

# Defence Mechanisms Against Mathematics

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Phantasy can be taken as the mental expression of instincts, but also as a means of escape - an escape from confronting external reality or the frustrated reality within. In this sense, it becomes a defence: according to Hannah Segal,

The individual, producing a phantasy of wish-fulfillment, is not only avoiding frustration and the recognition of an unpleasant external reality, he is also, which is even more important, defending himself against the reality of his own hunger and anger - his internal reality. Phantasies, moreover may be used as a defence against other phantasies [1]

The distinction between defence mechanism and phantasy depends, Segal claims, on "the difference between the actual process and its specific detailed mental representation". She gives a good example of this: repression, a defence mechanism, can be actually experienced and recounted by a patient as an inner dam which could burst under the pressure of a flood. "What an observer can describe as a mechanism is experienced by the person himself as a detailed phantasy." [2]

Two arguments can be put forward: either the anxiety and its "phantasmatic support" (*support fantasmatique*) are displaced onto mathematics, and defences are directed against mathematics, so indirectly containing the anxiety; or the anxiety is contained in some other way and defences can be seen to be mounted against this anxiety, mathematics serving as an instrument of this defence. Mathematics, then, through the phantasies that it calls forth, can be either that which you can defend yourself against, or - on the other hand - that which participates in a defence against anxiety. It can even sometimes, by splitting, serve as both.

I have tried to study some of the different defence mechanisms employed against mathematics by using a questionnaire with a group of 614 students from the public educational establishments of the Marne *department*. The questionnaire called for agreement or disagreement (on a five-point scale) with representative statements covering those themes that came up most frequently in 64 preliminary interviews. These interviews, lasting 45 minutes, were recorded and later transcribed. The same survey was carried out in Québec and in Belgium; the three samples amounted in all to 1420 students (about 45% of these being girls). The results were statistically analysed in some detail [3]. This revealed six main ways of grouping the statements; these may be linked with certain well-known defence mechanisms.

## Phobic avoidance

The statistical analysis lets us pick out a first group of statements:

- Q1: I feel there is something, that keeps me from getting at the problem, a barrier I can't get across.
- Q3: At the start of a mathematical problem, I feel as if I'm in front of a black hole.
- Q11: Doing maths is doing something which to me seems impossible.

These three statements betray a certain anxiety towards mathematics. The student cannot approach the mathematical object, something separates him or her from it - barrier, hole, or impossibility. No blame is placed on mathematics itself, as in other cases described below. I propose the following interpretation: the student is looking, in this case, for a way of avoiding mathematics because of the anxiety it provokes. The student self-protectively prefers to classify mathematics as impossible rather than confront it. This is a matter of the defence mechanism known as *phobic avoidance*. For example, a girl from an arts stream speaks of a veil set up in front of her:

It is as if there was a veil ... which separates me from what is there, if ... I look into space, I don't know, it's faraway ... it has already given me this impression ... evidently, I don't think immediately of maths, when I look at the stars; but there, I am aware that it represents something similar, I don't know. To look at something and then reach a time when you can no longer see, close your eyelids, there is the veil which prevents us from penetrating any further, from reaching it ... I think it's that.

This girl envisages a distance between herself and mathematics like that between her and the stars. What she wants is to be able to "penetrate" further, but in practice, she has set up a veil, which as in the Temple, separates the faithful from the Holy of Holies. The underlying ambivalence in such case was noted by Otto Fenichel:

Analysis always reveals that specifically avoided situations or inhibited functions have unconsciously an instinctive, sexual or aggressive, meaning. It is against this instinctive meaning that the defence is really directed. That which is avoided refers, either to a temptation to give in to the repressed urge or to a feared punishment, or to both at the same time [4]

## Repression

The second group of statements included the following:

- Q9: Doing maths, it represents nothing, it's absurd.
- Q10: It is something that you are told to do and which you repeat, a bit like a machine.
- Q13: It is doing something obligatory, something imposed

Here there is an absence of any sense of personal relevance for the students as far as mathematics is concerned. For such students, mathematics doesn't represent anything. If it is done at all, it is because it is compulsory; the student is so uninvolved that it feels mechanical. All drive towards mathematics is missing. I propose the conjecture that in fact all such drive is *repressed*. There is no longer anything positive for these students, but rather "indifference". It even happens that if they are forced into mathematics, it becomes negative (or absurd) for them.

For one student, "the  $x$ 's and the  $y$ 's, they represent nothing, it's completely abstract." For another it seems that "you have to copy out theorems that are completely idiotic." Another asserts:

I don't know what is really concrete. You calculate figures, you do anything! In the end, anything... to me that seems nonsensical. For me, figures, even when I wasn't particularly good with them at primary school, I still found them pleasing because they were something concrete, something that was plain for all to see, you calculated weights, measures. But here, now, we do calculations with letters. We have never learnt to say  $a$  times  $b$  makes  $c$ ; I don't know if it is that! I don't know, in the end it seems absurd to me... I don't remember anything, it is precisely because it is absurd that I don't remember anything

So completely absurd that you ask yourself whether teachers believe in it all themselves. "You, seeing as you are a maths teacher, do you really believe in all these theorems?"

If all mathematical signs become meaningless (or absurd), it is because they no longer have any apparent personal relevance. Repression permits a retreat from all investment of energy, for reasons which can be diverse but which are most often used as a way of assessing - sometimes in rather doubtful fashion - the personality of the student. This poses the question of whether it is justifiable that mathematics be compulsory for all. Is it not, at times, even rather dangerous to demand success in this subject "at any price"? It should be noted here that mathematical re-education is not a return to apprenticeship; the whole personality is involved.

### Projection

Another loosely grouped set of statements included:

- Q16: In mathematics there is no place for personality; all that you do has been done before, everything has been seen already.
- Q18: Mathematics sometimes risks bringing destruction, you only have to think of the atomic bomb.
- Q23: When one is deep in maths work, it's difficult to get out of it, that's why it doesn't do to get involved with it.
- Q24: Doing maths oversimplifies everything, it takes the poetry out of things.
- Q25: Those who do too much mathematics sometimes risk not having your feet on the ground.

The negative characteristics attributed here to mathematics present it as something dangerous where there is "no place

for personality". This feeling of danger can only come from a projection of the self onto mathematics which in itself is neither dangerous nor reassuring. The danger is inside the individual; to protect yourself you *project* the danger outward onto an object, in this case mathematics. The statements include suggestions of danger for the individual arising when personal expression is not a possibility. There is also the danger of losing your own physical boundaries: notions like "being deep in" or "having difficult getting out of" express the risk of leaving your element, of losing one's way, of being on the verge of "destruction".

The danger of no longer "having your feet on the ground" can lead as far as the idea of going mad. That mathematics provokes a state of madness is a theme often taken up by students. A 17-year-old boy from the arts stream helps us understand how far mathematics can take on this aspect:

I know a shepherd. I don't know how he found himself faced with some mathematical tables. He started to write down the numbers, to do calculations; eventually he reached the point of gaining his doctorate in mathematics. And so now he does calculations... He could have had a little farm and lived quite comfortably while still living with nature... he would have been happy. Ah, well! Now he is with his numbers. He is no longer concerned with sheep. He no longer knows anything about life. In fact, it would astonish me if he were still to know anything of the outside world. He studies, I don't know what after all; I no longer know what he does now. In the end, he abandoned his down-to-earth job, something natural that gave him a certain amount of physical exercise and kept him alive and breathing. Whereas here he is now, enclosed in a laboratory doing calculations. He suffocates in figures... He thinks mathematically. Well, I don't know, ultimately... we are mad... we are mad.

In the end, we have little chance of getting to that level. That's how it is, oh well! Lunatics in the end. People say that certain children who know how to calculate roots to what ever power were mentally deficient... oh, well! Fortunately, there's little chance of our going mad, because not many of us become top mathematicians.

Note during this passage how the student is gradually taken by his story. From the opening "I knew a shepherd" to the final "I don't know" he moves on to a more impersonal "we" when it comes to the subject of madness. This fear of madness, or more plainly this "risk of no longer having your feet on the ground" may surely be explained by the fact that

for certain individuals, the need to invest energy in abstract representations, which have not yet been incorporated into their psychic reality and into their own mental mechanisms, seems to constitute a traumatic experience. It breaks relationship with reality, and cuts off a channel of instinctive discharge - that of the flow of sadism sublimated into an activity of mental control of the outside world. The ego finds itself somewhat disconnected, in danger of a loss of meaningfulness and of depersonalisation [5]

In the three categories discussed so far, the mathematical object remains *outside* the student, whether the student avoids it or becomes disinterested in it, or whether the only relationship possible arises from the projection of an internal object on the external object. Evidently, mathematical training in all these cases is made difficult and sometimes painful for the students – as well as for the teacher.

### Reparation

The following statements reflect a feeling that you are creating something when you do mathematics:

- Q2: I have the impression I am creating something when I am solving a problem.
- Q8: It means doing something basic which is the key to everything else.
- Q12: It is constantly discovering something new.
- Q19: Mathematics brings you the pleasure of creating something.
- Q20: Mathematics means another world in which I feel at home.

Construction leads to the discovery of new and important things (“the key to everything else”), even to the construction of “another world”. This feeling conflicts with that of the previously encountered risk of destruction. This is why I propose the following interpretation: this group of statements express the putting into action of a mechanism of *reparation*.

This reparation could be the “wish and the capacity for the restoration of the good object, internal and external, that is the basis of the ego’s capacity to maintain love and relationships through conflicts and difficulties”. It is this that seems to lie behind the first two statements. But reparation can also be fanatical: “in that its aim is to repair the objects in such a way that guilt and loss are never experienced” [6]

Students may express the fear of “destruction by the mathematical object”, but the anxiety about destruction may be repressed by a reaction-formation in the form of a feeling of reparation, of construction, of discovery: “By doing mathematics you are making something for yourself...that’s why we enjoy it, everyone likes to make something, I think.”

Another girl from the scientific stream has the feeling of creating something which came out of her, but which didn’t begin with her:

*You like making things?*

Yes, by doing maths, you are making something for yourself. You are making something. Well, it’s for that reason... that we enjoy it; everybody likes to make something, I think, because if one doesn’t manage to make something, in the end to find... to find peace, to have precisely the joy of having done it, I think that makes you do more, in any case; it makes me do more.

*Do you feel you’re doing something that comes from you?*

Ah, yes! Which comes from us, Yes, like something that you think, you find, or you show. Yes, because, of course, the start of a problem doesn’t come from

you, but after doing what has to be done, the most important things is that which has to come from you.

The fantasy of childbirth, bringing with it a notion of peace, shows how the mathematical object can have energy invested in it in a very personal way when the motivation and the interest of the student is aroused.

### Introjection

Another group of statements reflects the notion that mathematics helps to set up a certain stability in the personality. The search for connections, the disciplining of the mind, the acquisition of sound reasoning help to establish a balanced character and a strong personality.

- Q14: Doing maths is a way of training my mind.
- Q15: It is trying to find connections between different things.
- Q17: Mathematics is a way of getting a strong character.
- Q21: Working with mathematics allows you to acquire a well-balanced personality.
- Q22: Mathematics allows you to develop good reasoning.

Mathematics is a language which always strives to clarify, to distinguish and to classify, its concepts. It rejects all equivocation and all ambiguity, for it will not tolerate them. In English or French and so on, a word refers more or less to some reality; in mathematics this is not possible. Moreover, in this language, information is rarely redundant; each sign acquires a sort of absolute necessity governed by rules which admit no exception. The rules have a compulsory nature, much more superior to those that govern spelling, for example. Failure to respect the latter rules does not always interfere with the meaning and so the words. Failure to respect the rules of mathematics hinders any use of the subject. It seemed to me that certain students *introject* this aspect of the mathematical object, taking it in and making use of it as a way of structuring their personality. They then have the impression that mathematics gives them some order, that is to say it lets them struggle against the instincts they consider bad.

Here is part of an interview with a 16-year-old girl from the scientific stream:

With maths, I think that when one has to solve something, you should do it progressively without jumping...jumping in that way from one question to another when they are totally different, you know... And then, to see how far you can go, although I don’t know myself! And it’s precisely that, I am searching for a way of life...a stability...It is perhaps because I am looking for something that will make me stable, because I know very well that in myself, I am not.

Mathematics offers the possibility of gaining internal stability or a way of testing it out. In other words, it serves to set limits, but also sometimes to reinforce the ego.

One day I’ll be in a good mood, the next day I’ll feel quite the opposite. I know very well I’m unstable. Well, perhaps I’m looking for something else; I think I’ve found it in maths, but that now it’s much more difficult for me.

*What do you mean when you say you are not stable?*

It's ...I don't know ...the mind and the thoughts ... in short, one day I will have quite bright, cheerful ideas and everything ... the next day I've black thoughts. And it's just that there's a contrast which comes about inside me. It's that, generally, when it's fine, when the sun's shining, it's then that I'm most black. With my previous maths, I'd found a bit of stability, much more so than I find now.

The mathematics she is now doing no longer enables this student to go on struggling. Instability has set in; black thoughts reappear in reaction to the weather. What are these black thoughts which mathematics is expected to keep in check?

*What are these things you call black thoughts?*

I don't know ...I don't know. Well, how strange life is! In short, it's not always pleasant ...there are things like that. I try to throw myself in to my work - by trying to work, to forget all these black ideas. It's often difficult, they always return .. afterwards, just the same ... Well, I think that it affects your health. It's not easy either, everyday, In short, I think that everything is held in. I don't know exactly what, well I'm ill. ...I've a little brother and I've great difficulty in getting on with him because he's always full of ... he's always on the go. And then he really takes life as it comes ... also I can't get on with him ... I'm as withdrawn as he's outgoing!

Over-investment of energy in mathematics was functioning to keep the mind busy so that she does not think about the aggressive and guilt-making ideas and that she knows rationally 'how far you can go' in behaviour to a brother

### Reversal into the opposite

A final group of statements reveal the presence in the individual of a disagreeable feeling which could possibly be neutralised whenever a solution to a mathematical problem is found.

- Q4: If I can't find the solution, I feel defeated  
Q5: When I work something out, I feel like a void is being filled  
Q7: If I find the solution straightaway, I feel really at peace.

I interpret the disagreeable feeling as a reminder of the "narcissistic wound" (recalled here in a symbolic form: wound = void - lack - defeat) and the search for the transformation of this feeling into its opposite: defeat into victory, lack into replenishment, disagreeable feeling into feeling at peace.

Failure in mathematics often calls into question the image that you have of yourself. A 17-year-old girl well expresses the feelings of many students for whom failure in mathematics is felt as lack of intelligence:

When you can't do something, it's not that it isn't normal, it's not that you have a grudge against it ... it's difficult to say! I enjoy it when we're taught something, when we've something to do. To be able to do it. Because you have to be able to do it: it has to be at

your level. You're given it, you have to be able to do it! Otherwise, as soon as there's a snag, something you can't do, you say, 'Drat! What's going on? Why can't I do it? I'm stupid, it's no good!' ... That's how it is. When you're given something, you have to know how to do it. That's how it is in the course, in class: some can do it, others can't.

For students like this there are two sorts of people, those who understand and those who don't. They also say "you're either good or bad at maths". So mathematics, through its rigour, that is to say through its constant refusal to entertain ambiguity, will more than any other discipline, revive anxieties arising from noticing individual differences. And revive, perhaps more fundamentally, anxieties about castration which manifest differences between the sexes on which all other differences may be based.

One thing surprises me: there was a girl who was getting very good marks at the beginning of the year and then afterwards she wasn't doing so well. The teacher said to her, 'I thought you were intelligent, and you're not'. Drat! I reacted to that! If maths is a matter of intelligence, well I haven't got much. Well, I was a bit disheartened at this point, and then I said to myself: you're alright at French, there's not much logic in language, it must be a matter of a different sort of intelligence there. But I don't know, I ask myself; if you're good at maths, does that mean you're more intelligent than someone else? I don't believe that's the case ... in short, it depends. I have friends who are really good at maths, it's unimaginable! They do lots of theorems and exercises

### Final remarks

The first three defence mechanisms described above - avoidance, repression, projection - are phobic defences. Some internal danger, say that of castration, is projected onto an external object which becomes the source of the anxiety and the avoidance of which brings a sense of peace. An example would be that of a student for whom mathematics is both an idealised object ("a treasure - something pure and virginal") and a bad object ("something with gaps and snares - something to be overcome"). Orderliness is introjected in the form of mathematical rigour. The bad object has to be controlled, and this may be done by setting out to know everything there is to know - so as not to be caught by those snares.

The other three defence mechanisms - reparation, introjection, reversal - are known as manic defences. In these cases, the object is split into a good object and a bad object; reparation is made and the bad object is brought under control (for example, by introjection of order). It may be conjectured that these defences serve here to combat a depressive state - in Segal's words, "to ward off underlying depressive phantasies".

The analysis of the responses to the questionnaire suggests that positive or negative attitudes to mathematics may be linked with these defence mechanisms. Similarly, anxiety is not correlated with attitude, but rather with the particular defence mechanism employed against mathematics.

### Appendix: National comparisons

The final questionnaire was also translated into English and offered to 810 students in the USA, in Great Britain and in Canada (Ontario and Québec). This encouraged me to try to compare the results for the English-speaking and French-speaking samples. There are inevitably lots of problems in trying to make such a comparison; and the statistical variation between countries was weak compared with that between samples of students from, say, arts and science courses. Any conclusions that may be drawn can only be thought of as conjectures, as a possible indication of trends. These are only presented briefly here; I have given further details elsewhere [3].

The students in the samples from Britain and Canada seemed to have a more positive attitude towards mathematics, than those from the other countries. On the other hand, the differences over some of the statements may only be artificial, reflecting nuances in translation. However, roughly speaking, particular statements did yield different positions. Thus, the British students found statement 4 ("If I can't find the solution, I feel defeated.") particularly true for them. The students from the States strongly rejected statement 3 ("At the start of a mathematical problem, I feel as if I'm in front of a black hole.") Those from France were the only ones who agreed with statement 21 ("Working with mathematics allows you to acquire a well-balanced personality.") or statement 25 ("Those who do too much mathematics sometimes risk not having your feet on the ground.") The Québécois sample was the only one where a majority opted for statement 20 ("Mathematics means another world in which I feel at home."). The students from Ontario overwhelmingly agreed with statement 12 ("It is constantly discovering something new")

To summarise: in spite of the language differences, the samples from Ontario and from Québec were similar. These and the British sample were characterised by a greater homogeneity in the attitudes of the students than in other samples. The students in these three samples had

generally a more positive attitude towards mathematics. The particular defence mechanisms involved here are introjection and reparation.

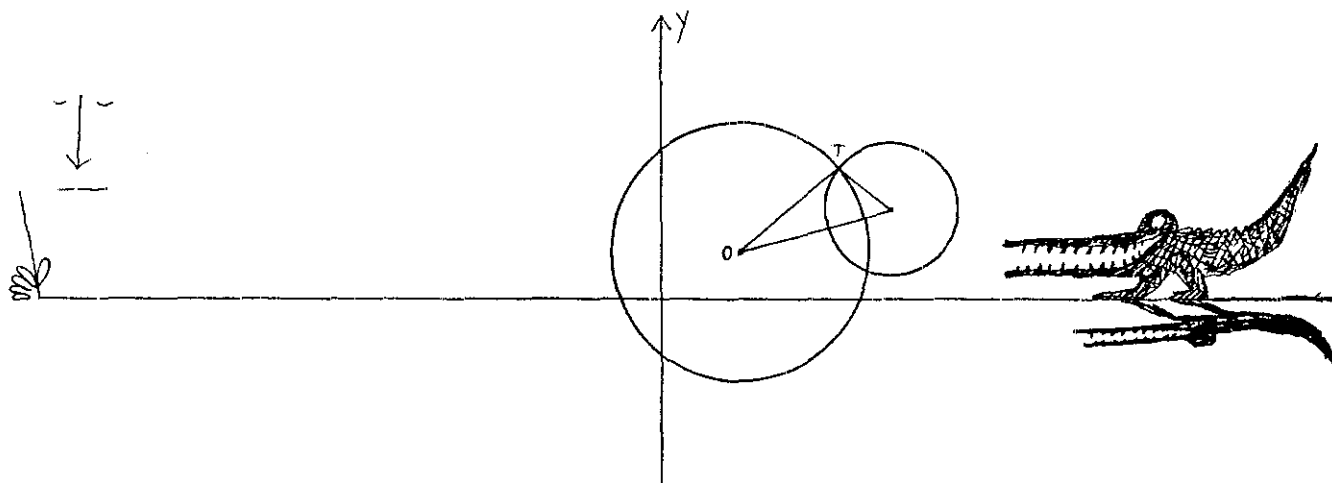
The samples from France and Belgium were also alike. They were characterised by a more heterogeneous attitude than was found in the previous samples. They contained a greater number of students displaying phobic attitudes towards mathematics. The particular defence mechanisms invoked here is projection. The French favoured most often the notion that mathematics balances the personality; but both the Belgian and the French samples included those who most strongly wanted to have nothing to do with mathematics.

The sample from the USA formed a sort of link between the two preceding groups, though it was often closer to the French and Belgian samples than the others. It was these students who mostly found mathematics compulsive and not leaving room for personality. On the other hand, they were the ones who were least inclined to invoke mechanisms of avoidance – they did not feel mathematics to be a barrier, a black hole, an impossibility.

### References

- [1] H. Segal, *Introduction to the work of Melanie Klein*, London: Hogarth Press, 1978, p16
- [2] H. Segal, *op cit*, p17
- [3] J. Nimier, *Les modes de relations aux mathématiques*, Paris: Meridiens Klingsieck, 1988, ch3 and appendices 1-4
- [4] O. Fenichel, *The psychoanalytic theory of the neuroses*. New York: Norton, 1945
- [5] D. Flagey, "Point de vue psychoanalytique sur l'inhibition intellectuelle" *Rev. fr. psychoanal*, 5-6 (1972) p782
- [6] H. Segal. *op cit*, p92 and p95

*This article is an edited extract from a previously published work[3]: the translation was by Charlotte Hoare and Dick Tahita. Note that Freud's term "besetzen" (fr: "investir") is customarily translated into English as "cathect" or sometimes "invest", in the sense of "investing energy in", which is the phrase adopted here*



A cartoon by Saul Steinberg suggests what might be between the lines, or behind the figures. What is being tamed – kept at bay? The Other may be named a crocodile. But every word learned is a step away from mother: language (and/or mathematics?) fills the gap, covers over the loss, con-

trols the desire. One word leads to another and another and another – leaving what Lacan called a 'metonymic residue which runs along the chain of signifiers, an indeterminate element, which is at once absolute, but untenable, a necessary and misunderstood element called Desire "