

Is the forbidden fruit the most tempting? ¹

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Using an economic concept, students reflect upon one of the scourges of contemporary society – drug abuse. They analyse the possible effects of free trade in drugs, are surprised by the results they arrive at, revise naïve ideas, suggest factors which are responsible for drug addiction, raise some disturbing questions, assume a position and propose measures.

Introduction

Young people, at least in western societies, have always been dreamers and rebels, rioters and transgressors, have always been in search of entertainment and pleasure, have always challenged authority – be it that of their parents, teachers or the police – and have always attacked the values for which these figures of authority stand. All of this is perfectly normal: it is part of the process of creating one's own identity and affirming one's own personality; it represents a healthy non-conformism to the status quo, it is the quest for «living well»² and, not seldom, for a more just society.

We live, however, in an era in which the brilliance of youth is no longer guided by a sense of responsibility. The heterodoxy of the young is, nowadays, totally manipulated and subordinated to economic interests. A powerful and flourishing industry has taken on the role of moulding tastes and creating fashions: it has undertaken to provoke rebelliousness and to promise dreams; it has taken upon itself to promote entertainment and pleasure. Yet when pleasure and entertainment go hand in hand with drugs, danger lurks.

Public opinion is divided when it comes to drug abuse. Some see drug-taking as a sign of debauchery, a crime which should be punished and seeks to stigmatise those whose habits are self-destructive and, moreover, represent a threat to the safety of the average citizen. Others try to understand what leads people to consume drugs and, generally believing in the perverse effects of prohibition and the failure of punitive measures, defend the legalisation of drugs, or controlled distribution, or at the very least the creation of places where drug addicts can inject themselves in hygienic conditions whilst at the same time having medical and psychological help available. Such measures, on the one hand, would increase public safety and on the other hand would improve the quality of life of the addict (Lipovetsky, 1994).

In the statements, which will be analysed here, it was found that the majority of students placed themselves amongst those who try to understand the phenomenon, look for its causes, examine its consequences and propose measures to be taken.

¹ This paper constitutes part of the research undertaken by the author for a doctoral thesis, currently in progress.

² In the Aristotelian sense

The data was collected in 1999, at a time when the Portuguese Parliament was debating a proposal for the liberalization of drug use. The proposal was eventually approved in 2001 in part: the decriminalisation of drug consumption was approved along with the creation of «injecting rooms», in the same way as had already happened in other European countries. The participating students were part of a Calculus class in the first year of a degree course in Management.

The pedagogical project (in brief)³

The students' assignment draws on the perspective that sees mathematical education as a contribution to sustained action (Moreira and Carreira, 1998) and considers the classroom to be a crucial space for participatory democracy.

I am convinced that debate between the students, the consequent confrontation of points of view and the exchange of arguments contributes towards «a cultivated form of constructing personal opinion» (Sève, 1999).

I believe in discussion, in ethical debate, in informed willingness to surpass differences and reach a consensus (Habermas, 1999).

Consensus, according to Rawls (1995), results from a synergy between the idea of impartiality motivated by the general good and mutual advantage, since all concerned are benefited; it is basically a case of learning democratic debate.

I hope that this debate contributes towards a raising of awareness concerning the psychological, sociological and economic causes which incite people to start taking drugs and which may lead to eventual drug dependency and also towards the realisation that drug addiction may constitute not only a threat to lives but also to freedoms.

I trust that, rather than moralist injunctions, it is this « conscientization» (Freire, 1975) which may enable young people to take the responsibility to efficiently manage their body, their health, their life and their individual freedoms.

Elasticity

Elasticity is a measure of how sensitive one variable is relative to another, that is, it quantifies the way in which a change in one of the variables affects the other.

The impact of changes in price on demand is measured by the elasticity of demand. In other words, this is a quantitative measure of how the decision on whether or not to buy is affected by changes in price.

Let us consider the demand function to be $Q=f(P)$.

The quotient

$$\frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{P}{Q} \frac{\Delta Q}{\Delta P}$$

³ For further details see Moreira (2000)

constitutes, then, a measure of the relationship between variations in price and demand.

Now ΔP and ΔQ have, normally, opposite signs (since when the price increases, demand falls) and P and Q are positive. In order for this ratio to be positive, some economists multiply it by (-1):

$$-\frac{P}{Q} \cdot \frac{\Delta Q}{\Delta P}$$

If the function $Q = f(P)$ were differential,

$$\lim_{\Delta P \rightarrow 0} \frac{\Delta Q}{\Delta P} = \frac{dQ}{dP}$$

elasticity, ε_P , is defined as:

$$\varepsilon_P = \lim_{\Delta P \rightarrow 0} \left(-\frac{P}{Q} \cdot \frac{\Delta Q}{\Delta P} \right) = -\frac{P}{Q} \cdot \frac{dQ}{dP}$$

The effect of price on revenue

Revenue is calculated by multiplying the number of units sold by the unit price, that is:

$$R = P \cdot Q \quad (1)$$

Now, if the number of units sold by one company already represents a significant percentage of the total of the sector, an increase in sales can only be achieved by lowering prices. Therefore, if the increase in one of the factors of revenue implies the decrease of the other, what decision should be taken at any moment in time? Increasing sales at the cost of reducing prices, or risking increasing prices and hoping that this will not result in a significant drop in sales?

The derivative $f(1)$ with respect to P is:

$$\frac{dR}{dP} = Q + P \frac{dQ}{dP} = Q + Q \frac{P}{Q} \cdot \frac{dQ}{dP} = Q(1 - \varepsilon_P)$$

Thus,

$$\varepsilon_P > 1 \Leftrightarrow \frac{dR}{dP} < 0$$

which means that with an increase in price there is a corresponding decrease in revenue, resulting, evidently, in a significant reduction in demand – elastic demand.

Analogically,

$$\varepsilon_P < 1 \Leftrightarrow \frac{dR}{dP} > 0$$

meaning that with an increase in price there is a corresponding increase in revenue, which can be explained by the fact that there is not a significant fall in demand – inelastic demand.

Finally,

$$\varepsilon_p = 1 \Leftrightarrow \frac{dR}{dp} = 0$$

That is to say, at a production level, which maximizes revenue, elasticity is equal to 1.

Work assignment

Having formally introduced the concept of elasticity, the students could merely have resolved exclusively economic problems, for example: if a country wants to raise its income from petrol sales, which strategy should it pursue – increasing the price of crude oil or increasing its extraction?

It so happens that market forces also govern demand for illegal drugs.

An article entitled ‘Urban crime and the price of heroin’, published in the Journal of Urban Economics, reports that the elasticity of demand for heroin in Detroit was 0.267. In another article, published in the Review of Economics and Statistics, we learn that the elasticity of demand for cannabis in university campuses was calculated to be 1.013.

Thus the field is opened for other types of reflections and problems. The following question requires students to take a position regarding an issue which was under public discussion at the time:

At different times, various politicians have sought parliamentary legislation for liberalizing drug use. In view of the data supplied, how would you evaluate the proposal for the liberalization of drug consumption?

Liberalizing drug use: for or against?

Before giving their opinion, one group of students discussed the meaning of ‘liberalization of consumption’:

Group H: Before giving our opinion on this measure, we thought we should discuss what is meant by liberalization of consumption. If it were merely a question of decriminalising drug use, the only effect would be that an individual caught with small doses of drugs would not go to prison and wouldn’t be incriminated for possession. If on the other hand by liberalization we mean free entry of drugs into the country and their commercialisation by licensed, government-designated points of sale (...)

The other groups, however, took it to mean the latter from the start and went straight on to analyse possible governmental measures with such purpose.

One group rejected outright the idea of the State as a «dealer of death» (Lipovetsky, 1994):

Group C: From an ethical point of view, it would be a blameworthy measure, since the State can hardly be seen as a drug trafficker.

Another group recognised such a measure as a last resort:

Group E: The main aim of liberalizing drug consumption is to find solutions, not for drug addiction as such, but for some of its consequences.

As can be imagined, all the students had a point of view on the matter from the beginning, but their positions were by no means unanimous and clearly some

discussion arose in each group, as they themselves report:

Group B: The question caused some debate within the group.

The internal debate nonetheless resulted in an initial opinion:

Group B: Our first impression is that if we're talking about liberalizing some types of drugs, it should be soft drugs.

This conviction appears to be based on the old saying from which this paper takes its title:

Group B: We based our opinion on the conviction that once the «forbidden fruit» is liberalized, there would no longer be such a strong desire to consume it.

Group G: Remembering the old saying, «the forbidden fruit is the most tempting», we are led to conclude that the appeal of drugs would lessen amongst those who have never tried them.

Yet the examination of the data shook this intuition and mathematical treatment of the problem led the students to review their initial opinions:

Group B: However, the mathematical study that we did seems to indicate that it would be more effective to liberalize hard drugs.

The expression «seems to indicate» could suggest reservations in relation to the study, either because it goes against popular belief or because the data refers to American society and the proposal under discussion was to be applied in Portugal. This type of reservation was indeed made explicit by other groups:

Group E: This data isn't sufficient in that it refers to specific drugs and specific populations, but if we could generalise (...)

Group G: Judging by the data supplied by the teacher and if we were to assume that in Portugal we would obtain similar values (...)

Considering, then, the data supplied and assuming that it can be generalised, what did the students conclude?

Group C: With the liberalization of consumption, associated with free trade in drugs, market law would come into force and as there would be greater supply given the lack of restrictions on drugs entering the country, the price of drugs would fall.

And this economic result would have consequences on consumption:

Group E: As for heroin, a decrease in price would not cause a significant increase in demand, since this is inelastic – a fact that can be explained by the highly addictive nature of the drug; as for cannabis, consumption would probably be greater as its demand is elastic.

Group H: If the price of any type of drug falls, the data we have at our disposal shows that consumption of soft drugs would rise and that of hard drugs would hardly be affected. This means that there would be more young people experimenting with drugs and at the same time the numbers of those addicted to hard drugs would not decrease.

Some students were not expecting these consequences and some worrying questions were then raised:

Group B: (...) if all drugs were liberalized, wouldn't this lead those who only use soft drugs to try out hard drugs?

Group E: Accessibility [of drugs] will lead to an increase in the consumption of soft drugs. And will the consumption of soft drugs not induce these consumers to try hard drugs?

This question is even more worrying since:

Group B: (...) it particularly affects young people who destroy their lives by using drugs.

And it is above all this possible consequence which leads some groups to take a position against the liberalization of drugs, even though they also recognise the merit in contributing towards a better quality of life for drug addicts and towards a decrease in drug-related crime:

Group E: There would be a decrease in the number of deaths resulting from drugs, which have been adulterated with other substances. Drug users would not be seen as social outcasts or criminals. They would not need to hide, or live in seedy places without even the minimum levels of hygiene which lead to the propagation of fatal illnesses such as hepatitis or AIDS. The families of drug addicts would be better able to deal with the situation, without fearing the scorn of neighbours and friends. With a fall in prices, the theft and prostitution that is often used to fund the habit would also decrease. This would also have an effect on the families who would not see their moral and material values questioned.

A decrease in drug-trafficking related crimes is referred to by other groups. One group even traces a parallel with 1920's American society:

Group G: Films depicting American society at the time of Prohibition, that is, when the sale of alcohol was made illegal, show the intense level of criminal activity resulting from the fights between rival gangs who secretly sold alcoholic drinks. Nowadays there is crime associated with drug trafficking.

But for some students, the issue remains open:

Group B: The data (...) allows us to see the lack of unanimous opinions amongst politicians and, above all, amongst doctors. Thus from the beginning it appeared to us that liberalization would have negative effects.

Group H: A question then arose in the group. If the answer seems so obvious, why is there no consensus, even among medics?

A question which they believe they can answer:

Group H: And the answer can only be: because there are other factors to analyse.

This group goes on to analyse the liberalization of soft drugs and puts aside the theory that soft drugs lead to hard drugs:

Group H: In this case there are two aspects to consider: one is the dependency which we know they do not provoke, therefore the demand is elastic, and as there is no addiction involved it is only natural that the great majority of users will not be drawn to harder drugs.

As regards effects on the body, this group makes a comparison with another type of drug:

Group H: (...) from what we know, the effects on the body are not as serious as, for example, drinking alcohol. Besides, consumption of alcohol can have consequences on third parties – it can lead individuals to become violent and to drive dangerously.

And it is on the basis of this incipient comparison that the group concludes:

Group H: Therefore we ended up concluding that soft drugs should be liberalized.

Group B arrived at the same conclusion, having also made a comparison with tobacco and alcohol. The reasoning of the students is as follows: 1) soft drugs are not as harmful to health as tobacco and alcohol; 2) therefore, the use of soft drugs cannot be more penalised than the consumption of the latter; 3) either there is no logic in political decisions or the use of soft drugs must be liberalized.

Group B: It is known, however, that soft drugs are not addictive, nor do they have such disastrous consequences on health as for example tobacco and alcohol. But society better accepts the consumption of these latter drugs and indeed does not even consider them to be drugs. Because of this, we are inclined towards the liberalization of soft drugs. Indeed there does not seem to be any choice in the matter since tobacco and alcohol can be freely consumed.

The students are capable of criticising a society, which condemns the use of narcotics but accepts the consumption of other drugs such as alcohol and tobacco. Regarding alcohol and tobacco, there are two types of discourse in society – or rather, an official discourse and a social practice: the official discourse disapproves their use whilst social practice entices it⁴. The students are critical of such social hypocrisy and decide to disregard it.

As far as the results of the debate on the liberalization of hard drugs are concerned, the students are more hesitant. The data available does not convince them. Nor does the psychological factor – which they themselves previously invoked – of the temptation of the forbidden fruit seem to be applicable to this case. The solution they suggest (in fact going further than they were asked in the assignment) is more exacting and surpasses the power of one nation-state, demanding worldwide co-operation:

Group B: The solution can only be global. All countries without exception must become involved in the fight against the sale and the production of drugs.

Group E: Furthermore, such a decision should be taken in conjunction with our fellow European (and other) countries, for a single country taking this measure will not succeed in getting positive results as border control is difficult.

Students are aware of the difficulties resulting from the interests involved in drug traffic; they know that greed for profit overrides the ethical concerns:

Group B: We know that this is as hard as putting an end to arms traffic given the profits involved and the currency that goes into the countries that produce those arms.

The students of group H go even further, because:

⁴ A glass of whisky in one hand and a cigarette in the other is part of the image of a successful businessman who closes his deals at the end of a good lunch.

Group H: (...) things cannot continue as they are. On the one hand, we have crimes and offences committed to obtain money to buy drugs and it must be remembered that the majority of those detained in Portuguese prisons are there for drug-related crime. Therefore, people's safety would be increased by liberalization. On the other hand, there is the question of the spread of AIDS and other contagious diseases which is increasing due to the conditions in which, nowadays, drug addicts inject themselves.

And there is another fact to consider:

Group H: (...) the ineffectiveness of prohibitive measures.

Thus the students conclude that:

Group H: (...) the use of hard drugs should be liberalized (...)

But this is a responsible conclusion, in view of the fact that they indicate complementary measures which are indispensable to the success of this action:

Group H: (...) as long as the government adopts parallel measures which would facilitate the treatment of addicts, such as the distribution of substitute substances under medical supervision.

Group E: Such a measure should be accompanied by others, namely in the areas of education and sport.

Some students went further than simply taking a standpoint on the problem under analysis and sought explanations for what leads people to start using drugs. Challenging the authority represented by teachers and school directors is a way of being a hero, of being a protagonist, albeit in the negative sense. Moreover, it is this type of hero that others will try to imitate in every one of their transgressions:

Group G: But in starting to use drugs, other factors are in play besides the predisposition of young people to deliberately go against established rules – it's forbidden, so let's go and do it. It is a way of affirming personality. But there is also a tendency to imitate those who have some power, even in the negative sense. The younger pupils see their colleagues who challenge school authority as heroes, and imitate them.

In the opinion of these students, peer pressure is another factor, which leads young people to experiment with drugs:

Group G: Often, not experimenting with a few puffs of a joint is seen as cowardice and a reason for derision. So to avoid this many youngsters experiment once, twice, three times and then cannot stop, eventually becoming addicts.

Finally, there are those who foresee how the income generated for the government by controlled commercialisation of drugs could be used:

Group E: With this income, the government could take steps to help addicts, such as: (a) create more hygienic conditions regarding drug use; (b) make information on preventative measures against drug use more widely available; (c) set up institutions to provide shelter for those who have been thrown out of their homes; (d) distribute drug substitutes; (e) set up treatment centres.

Ultimately, the decision as to whether or not to liberalize drugs should not rest in the hands of our politicians:

Group E: A decision of this complexity demands that all members of society be informed of the possible consequences and be consulted as to their opinion.

It is not even the responsibility of experts to make the decision, perhaps due to the lack of consensus given the complexity of the problem. The power of decision lies with the people, the real sovereignty. But only after being duly informed.

Final comments

From this data, it is possible to argue with empirical evidence that the development of democratic competence can be a legitimate and significant component of mathematical education. To educate towards citizenship and the development of critical capacities is not incompatible with teaching mathematics to young people; on the contrary, it can be one of the aspects involved.

The students observed revealed the capacity to find ways of mobilising ideas and knowledge which, in the face of a complex and delicate issue which excites public opinion and preoccupies political power, surpass the usual sphere of the application of mathematics to more or less routine problems.

Mathematics appears, in the discussions and subsequent positions taken by the students, as a valid resource and as an additional source of information and knowledge which permits them to justify opinions and review previous conceptions. Mathematical knowledge constitutes, among others, a means of access to the establishing of opinions and sustained positions.

It is not mathematics which dictates the truth or represents the authority on which a standpoint or an option is justified. Economic and social considerations, humanistic aspects and day-to-day reality are brought into the discussion. The mathematics classroom becomes simultaneously a place of mathematical learning and critical reflection.

The importance of opening mathematics to socio-economic reality and the problems of citizenship can be interpreted as a form of making mathematical concepts and tools significant and, above all, using them to intervene in a consequential manner in the development of ways of thinking and changing the world we live in.

These students did not stop at the «*conscientization*» of the problems and the issues involved, but showed a distinct preoccupation with intervention. Thus, a real-world issue brought into a classroom context becomes a real issue for the students, in the way in which they appropriate it (Sierpinska, 1995). This was the case. The task is not a mere application of an economic concept. It is an opportunity for the students to reflect together, using real data, upon something they confront on a daily basis. It is an attempt to overcome, or confirm, on a rational basis, preconceived ideas. It is a means of becoming better informed about the issue, so that when confronted by arguments for or against, counter-arguments can be more easily constructed. It also means that if called to a referendum on the matter, students will be able to vote or otherwise to waive

their right to vote depending on feeling or not sufficiently enlightened on the subject.

References

- Changeux, J.-P. (1999) 'O debate ético numa sociedade pluralista', in Changeux, J.-P. (Dir.), *Uma mesma ética para todos?*, Lisboa, Instituto Piaget.
- Freire, P. (1975) *Pedagogia do oprimido*, Porto, Afrontamento.
- Habermas, J. (1999) *Comentários à ética do discurso*, Lisboa, Instituto Piaget.
- Jonas, H. (1994) *Ética, medicina e técnica*, Lisboa, Vega.
- Lipovetsky, G. (1994) *O crepúsculo do dever: a ética indolor dos novos tempos democráticos*, Lisboa, Publicações Dom Quixote.
- Moreira, L. (2000) 'Some reflections on democracy with regard to curricula and vice-versa', in Matos, J. F. and Santos, M. (Eds.), *Proceedings of the Second International Mathematics Education and Society Conference*, Lisboa, Centro de Investigação em Educação da Faculdade de Ciências da Universidade de Lisboa.
- Moreira, L. and Carreira, S. (1998) 'No excuses to command, no excuses to obey, no excuses to ignore. Some data to reflect upon', in Gates, P. (ed.), *Proceedings of the First International Mathematics Education and Society Conference*, Nottingham, Centre for the study of Mathematics Education – Nottingham University.
- Rawls, J. (1995) *Libéralisme politique*, Paris, Presses Universitaires de France.
- Sève, L. (1999) 'Entender-se em ética: actos de linguagem e linguagem dos actos', in Changeux, J.-P. (Dir.), *Uma mesma ética para todos?*, Lisboa, Instituto Piaget.
- Sierpinska, A. (1995) 'Mathematics: "in context", "pure", or "with applications"? – a contribution to the question of transfer in the learning of mathematics', *For the Learning of Mathematics*, 15, (1), 2-15.