Can we fight drugs using communication campaigns?

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Abstract

Eradication is the main policy instrument used to fight coca cultivation. About two thirds of the resources used on the war on drugs are devoted to eradication campaigns. However, coca cultivation is not only driven by economic incentives. Normative factors are key factors affecting coca cultivation in Colombia (Ibanez, 2010). Changing people's perceptions about the problems that coca entails for the family and the community seems to be a powerful instrument in the war on drugs. By using framed field experiments, we evaluate the effect of different messages on farmers' willingness to cultivate coca. Moreover, we evaluate the impact of the messages on attitudes towards coca cultivation.

Keywords: Illicit Drugs, War on drugs, Communication campaigns, Media, Field experiment.

JEL classification: A13, G11, H 43, K 42, Z 12, Z 13

1. Introduction

In contrast to many people's thinking, the coca growing problem is not due to economic problems alone. Although coca is 2 to 5 times more profitable than legal products and though the risk of growing is relatively low, a significant proportion of producers does not grow coca. Besides the lack of options in the legal economy, Ibanez (2007) finds that a number of normative and moral factors influence the coca growing decision in Colombia. Particularly, producers belonging to non-catholic religious groups, and producers that back-up the institutions, are less likely to grow coca. This finding

suggests that apart from eradication and productive subsidies traditionally used to reduce coca crops, it is possible to use alternative policy instruments. Raising awareness among the population about the problems that coca growing inflicts on families, the community and the country could be a cost effective option to fight illicit drugs.

In 2008, the DNE (Colombia's agency against illegal drugs) in cooperation with United Nations Office on Drugs and Crime (UNODC) implemented a mass communication campaign by radio and television seeking a change in coca growing attitudes. Using a simple message, a girl's voice conveyed the message "Don't grow the plant that kills." In the message, the girl explains that coca cultivation is illicit and generates losses at the personal, family and community level. Although the campaign was criticized on the grounds of disregarding diversity of cultural values and misinforming public opinion, this was the first time an attempt was made at raising awareness over the country's coca growing problem. The general opinion has been that the drug problem is a consumers 'problem, and that consumers are the ones to be blamed, relieving producers of any responsibility. Besides using the radio and television media, the presidential program against illegal crops ("PCI") started to circulate a quarterly newspaper designed to illustrate the positive experiences resulting from crop substitution and legal production.

While communication campaigns have been used as a strategy to fight illicit drug production, the use of this strategy poses several questions: Which type of communication campaigns can be used and can they be effective in changing attitudes towards coca cultivation? Do changes in attitudes translate into behavioral changes? To what extent do alternative development programs' (productive projects) sustainability hinge on an attitudinal change towards illegality?

The objective of our research is to measure the effectiveness of communication campaigns on the fight against drugs, specifically through a reduction of cocaine supply as a result of a decrease in coca crops. We use the Theory of Planned Behavior (Ajzen, 1985, 1988, 1991), as out theoretical model that predicts that communication messages affect behavioral beliefs that end up affecting real behavior after changing attitudes and intentions. Although different communication campaigns aim at

promoting the culture of lawfulness, to the best of our knowledge no evaluations have been conducted on the effect that these interventions have in the attitude towards illegality and in behavioral change.

To evaluate the effectiveness of different communication strategies on the change of attitudes and behavior towards coca cultivation we conducted a framed field experiment with farmers living in Putumayo, one of the regions with largest tradition of coca cultivation in Colombia. Our experiment uses five different messages to highlight the negative impacts that coca has on the community. We compare their effectiveness in terms of farmer's willingness to invest in coca. Besides, we study the short term impact of communication campaigns on farmers' attitudes towards coca and their willingness to invest in coca in the future.

We find that communication messages are effective in changing investment decisions and generating changes in people's attitudes. Particularly, we find that messages that communicate the violence that coca generates and illustrate it with numbers are the most effective strategy to reduce farmer's willingness to invest in coca. Also, messages that highlight the negative effects of coca on the community, such as erosion of morals of the young are effective in changing the attitude against coca cultivation. Finally, changes in attitudes are also reflected in changes in intentions to cultivate. Contrary to our expectations, we find that the effectiveness of substitution into legal alternatives is not improved by the use of communication campaigns. Instead, the effectiveness of eradication is decreased.

The paper is organized as follows. Section 2 describes the policies used against coca cultivation while section 3 presents the literature review. There are two main sources of information specifically collected for this study. The first one is a field experiment with coca growers and the second a survey carried out after the experiment had ended. The experiment provides information on how farmers' investments in coca react to different messages, as well as to price and risk incentives, which can be also thought as observed coca growing behavior. Sections 4, 5 and 6 deal specifically with the experiment: The experimental design is presented in Section 4, experimental procedures in Section 5 and preliminary results in Section 6. Section 7 concludes.

2. Background

The battle against drugs has been critical for Colombia since the 1980s, when it became a main grower and producer of illicit crops. By the year 2000, Colombia was considered the first cocaine producer in the world, and even though the amount of coca cultivated has decreased, it still poses great challenges. The government's response to this situation has varied over time. The first response came in the form of pure interdiction, mostly in the hands of the police and other armed forces. In the nineties the response was amplified and not only focused on interdiction, but also on crop detection and eradication and began its first Alternative Development (AD) initiative, with socioeconomic interventions aimed at raising the opportunity cost of growing coca-leafs.

Alternative Development in Colombia seeks to offer communities licit activities that generate income so that illicit crops can be replaced. In exchange, communities promise to keep their territories free of illicit crops by either eradicating previous crops or preventing future ones. A common denominator in the latest AD initiatives has been a growing interest in the culture of lawfulness. This has been identified as a key element in the success of AD interventions. Particularly as in most targeted areas, growing illicit crops is culturally accepted, even if it is prohibited by law. As stated by the director of AD program "Sí Se Puede" in the south, "coca must be eradicated not only from people's fields, but also from their minds and especially from their hearts". The first requires licit alternatives to illicit crops, and the latter requires a change of mind; and here is where culture of lawfulness plays a role.

So far, efforts to generate legality have been undertaken mostly within the AD programs mentioned, through workshops and training sessions as well as through the programs' own rules. To the best of our knowledge, the only effort aimed at generating a culture of lawfulness outside a specific program and based on a massive communication campaign was PCI's already mentioned "Don't grow the plant that kills" campaign. Understanding the effects that communication campaigns can have on legality opens up a whole other avenue of interventions, that is able to reach more people at the same time than AD programs, and that can complement their efforts and those of other governmental interventions, such as the National Consolidation Plan, the Rapid Response Program, and other

programs and interventions under the leadership of the National Police, to name a few. Additionally, if communications do in fact change attitudes, the sustainability of a change of behavior is more likely, since this contributes not just to eradicating coca from the field, which could be a result only of fear of being caught, but a step forward in the eradication of coca from the heart, if the attitudes toward it change.

3. Literature review

There is a relatively long tradition in economics trying to understand why individuals comply with the law. Becker's seminal paper (1968) considers that individuals make a rational decision when they are deciding whether to break the law or not. If the economic benefits from breaking the law are larger than the expected cost (plus the risk premium), individuals are expected to break the law. The straightforward prediction of the model is that to reduce crime, authorities should be more effective in capturing and penalizing criminals (increase the risk of criminal participation) and should increase the value of the sanctions (increase sentences or fines). The literature has largely supported the deterring effects of sanctions/fines and of having higher risk to be discovered (Cameron, 1988; Freeman, 1999; Witte and Witt, 2000; Levitt, 2004). However, the economic model of crime has been of limited utility to explain why individuals comply even when it pays-off to break the law. For instance, even if the benefits from breaking the law are positive individuals refrain from breaking the law and report taxes correctly, pay tv licenses, do not cultivate coca (Andreoni, 1998; Fellner et al 2009; Ibanez and Carlsson, 2010). To understand the deviations from the predictions of the economic model of crime, it is necessary to expand the model to include the effect of normative factors.

One way to capture both the cost-benefit analysis performed in the model of crime and of normative and other factors that might shape a person's decision to act illegally is to use the tools developed by psychological models. One of them is the Theory of Planned Behavior TPB (Ajzen, 1985, 1988, 1991), a widely used model that is concerned with explaining behavior, while focusing on the factors that determine an individual's decision to carry out a particular behavior (Conner et al, 1998).

According to this theory, the closest predictor of behavior is behavioral intention, better understood as the person's decision to carry out a particular behavior, which is determined by attitudes, subjective norms and perceived behavioral control (Arvola et al, 2008; Conner et al 1998; Fishbein & Ajzen, 1975). Each of these have their own determinants: Attitudes, defined as "a person's general feeling of favorableness or unfavorableness for that behavior" (Ajzen and Fishbein, 1980), are made up of behavioral beliefs, or the belief that a behavior leads to a particular outcome, and the evaluation of such outcomes (Chang, 2013); subjective norms, which capture the perceived approval by other members of society or important others of performing a behavior, or socially shared rules of what is right or wrong, and the motivation to comply with those expectations (Abrahamse et al, 2009; Conner et al 1998, Arvola et al 2008); and perceived behavioral control, determined by the perception of ease or difficulty in engaging in a given behavior or of the factors that might facilitate or impede it (Fishbein & Ajzen, 2005; Abrahamnse et al, 2009; Chang, 2013).

These variables have also been studied and tested outside the framework of the TPB with reassuring results of their importance. For instance, evidence that social norms can affect individual behavior (Elster, 1989; Axelrod, 1986; Akerlof and Yellen, 1986) as interaction with others can affect individual preferences, changes expectations, and/or modify the constraints an individual faces (Glaeser et al., 1996; Manski, 2000; Garoupa, 2003; Calvó-Armengol and Zenou, 2004).

The model of crime fits in the framework of this theory, and plays an important role in the definition of attitudes through its effects on behavioral beliefs. Fishbein & Ajzen (2005) mention that what they call behavioral beliefs exists under different terms for other authors, and in particular for Becker (1974) is called 'costs and benefits'. Both models share assumptions of rationality and in both cases are deliberative processes where individuals weigh outcomes, costs and benefits of a given behavior.

The advantage of nesting the variables of the model of crime in the TPB is that other factors can be taken into account, in particular those related to morality. Although the original TPB didn't directly account for moral norms there is extensive literature that has worked on including this variable in the model with very positive results of its independent explanatory power of intentions and certain

behaviors that have ethical or moral components, such as cheating, stealing, lying, software piracy, among others (Arvola et al, 2008; Abrahamse et al, 2009; Fishbein & Ajzen, 1991; Chang, 2013; Conner & Armitage, 1998). The moral sense refers to individuals' internal sense of what is right and wrong. Deviating from what they consider to be morally correct generates a feeling of internal disappointment or guilt (Etzioni, 1986; Frey, 1997; Hausman and McPherson, 2006). In our study we include a moral component, since cultivating coca is an illegal behavior which entails costs not only for the individual, but for the community as a whole. Conner et al (1998) argue that based on existing evidence moral norms appear to be highly related to attitudes and in some cases might precede it, directly affecting behavioral beliefs, which in turn determine attitudes. We hope that with the use of the basic ideas of the model of crime nested in a moral-augmented TPB we are able to model illegal behavior and independently capture its motivations. Even more, our work contributes to closing the gap generated by the rare use of rigorous experimental methods to test the TPB (Sniehotta, 2009)

Within this framework, we evaluate the impact of communication campaigns of the effectiveness on anti-drug programs. According to Sniehotta (2009), the rationale behind an intervention that seeks to change behavior, within the framework of the TPB, is to target the salient beliefs that determine attitudes, or the other factors that affect intentions, such as subjective norms and control beliefs, which in turn affect behavior. In our case, we aim at changing attitudes towards illegal coca cultivation as a result of altering behavioral beliefs, by changing the way people evaluate the outcome of growing coca. Figure 1 shows the reasoning behind this paper: via communication messages affect behavioral beliefs that end up affecting real behavior after changing attitudes and intentions, while controlling for all the other components of the theory of planned behavior.

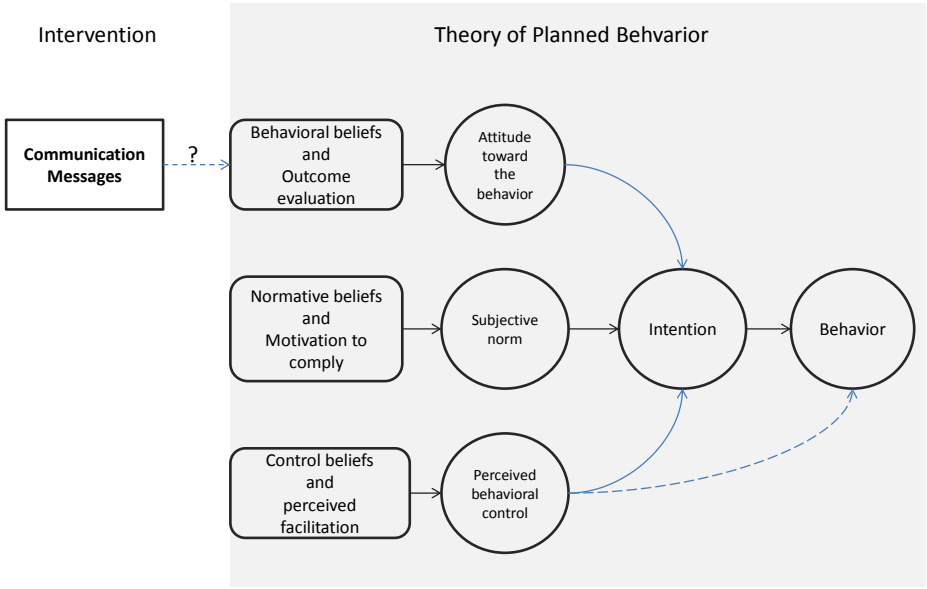


Figure 1. Intervention of communications on the theory of Planned Behavior. The TPB taken from Chang, M. K. (2013).

The use of communication campaigns as a strategy to fight the problem of drugs is not new. For instance there is an extensive literature on the effect of communication campaigns on the attitudes towards the consumption and use of illicit drugs (Derzon and Lipzey, 2002; Block et al, 2002; Palmgreen, 2006). Similarly, there is a growing body of literature analyzing the effect of different types of communication campaigns on political attitudes and voting behavior (Gerber et al. 2007, Oberholzer-Gee and Waldfogel, 2009; DellaVigna and Kaplan, 2007; Gentzkow, M. Shapiro, J. 2010) as well as attitudes towards intergroup prejudice and conflict, racial prejudice, contraceptive use, HIV prevention, saving for the old age, loan take-up, and obesity among others (Paluck, E.L. 2009; Kellsetdt 2000; Mesina, E.V. 2005, Palmgreen et al 2008; Karlan et al 2010; Choi et al 2012; Bertrand 2009; Emery et al. 2007). The use of informational campaigns to generate pro-social and pro-environmental behaviors, such as recycling, has also been studied (Carlson 2001, Gerber et al 2008, Burn and Oskamp 1986, Chong et al 2013). The motivation to use communication campaigns as a possible way to fight drugs is the "mounting evidence that in certain contexts simple, timely bits of information, reminders, cues/primes, or even pure framing can drive behavior" (Chong et al 2013).

A wide range of strategies are used in communication campaigns to change attitudes, such as priming, giving information, using persuasive messages, sending reminders, setting an agenda and framing,

among others. We use framing as our message intervention tool, which has been especially used by politicians and political campaigns to change people's opinions and attitudes towards candidates, policies and political, social and environmental issues (Gamson 1992, Iyenar 1991, Nelson and Kinder 1996, Nelson et al, 1997, Wood 2000). Framing centers on media content and emphasizes certain consequences, considerations or attributes of an issue over other potential consequences, and assumes that how an issue is characterized influences the way it is understood by causing individuals to focus on such considerations when they create their opinions (Nelson et al 1997, Wood 2000, Scheufele & Tewksbury 2007, Druckman et al 2010, Chong & Druckman 2007). In other words, if an issue can be viewed from many perspectives and can also be thought of as having multiple consequences, what framing does is to conceptualize one of these perspectives and reorient the audience into thinking of an issue in the terms established by the frame (Chong & Druckman 2007).

Moreover, the literature has already mentioned how Ajzen's TPB responds to framing, by changing the perceived likelihood of behaviors and altering the evaluations given to them (Wood 2000). Druckman et al, 2010). Chong & Druckman 2007 use a mathematical conceptualization of the TPB, and define an attitude as vi*wi, where i can be called thought of the belief in the TPB, vi the evaluation of the belief and wi the weight attached to it. This change of weight of an attribute may lead to an overall change in attitudes (Nelson, Clawson, and Oxley 1997; Price and Tewksbury 1997; Wood 2000).

In our experiment we use one of the standard ways to test frames, where treatment groups are compared to a control group that receives no frames (Chong & Druckman, 2007). Our contribution to the literature hinges on the fact that, to the best of our knowledge, a field experimental evaluation has not been implemented to evaluate the effect of communication messages on illegal behaviors nor in the production and trafficking of illicit drugs.

4. Experimental Design

Our experimental design follows Ibanez and Martinsson (2007). Participants are randomly matched in groups of five. Each participant is endowed with 10 tokens that represent the amount of land, labor

and capital that are available to them to invest in agricultural activities and their task is to decide how many tokens invest in coca cultivation and cattle farming respectively.[1] The three key features of coca cultivation included in the public bad experiment are: (i) coca is more profitable than cattle, (ii) there is a probability that the coca plants will be eradicated by authorities, and (iii) coca production generates negative externalities (see the protocol used in the experiment in Appendix A).

Each unit invested in coca cultivation yields a return of one, while investment in cattle farming gives a return of less than one, mimicking the fact that investment in coca cultivation yields a higher profit than investments in cattle farming. Based on observations from real-life and likely future levels, we included the following three levels of relative profits between cattle farming and coca cultivation; 0.2, 0.44 and 0.68. However, investment in coca cultivation is a risky decision since the plantation can be detected and subsequently eradicated. Since successful eradication may not happen for sure, we introduce the probability of successful eradication. We applied the following three levels of successful eradication: 0%, 10% and 30%. These levels correspond to real life values. If coca plants are sprayed, farmers collect and process the leaves to sell them, but the coca plantation is lost, and the sprayed land cannot be used for any crops in the near future. For each unit invested in coca when eradication is successful, there is a fine of 1.2 tokens.

The third specific feature of coca cultivation is that it generates negative externalities such as environmental damages and social problems, and these events affect all the members in the community.[2] These effects were included in the experimental design such that each unit of coca cultivation generated by any member reduces the income by 0.17 for each member in the group

[1] Te interventions that we evaluated in this research take place in areas where producers have a choice on whether they grow or not coca. Areas where this choice is still not possible due to the control of productive decisions by an illegal armed group entail a different problem.

[2] Our main interest is to capture the effect of the illegality of coca. Still, the best alternative, cattle farming, also has negative environmental impacts related with soil erosion and deforestation.

including the one who made the investment.[3] We use 5 different messages to explain why this reduction is applied. In the control treatment we use a rather abstract framework similar to Ibanez and Martinson (2007) and explain that these costs relate to increased violence and environmental problems as more coca was grown. In the treatment *Violence*, we explain that due to coca cultivation violence increase in the area. We explain that homicide rates are higher, that armed groups dispute the control over the territory and that the fields are planted with land mines. In the treatment *Environmental Damage*, we mention that deforestation is due to coca cultivation and that health problems are generated by the cultivation and processing of coca. In the treatment *Values*, we explain that coca generates a mentality of easy money so the youth abandon school, and emphasize domestic violence. In the treatment *Violence with Data* we provide figures on the magnitudes of the violence generated.

Our experiment uses a within-between subject design. Each participant is exposed to 9 different scenarios that combine 3 relative profits of the alternative and 3 levels of risk. Participants are exposed to only one type of message. The type of message that is presented is randomized across sessions. In this way, it was possible to overcome the problems of literacy by read the instructions to the participants.

The expected pay-off for subject *i* can then be expressed as

$$\pi_i = (c_i + a(10 - c_i) - 0.17\sum_{i=1}^{5} c_i)$$ when they are not discovered which happens with probability (1-p)

$$\pi_i = (c_i + a(10 - c_i) - 0.17\sum_{i=1}^{5} c_i - 1.2c_i)$$ when they are discovered which happens with probability (p).

Where, c_i is the amount invested in coca cultivation and a is the relative profit. The probability of being discovered is p. The parameters included in the experiment ensures a social dilemma situation

[3] It would also be of interest to investigate the effect of different magnitudes of the loss of income and the negative externality, but we preferred to keep the design as simple as possible given that it is already rather complicated with 9 different decisions.

since the social cost related to the negative externality is 0.85 (0.17*5=0.85), which is larger than the private benefit (1-*a*), where *a* varies between 0.2 and 0.68.

It is expected that a subject who is a self-interested utility maximizer and who is risk neutral will make a non-zero investment in coca if $1-a-0.17-1.2p>0$. Table 1 summarizes the marginal profit from coca cultivation in all the nine treatments applied in the experiment, and the treatments are labeled *A* to *I*. As Table 1 shows, coca cultivation results in positive marginal benefits in all cases except in treatment *I*. Thus a risk-neutral subject who maximizes the expected utility of the profit function given above will fully invest in coca cultivation in all cases except *I*, where nothing would be invested.

Table 1. Marginal incentives to crop coca.

	Probability of eradication (*p*)		
Profit cattle/coca (*a*)	0%	10%	30%
0.2	A = 0.63	B = 0.51	C = 0.27
0.44	D = 0.39	E = 0.27	F = 0.03
0.68	G = 0.15	H = 0.03	I = -0.21

Note. We calculate the marginal incentive from coca cultivation as *1-a-0.17-1.2 p*

5. Experimental procedures

The experiment was conducted with farmers living in Putumayo, Colombia between March and May 2012. Four municipalities were included in the study: Puerto Asis, Valle del Guamuez, San Miguel and Puerto Leguizamo. We contacted local leaders and asked them to write a list with all members in the community. From the list, participants were randomly selected and invited to participate in a one-day workshop. Participants were informed that this was a study from the university but did not know what the activity was about. In the morning session we conducted the framed field experiment. In

the afternoon, after a lunch break, participants were interviewed individually. We conducted 21 sessions with 732 participants.

The experimental session consisted of five stages. First, the instructions of the modified public bad experiment were read to the subjects. This was followed by several examples and individual exercises. To check for subjects' understanding of the experiment an enumerator accompanied them verifying that they understood their task. Then, the subjects simultaneously decided how much they wanted to invest in coca and how much they expected others to invest in each of the nine treatments, where the probability of eradication and relative profits varied as described above. In the third stage, we randomly decided which of the nine treatments that was going to be paid based on a lottery, where each treatment had the same chance to be selected. If a treatment with a positive probability of eradication was selected, then a second lottery was used to determine if successful eradication took place. The outcomes from these two lotteries are common to everyone. This mimics the actual situation since both relative profits and successful eradication are normally the same for people living close to each other. Finally, all subjects were paid privately in cash. Afterwards, and while the payouts were calculated, we had a group discussion, were people commented on the experiment.

The interviews were anonymous and in order to encourage honest answers we did not ask names, addresses or any other information that allowed their identification. To match survey and experimental information we used identification numbers that were given to participants upon arrival to the workshop. The survey consisted of a battery of standard questions on socioeconomic characteristics and some specialized questions for our research, which relates to attitudes towards coca cultivation and intentions to cultivate coca in the future.

6. Preliminary results

In this section we present the preliminary results. We start by looking at how farmers respond to factors that directly affect the return of coca and then further explore what is behind both the decision to opt into coca and the decision of how much coca to grow. Table 1 shows that people respond as

expected to risk and the profit of the alternative legal productive activity. As risk of being caught rises, the proportion of participants that opt into coca goes down, as well as the amount of coca that people invest in. Moreover, as the profit of cattle relative to coca rises, the proportion of people cultivating any endowment on coca goes down, as well as the total investment. However, it can be seen that the response to changes in risk are greater than the response to changes in relative profit.

Table 2. Investment in Coca

	Investment in Coca			Proportion Invest in Coca			Conditional Investment		
	risk			risk			risk		
Profit Alt	0	0.2	0.3	0	0.2	0.3	0	0.2	0.3
0.2	2.05	1.52	1.16	0.50	0.44	0.33	4.07	3.48	3.47
0.44	1.87	1.31	1.09	0.49	0.40	0.34	3.80	3.25	3.24
0.68	1.64	1.30	0.97	0.45	0.40	0.31	3.66	3.26	3.09

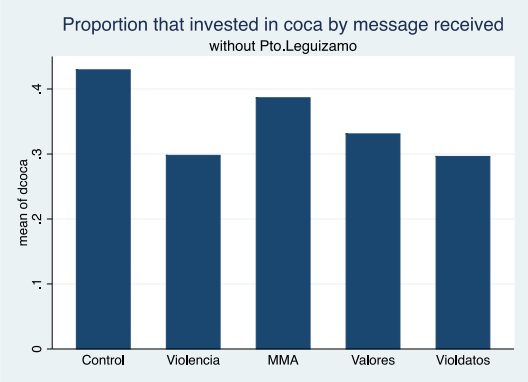
People do in fact react to economic incentives in the experiment and change their investment decisions according to expected profits. This goes in line with the argument that says that people grow coca because it is more profitable, especially when it is less risky. Now we turn to see whether people also react to messages they hear when the instructions are being read out loud. The different treatments don't entail a punishment on the game payoffs to people, so if only profits mattered, whatever message people hear would be irrelevant to their choice of coca investment. Table 3 indicates that this might not be the case, and that there are other factors at play. We see that messages that relate coca to violence, both in an abstract and in a quantified way lead to less people opting into coca and into generally less amount of coca chosen. This is also the case with the erosion of morals and values treatment. Surprisingly, the message that explored negative effects on the environment led people to invest more and be more likely to invest than in other treatments. This could mean that people don't value the environment as much as they do values and safety, and that they might not see damage to their future and their future as something worth losing possible extra income with coca.

Table 3. Investment by Communication treatment

Message Received	Investment in Coca	Proportion Invest	Conditional Investment
Control	1.41	0.43	3.28
Violence	1.36	0.37	3.66
Environment	1.75	0.50	3.53
Values	1.18	0.33	3.56
Quantified Violence	1.36	0.37	3.69

When looking into the data we find that the sessions carried out near the river, which are only accessible by boat and are much farther from institutional and state presence, show much higher propensities to cultivate coca than in all the other places not on the river. When analyzing coca growing patterns across all participants without those at the river, we see that all treatments lower coca participation, especially in the violence and values messages and less so in the environmental damage.

Graph 1



Next we look into two regression results. The first studies the decision to opt in or out of coca and the second the decision of how much coca to grow. The second model takes into account self-selection of people into positive amounts of coca, by controlling for selection by the inverse mills ratio in the investment model, where only positive amounts of coca are taken into account. We confirm the descriptive results described above and find that higher risk and higher relative profit of the alternative activity lower participation in coca and how much coca is grown. We also find that the messages themselves lower the efficiency of risk to lower opting into coca. Only in the case of erosion of morals and values does risk lead to even lower coca investments.

We find that all the messages related to violence and values sent to participants had an effect on their decision to cultivate coca or not, but didn't really have an effect on how much coca is grown. It seems that the big decision happens between no coca at all and some positive amount. Economic considerations are important in both cases since they alter profits at every decision point. Non-economic reasons behind growing coca might only affect the opting in decision. Consistent with what we found, the environmental message is the least effective in achieving reductions in either how many participants grow any coca or in how much they want to invest in it.

Additionally, people might try to justify their actions with what they think others are doing. When people perceive or think others in their group are growing more coca, they grow more coca themselves as well. This is consistent with the literature, where the perception of what other do is one of the main explanatory reasons of why people decide to cooperate (Kahan 2002;Fortin et al 2007; Wenzel 2005; Van der Weele 2007; Shefrin et al 1991). Even so, people had the incentive to pin down other's investments in coca, since they got extra points for guessing their investments right.

Table 4. Regression Analysis

	RE Probit		**RE GLS**	
	dcoca		coca|dcoca=1	
	Coeff.	dy/dx	Coeff.	dy/dx
profit	-0.397	-0.0682**	-1.015**	-0.501**
	0.297	0.0236	0.343	0.17
risk	-4.498***	-0.518***	-0.45	-1.222***
	0.527	0.0655	0.61	0.322
Violence	-1.553**	-0.217*	0.0872	0.433
	0.581	0.0874	0.367	0.283
Environment	-0.955	-0.117	-0.0617	0.0149
	0.632	0.101	0.347	0.273
Values	-1.297*	-0.195*	0.818	0.424
	0.569	0.0871	0.427	0.323
Data_Violence	-1.965**	0.253**	-0.29	0.163
	0.653	-0.0904	0.416	0.316
otros_coca	0.241***	0.0333***	0.296***	0.296***
	0.0191	0.00522	0.0241	0.0241
Violence*profit	-0.53		0.617	
	0.475		0.496	

	RE Probit		RE GLS	
	dcoca		coca|dcoca=1	
	Coeff.	dy/dx	Coeff.	dy/dx
Environment*profit	0.0978		0.483	
	0.433		0.463	
Quant_Violence*profit	-0.0585		1.701**	
	0.494		0.578	
Violence*risk	1.627*		0.537	
	0.802		0.806	
Environment*risk	1.796*		-0.895	
	0.738		0.747	
Values*risk	1.012		-2.971**	
	0.851		0.979	
Quant_Violence*risk	0.168		-1.912*	
	0.862		0.92	
2.mpio	2.935***	0.666***		
	0.582	0.107		
3.mpio	-0.142	-0.0195		
	0.478	0.0665		
4.mpio	-0.357	-0.0456		
	0.43	0.0578		
lambda			0.0449	0.0449
			-0.11	-0.11
_cons	-0.186		2.806***	
	-0.575		-0.265	
N	6518	6518	2649	2649

We are confident that these results stem from the messages sent and not from initial differences among each treatment group, in other words, we are positive that our randomization process worked. Secondary information on coca density, alternative crops[4], number of people in the community, number of teachers, having a library at school, computers for children in school, amount of people eligible for state subsidized health and social programs (sisben), distance and time to nearest town, electricity, sewage, among other variables, was collected on each one of the veredas were the experiment was carried out. We ran regressions of each of the treatments on all of these variables and found almost no significant explanatory effect of the treatments on the secondary data (Table 5),

[4] Information on coca density as perceived and described by enumerators who went to each vereda. Alternative crops were determined by community leaders

meaning that the veredas are similar to each other, independent of the treatment[5]. We did the same exercise with survey variables that were most likely not affected by the experimental sessions, such as household head age, education and religion, household income and expenditure, amount of land and amount of land with a property title, whether they have lost a child due to violence, the violence they have been exposed to, mean trust and trust in institutions, and perceived risk of being caught growing coca, in 2000 and in 2011. In most cases there are no differences among treatments, confirming the randomization worked. Those assigned to the "values" treatment seem to have less land and property titles for the land they have, which means that this should be controlled for in the analysis.

Table 5. Randomization Check

	Treatments			
	Violence	Environment	Values	Quantified Violence
		Secondary data Variables		
Coca density	NS	NS	NS	*
Alternative crops (1)	NS	NS	**	NS
Num. Habitants	NS	NS	NS	NS
SISBEN	NS	NS	NS	NS
School library	NS	NS	NS	NS
School computers	NS	NS	NS	NS
Num. Teachers	NS	NS	NS	NS
Distance to town	NS	NS	NS	NS
Time to town	NS	NS	NS	NS
Electricity (at home)	NS	NS	**	**
Public Electricity	NS	NS	NS	NS
		Survey Data Variables		
Age of HH head	NS	NS	NS	NS
Education of HH head	NS	NS	NS	NS
HH income	NS	NS	NS	NS
HH expenditure	NS	NS	NS	NS
Livelihoods Index	NS	NS	*	NS
Christian HH head	NS	*	NS	NS
% Land with title (91)	NS	NS	*	NS
% Land with title (11)	NS	NS	***	NS
Amount of land (91)	NS	NS	**	NS

[5] All regressions were clustered at a municipal level, since Puerto Leguizamo (river communities) has very different characteristics than the other municipalities.

	Treatments			
	Violence	Environment	Values	Quantified Violence
Amount of land (11)	NS	NS	**	NS
Violent death of child	NS	NS	NS	NS
Violent acts	NS	NS	NS	NS
Mean trust	NS	NS	*	NS
Mean trust in institutions	NS	NS	NS	NS
Perceived risk of being caught growing coca (2000)	NS	NS	NS	NS
Perceived risk of being caught growing coca (2011)	*	NS	NS	NS

Note: *Significant at 10%, **Significant at 5%, ***Significant at 1%, NS not significant
(1) Stops being significant when religious communities are not taken into account

After the lunch break following the experiment we run an anonymous survey, which, apart from asking basic socioeconomic questions, asks about attitudes toward coca growing and its effects on communities and families. Since the message was sent before the experiment and the survey, it is possible that it could have had effects that overpass the experimental session and affect the attitudinal questions as well. This analysis serves two purposes. One, it lets us see whether communication messages affect attitudes toward coca and through this mechanism affected behavior in the experiment, as the theory of planned behavior would predict; two, it serves as a pretest of whether converting these messages into communication campaigns could potentially lead to changes in attitudes and behavior at a larger scale.

Here we show the first exploratory results in this direction. Table 6 presents the results of single regressions of the experimental treatments on the attitude questions included in the survey. We see that in general people maintain a rather negative attitude towards coca. About 70% of the population considers that coca cultivation should be illegal. A similar proportion think that it is not justifiable to cultivate coca while about 80% of the participants considered that people should not be cultivating coca. Most of the participants believe that coca generates different type of damage to the community: It destroys trust (70%); It brings family problems (80%); It brings violence (82%); It destroys legitimacy of the institutions (94%) and it increases consumption (96%).

Most of the communication messages that we tested increase the negative attitude towards coca. In particular, we find that the message that stresses the negative effect of coca on values (decrease education, culture of easy money, etc.) decreases the proportion of participants that consider that coca should be legal and increases the proportion of participants that consider that coca destroys trust and that it should not be cultivated. Surprisingly, the violence treatment does not increase the proportion of participants that consider that it brings violence to the community; although one probable explanation is that the fraction reporting that effect was already quite high in the control group. Yet, the treatment Violence increases the proportion of participants who report that coca destroys trust. Participants in the treatment Environment are more likely to report that coca brings progress to the region. This positive effect on attitudes towards coca probably reflects a justification on why people do it.

To test the effect of the messages on participants' intentions to cultivate coca, we asked if they would be cultivating coca in the next year. 88% of the participants said they would not be cultivating. The only treatment that succeeded in increasing the proportion of participants who report that would not cultivate on the next year was the treatment on Values.

It is possible to think that attitudes in the survey change not because people have interiorized a message and believed it but because they want to please the experimenter with their answers. Some arguments lead us to believe that this is not the case. In the first place the experimenter himself does not take part in doing the surveys, and each person answers it anonymously with an enumerator that didn't play a role in the experiment. Second, in all treatments the instructions mentioned that coca had negative effects and was actually fined in the experiment. The difference between the control group and the communication messages was that in the latter different aspects of the negative consequences were made salient, whereas in the former its negative effects were left abstract. If people wanted to please the experimenter, they would have all had anti coca attitudes, since in all cases the experimenter mentioned that coca was negative. However, as we see, this is not the case, and the results on attitudes coincide with the regression results, where we find that violence and erosion of values are the most effecting in preventing people from investing in coca at all.

7. Conclusions

Our work shows that messages that make salient the negative consequences of coca on the communities themselves are effective in preventing people from investing in coca at all. This is particularly true when the message speaks of the violence coca brings to the community and of how coca changes the values of younger generations. It is possible that such change in behavior is caused by a change in attitudes towards coca provoked by the messages received.

Our results have implications on drug policy since it highlights communication messages and possibly communication campaigns as an effective tool for fighting illegal crops, even without the need of increasing the risk people face from growing coca or increasing the profits people can attain with an alternative legal product.

Table 6. Change in attitudes due to different messages
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Attitude		**Violence**	**Environment**	**Value**	**Data Violence**	**Constant**	**R2**	**Chi2**	**p**
		Coeff	Coeff	Coeff	Coeff	Coeff			
How bad would you feel if family cultivates?	0 Not too bad; 1 Very bad	-0.005	-0.145	0.006	-0.048	0.676***	0.013	4.824	0.306
It is justifiable	0:never, 1: always justified	-0.016	0.05	-0.066	0.025	0.278***	0.007	2.483	0.648
Coca cultivation should be legal	0 Disagree 1 Agree	0.045	-0.031	-0.145*	-0.11	0.296***	0.024	9.145	0.058
It brings family problems	0 Disagree 1 Agree	0.081	0.054	0.073	0.101	0.806***	0.011	4.17	0.383
It brings progress to the region	0 Disagree 1 Agree	0.074	0.152*	0.051	0.033	0.176***	0.015	5.581	0.233
People do it due to the need	0 Disagree 1 Agree	0.059	0.076	0.078	0.092	0.861***	0.015	5.778	0.216
It destroys trust	0 Disagree 1 Agree	0.121*	0.034	0.193**	0.036	0.731***	0.032	12.363	0.015
It brings violence	0 Disagree 1 Agree	0.028	0.067	0.1	0.106	0.824***	0.015	5.759	0.218
It should not be cultivated	0 Disagree 1 Agree	-0.073	-0.059	0.131*	-0.01	0.778***	0.028	10.691	0.03
It destroy legitimacy of institutions	0 Disagree 1 Agree	0.004	-0.073	0.008	0.037	0.917***	0.013	4.851	0.303
It increases consumption	0 Disagree 1 Agree	0.01	-0.007	0.025	0.009	0.944***	0.002	0.88	0.927

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