their associated probabilities of survival:

$$B_{-i} \, B_i \, B_{-i} \, \neg\varphi \, (p = 1) \rightarrow p_s = 1$$
$$B_i \, B_{-i} \, B_i \, \neg\varphi \, (p = 1) \rightarrow p_s = 1$$

$$B_{-i} \, B_i \, B_{-i} \, \varphi \, (p = 0.5) \rightarrow p_s = 0.5$$
$$B_i \, B_{-i} B_i \, \varphi \, (p = 0.5) \rightarrow p_s = 0.5$$

The first two instances of the belief system describe a situation perceived by the agents as seriously damaging to their survival. They will prefer not to remain in that territory and to move to another location x'. The next two describe the opposite situation: an extremely safe, undisputed territory controlled by an armed organisation, or coalition, and the civilian population, which leads to a shared belief of probability of survival close to one. In such a situation it is rational to believe that no armed agent will try to dispute the territory the civilian agents are located in. The final two describe a situation of extreme uncertainty: given the information available, there is no way to rationally establish if φ true or false. This is a dividing point: if the agents' belief system cannot assign a probability smaller or larger than 0.5 then agents should prefer not to stay in that territory.

Morris and Shin [1997] and Kajii and Morris [1995], have developed the concept of p-belief common knowledge. An event is a common p-belief if everyone believes in it with a probability of at least p, and everyone believes with probability at least p that everyone believes in it with probability at least p, and so on. We can translate the results of our belief system into the language of Morris and his associates: the probability of survival, p_s, is a common p-belief at state x if, and only if, x is an element of a p-evident event φ, with the property that everyone believes p_s is at least p whenever φ is true.

From a civilian point of view we can say: whenever everyone believes that φ is true –or is not true–, everyone believes that everyone believes that p_s is at least p at situation x if, and only if, x is an element of a p-evident event φ. But the truth of φ is probabilistic: the armed organisation may attack with a probability close to one, with zero probability, or with a probability around 0.5. The belief system then relates each of these probabilities to the probability of survival. Depending upon the probability given to violence, individuals create a p-belief with respect to probability of survival. The analytical effects of the two extreme values are easy to grasp. If the probability of violence is close to one, individuals believe that the armed organisation will exert violence upon them at any moment, making their probability of survival fall to near zero. But if they associate a probability close to zero with the use of violence by that organisation, they will have a probability of survival close to one.

What about a probability of around 0.5? If the probability of survival is bounded from above, and individuals have lexicographic preferences, it is more likely that a probability of violence of around 0.5 is translated as a probability of survival under or close to the survival threshold. In other words, whenever the probability of violence in a disputed territory is around 0.5, social processes will ring the survival alarm and the perceived probability of survival will fall towards the survival threshold. Populations that have suffered several rounds of violence will have lower survival thresholds: a positive probability of violence will become a survival threshold of near zero. Both the probability of survival and the survival threshold will converge towards zero.

In a situation of irregular war there is an element that prevents uncertainty from decreasing below a certain threshold. The degree of random violence perpetrated by armed factions –massacres make up a part of this arbitrariness. Each faction has to prove that it is capable of using violent means to impose its authority, even at the expense of emptying territories. In a situation of this type it is almost impossible to obtain enough information to make the correct decision. Referring to the amount of information required to make a rational decision, Elster phrases the problem thus:

> More generally, we must require not only that beliefs be rational with respect to the available evidence, but also that the amount of evidence collected be in some sense optimum. On one hand, there is a risk of collecting too little evidence […] On the other hand, there is the risk of collecting too much evidence […] Other things being equal, a decision is likely to better the more evidence we gather and the longer we deliberate, but other things are not always equal. By the time they have reached a decision, the occasion may well have passed us by. The patient may be dead, the firm gone into bankruptcy or the battle lost [Elster 1989: 25].

In analytical terms, we propose the following formula: a situation is defined by a set of elements made out of the economic opportunities available and the perceived probability of survival. In normal conditions, an individual's preferences will be defined only by the differences in the economic opportunities. In a context of irregular war, this set, which represents the situation, has an additional element: the probability of survival. This normally varies between zero and one. However, a climate of permanent uncertainty generates an upper bound for the probability of survival. In such a situation lexicographic preferences take over: agents rank situations and territories based on probability of survival. It does not matter that huge or relatively large economic opportunities have to be overlooked. Survival prevails and agents act in a way compatible with that goal. The agents' perceptions

of the situation are associated with a specific probability of survival. But if there are many individuals facing the same situation, how is it possible to converge on a single probability of survival and, consequently, a single action? The role of social interaction through networks and social groups is decisive at this point.

This brings us to the second difference with conventional economic rationality. The states that come about as a result of the interaction between armed agents and civilians are emergent states. They arise, not from the direct election of the agents involved, but from the interaction between them and the constant revision of their expectations. To understand them, it is necessary to understand the spontaneous social processes that lead to one result or another and the structures that are maintained or transformed by these processes. In particular, it is necessary to understand the processes of the formation, destruction and transformation of social networks.

The third difference relates to the role of time in civilian decision-making processes. In an irregular war the risk and the probability of not surviving increase if no agent or coalition of agents has credible and stable control of the territory. Moreover, the relevant time for making a survival decision is cut short. It is no longer a question of making long or middle-term decisions about the level of security in a certain territory. It is necessary to detect, in a very short space of time and sometimes immediately, the magnitude of the threat and the degree of uncertainty inherent in the changing situation. The long-term disappears and only the short-term is relevant for the purposes of making decisions that lead to a certain kind of equilibrium; to stay or not stay in a certain territory, for example. The perception of time undergoes a crucial change: each moment may be decisive and the individuals' survival will depend on the networks they are linked to and their past actions.

What is known as temporal inconsistency [Rabin 1998, Gul and Pesendorfer 2000] makes an appearance here in another guise[4]. In situations of irregular war, the crucial point is not so much the effect of time on agents' rationality. Nor is it about the necessary apparition of inconsistency in the individuals' processes due to the temptation exerted, on future occasions, by inferior alternatives. The fact is that agents know that the situation they are in could become even more uncertain and that today's preferences may not work tomorrow. However, that

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[4] In formal terms, however, the question that we raise here can be modelled by following the formal and rigorous treatment that Gul and Pesendorfer give it in their article [2000].

'tomorrow' may be very near. The situation can change in a very short period of time –from one day to another, in a matter of hours– and this places heavy demands on the rationality of civilian agents. When a threatening future looms, individuals tend to prefer safer, less risky situations, even though the economic outcomes associated with them are clearly inferior to those of an uncertain future. Thus, the future is more heavily discounted and a reversal in preferences comes about. We are faced not so much with the effect of time on individual preferences and decisions, as with the imminent probability of a catastrophic event.

The issue here is not that temptation may affect the agents at a later stage, making them deviate from their long-term plans, but rather the decision of life or death that they are obliged to make with a minimum amount of deliberation. Note that the pressure of minimising the cost of deliberation becomes ever stronger in this type of situation. The crucial role of social networks, groups and civilian organisations is obvious: it is only through networks that process the relevant information at the necessary speed that agents can minimise the cost of deliberation and reach the correct survival decisions in the time available.

The rationality of individuals within a network

The act of forming a network determines the result of individuals interactions with other organisations. By their very nature, the presence of violent factions and their constant confrontation with the State military has succeeded in changing the set of alternatives available to individuals of all social classes throughout the nation. It is not possible, therefore, to analyse the Colombian situation from the point of view of isolated agents who make decisions freely or following processes of conventional deliberation or maximisation.

As we mentioned earlier, the restrictions faced by individuals in a conflict situation are so strong that the set of alternatives collapses into a set of opportunities made up of very few elements. This transformation is not casual. As Elster [1989] states, changing circumstances or opportunities is easier than changing opinions. The population is aware that ever changing opportunities is a strategy used by armed factions to achieve their aims. The population must find a mechanism that allows interaction with these armed organisations at the lowest possible cost. On the basis of other populations' experiences in similar circumstances, civilians learn to recognise that the isolated confrontation of each individual with an armed agent implies a very high cost.

The transformation and decrease in the range of opportunities available to the population and their constant (obligatory) participation in the Colombian irregular war has led to the emergence, and use, of civilian networks and organisations in the regions of greatest conflict. Networks are a representation of relationships between individuals involved in social or economic activities. When people are faced with a conflict situation they choose to form networks. The presence of links represents closeness between individuals that have apparently little in common. When two individuals have some type of connection, transmission of information across their links is less costly for them.

Let's imagine a situation where political actors use violence to try to take control of people living under enemy control. A certain degree of interaction between the civil population and the insurgent faction follows. As we have seen, certain patterns can be observed in the actions of insurgent agents; they form rational beliefs depending on their exchanges with civil population. Their predatory activities are neither a threat for the viability of the whole economy nor for its social tissue. However, if they use terror as a weapon against civilian population the whole social structure changes –civilians are required to respond to the violent activity of armed groups. There are several ways to represent such responses. Networks are one of them. The coming together of individual agents into networks and groups plays an important part in determining the outcome of social interactions in the Colombian irregular war; for example in territories where there is tension between armed groups and where the population must choose a course of action that involves walking the thin line between life and death. In these situations, network structures represent different patterns of communication and cooperation between civilians.

What is the mechanism of network formation? Over time, a group of unconnected self-interested agents decide whether or not to form links with each other. Such decisions are based upon other populations' experiences. Each agent has some information about the consequences of determined actions, which they transmit through their connections. Within a network, every individual is assumed to be symmetrically informed; i.e. individuals who are linked share information about the environmental in which they live. Each agent is myopic, and so he/she decides about links based on whether severing or forming a link will increase or decrease his/her payoff in the current period. Payoffs thus depend on the individual agent's perceptions about the state of the war and its effects upon his/her survival. When we assume that agents are initially unconnected, the cost of facing armed groups can be greater that they

are connected. If an agent knows the consequences of another's actions in similar circumstances, he/she can process and transform this information into patterns that allows him/her to make a "correct" decision that decreases the probability of loss.

Are these social networks the most efficient way to produce, exchange and process information within a context of irregular war? We believe so. Their significance lies beyond the fact that they allow information to be exchanged. They are characterised by two fundamental virtues: the flexibility of links between individuals (these links can be broken or created at any time, according to the circumstances or the interests of the network's members) and the minimum cost with which they manage to process the available information and take the corresponding decisions in a situation of irregular war.

The sheer length of the Colombian conflict makes the flexibility of links an important factor in explaining the different states of interaction between civilians and armed organisations. A regional overview of our conflict's evolution shows the different arrangements achieved by interaction between armed agents and the civilian population. In the long-run, decisions about adding or severing links will prove a very important factor to understand why different states come about as an outcome of the strategic interaction between civilians and armed organisations. A regional overview of our conflict's evolution shows a wide range of arrangements achieved by the interaction of armed agents and civilian population. We can find places where social networks have accelerated people displacement, increasing their probability of survival and contributing to the overthrow of one of the parties' territorial control. In other places, social networks have promoted civilian resistance against armed agents' claims. A failure to construct social networks may help to understand the massive killings of civilians in other places and circumstances.

The efficiency of links depends upon players' location. We argue that the formation of networks within a context of irregular war is related to the spatial distance between individuals. It means that networks are formed between members that are spatially close or connected through friendship or kinship ties. It is easy to verify that the population of the Northern region of the country does not form links with the Southern population because of the huge geographic distance between them. This gives a geographic flavour to social networks analysis, and yields some interesting structures for efficient networks. Thus, we analyse networks formed between neighbours, friends or kin in a territory under the

same type of violence. It is possible that the only existence of this condition leads to the formation or activation of networks.

Within a territory T individuals linked by ties of family, kinship or friendship must take a decision with respect to stay in or moving out of it. Those who choose to move out have to take another crucial decision: which place they will locate in. The set of available locations is of course very large, but some minimal rationality criteria will make it shrink to a more manageable size. Individuals will prefer locations that (i) minimise the distance with respect to their former location; (ii) minimise the economic and social loss from being displaced; (iii) have a higher perceived probability of survival. How can they gather the information required to comply with the above criteria? Social networks are crucial here. Family members, acquaintances, friends already located in other places, or that have experienced displacement on an earlier moment, can send messages or signals about the outcomes of their own decisions in the past. Information about better living conditions, more proactive authorities, more active independent aid organisations, local population more open to the influx of displaced people can be transferred through dormant but now activated networks. It is the perception of a new state of the world which prompts the activation of social networks and decreases the probability of error in displaced people's decisions. The impact of networks is deeper and more continuous in communities with a more knit-tight social tissue, stronger societal links and a higher degree of independence with respect to the armed organisations' demands. In Cauca and Chocó, the Indian and Black communities have been able of preserving their social links, keep their independence from armed organisations' pressures and move within their territories without losing their basic social structures.

In Colombia, some guerrilla and paramilitary groups view the civilian population as a tool they may use to achieve their objectives. If one of these groups needs to recover a territory from the hands of the enemy, it often targets the civilian population through selective murders and massacres. However, if it requires the support or loyalty of civilians, the group becomes a protection agency or, in some situations, assumes state functions. As Kalyvas point out:

> Political actors may intend to govern the people against whom they are using violence, or they may not. In the second case, the purpose of violence is exhausted by its use, whereas in the first, it lies in the purposive creation of fear: violence is a means, not an end; a resource, not the final product. Violence is, then, a tool for shaping individual behaviour by attaching a cost to particular actions. This is often called "terror" [Kalyvas 2000: 3].

At this moment the population must take decisions. If taken separately, the cost of a mistake in survival terms is higher than if made collectively. Most writing on the subject assumes that social networks are formed by individual decisions that trade off the cost of forming and maintaining links against the potential reward [Goyal and Vega-Redondo 2000].

In Colombia, the forming of social networks is often motivated by a need to obtain information that increases the probability of survival in a territory where there are active armed factions. The links generated allow the transfer of information about past experiences between individuals related by network structures. It allows them to increase their stock of knowledge about the behaviour of armed groups, and to reduce the error rate of individual decision making. Before the network becomes active, each individual has a specific belief system that represents his/her beliefs with respect to his/her neighbour's beliefs, and in turn with respect to the armed agent's most probable course of action. When two individuals form a network, their belief systems change. The degree of change depends on the individual system of beliefs. In a network, individuals must update their belief systems; thus all individuals will eventually share the same system of beliefs.

Conclusion

In the context of an irregular war, individuals establish preferences in relation to their current situation. A situation is defined by the economic opportunities available and by the probability of survival associated *with staying* in a specific territory at a time *t*. Territorial dispute leads to a decrease in the perceived probability of survival, and individuals will decide not to stay in the disputed territory, *even if this decision implies incurring* in increasing economic costs. They will not maximise utility but try to improve their chances of survival, which is a form of self-control. Networks are crucial to the convergence of individual decisions with a minimum deliberation cost.

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