

Bion and Problem Solving

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Psychoanalysis is a process which takes place in a relationship between psychoanalyst and client, working together to explore the client's current distress in relation to his or her childhood and family history. In this it does not differ greatly from other therapies, but it has the extra tool of special access to unconscious processes. Thus, psychoanalysts can gain access to ideas that were once consciously active but became repressed because they were "too true to be good". The thesis of psychoanalysis is this: these ideas may be repressed and forgotten, but they remain active and continue to exert a secret, powerful influence on the client's life. Psychoanalysis, therefore, does not investigate the past for its own sake, but in order to see what is really underpinning current anxieties. However, it is not enough just to *recall* the past, a great deal of the mutual task in analysis is in allowing a *reliving* of the past in the present relationship with the analyst. The link between the present and the past thus becomes "alive" in the relationship with the analyst who can assist the client in assimilating this link.

I had always kept my interest in psychoanalysis separated off from my profession of lecturing on mathematical logic and the foundations of mathematics. This was because the first seemed to be about emotions and the second about the intellect. So it seemed "natural" to keep them apart, in case the emotional life would be spoiled by contact with "cold" logic and the logical world contaminated by emotion. One day, I had just finished giving a lecture on Cantor's mathematical theory of the infinite and was leafing in a desultory fashion through the pages of the *International Journal of Psychoanalysis*. Suddenly, my eye fell on a book review of *The unconscious as infinite sets* by Ignacio Matte Blanco. I could not believe my eyes. .the unconscious as *infinite sets* - Cantorian infinite sets? Surely not! As I read the review, it dawned on me that it really was Cantor's infinities that this author had linked to the unconscious. And two worlds, the world of psychoanalysis and the world of logic, which up to that point I had kept separate in my mind, collided in my head.

I checked the Library catalogue, and it was not a dream; the book was in stock and during the following weeks I immersed myself in its strange atmosphere. On the wall above my head was Chagall's *I and the village* and when I rested from my strange reading matter my eyes fell on that somewhat chaotic painting, re-inforcing the rather 'mad' feeling I was getting from the universe of this Chilean psychoanalyst. In time I got used to the ideas and began to feel more at home in this new world. Since then, I have allowed my mathematical and scientific interests to "soak" into psychoanalysis and conversely.

One of the more obvious areas of overlap is clearly that of psychoanalysis and scientific discovery, for here we can sometimes see links between the psychology of the scien-

tist and his or her discovery. It should be possible to trace connections between the intimate life of mathematicians or scientists and their creative productions just as writers' biographies can so often be traced in their novels or poems.

Writers, like all of us, are inhabited by their uncomfortable past, which they transform in their writing through a continuous process of trying to digest or assimilate what had happened to them. In the novel, the author's personal problems are often visible; my intuition is that the mathematician and the scientist is in the same position, but that this is less obvious. This may be because mathematics - like music - comes from deeper layers of the psyche at the pre-linguistic level. It is interesting that many very disturbed clients have an artistic or musical aptitude untouched by the disturbance; a patient who is virtually inarticulate about his or her pain can draw or dance with expressive ease.

The psychoanalyst Melanie Klein saw children's play as showing the existence of a continuous stream of what is called "unconscious phantasy", a pre-logical and pre-verbal form of expression concealed and revealed in playing. She believed that unconscious phantasy is the dream process which underlies all our conscious activities. It is normally only evident in the night when we are asleep and dreaming; but the Kleinian thesis is that this underlying process never ceases from birth to death. Just as we somehow imagine, when we are surprised by the wet ground in the morning, that weather does not continue through the night, so we are inclined to think that just because we dream at night we do not dream in the daytime.

Dreams are the clearing house of the day's experiences; but they are more than this. It is well known that creative ideas often come in dreams. The well known example is of Kekulé who literally dreamed the idea of benzene rings in the dream image of snakes biting their own tails. What is instructive about this is not only that he really seemed to dream a solution to his problem, but that he seems to have solved it not in the language of organic chemistry but in the language of the dream - that is, using a personal depth idea of a phallic symbol.

Another example is the work of Georg Cantor, an intensely religious man who was also deeply preoccupied with certain problems in mathematical analysis. His life was periodically shaken with severe manic depressive episodes. In a manic phase, the sufferer is full of wild ideas like an omnipotent God. Cantor's unconscious phantasy life became conscious. He conceived the idea of *actual* mathematical infinities, as opposed to the potential infinities so familiar to the philosophers and theologians of earlier centuries. Moreover, he raised actual infinity (aleph null) to a power of two and demonstrated that the second infinity was bigger than the first.

Cantor showed the incredible omnipotence of mania when he raised his actual infinity to a *higher power*, and then raised this to a still higher power, thus opening up completely new realms of mathematics. It seems to me that here also was the "Higher Power" known to theology. Cantor asserted that whereas there are aleph null physical particles in the universe there are two to the power of aleph null mental events or thoughts! Thus, since "God made the world", the world of thoughts (God's mind) is of a higher power. It is not difficult to imagine how Cantor's pathological religious mania entered into the solution of his problem in mathematical analysis.

What these two examples show is that *unconscious* processes were at work. To understand them we must look more deeply into the psychoanalyst's view of the mind. The reader is probably aware that this view is dynamic and historical - in the sense that Freud thought that the events of the first few years of life were virtually decisive for the quality of life that an individual can expect. Although past events are forgotten or repressed, they remain active in influencing the present. Klein held an even more extreme version of the Freudian theory, namely that not only were the first few years decisive in the destiny of the individual, but these first years were founded on the experience of the first months of life. So that, whereas Freud centres the crucial phase of development between the ages of three and five - the so-called oedipal phase - Klein centres development in the early relationship to the mother's breast. The taking in of milk and how mother handles feeding become a root issue for the baby soon to become a child.

A theory of thought

Wilfred Bion was a follower of Klein and so his thinking centred around the key reality and phantasy of breast feeding. According to him, the baby is born with a *preconception* of the breast. When it is hungry the preconception will either be satisfied or it will be unsatisfied by the presence or absence of the feeding breast or bottle. In Bion's language, it will be positively or negatively "realised". In terms of the breast, if the feeding breast is there on cue the infant does not have a problem; but if it is absent, then the baby has somehow to "take in" this experience of absence. This, according to Bion, is where, in normal development, an *idea* of the breast comes into the mind as a substitute for the real thing. Thus, frustration is the spur to learning, and so begins the experience of the function of human thinking which is founded in the attempt to represent what is "not there" by ideas. Learning is above all a *process* which involves growth of knowledge; and since growth involves setbacks, the course of true learning never runs smoothly.

For Bion, the breast-feeding process is internalised and becomes the core of the evolving young mind. Accordingly, he centralises this motif as representing mind in action which he sees as a digestive system. So, for him, the mind operates on an everyday (and every night) basis of digesting experiences. A mathematical analogy seems apt here: the adult functioning of mind is itself a complex function of the primitive functions of childhood and infancy.

So far it all seems plain sailing: frustrating absences give rise to thoughts, which are then "thought" by a mind brought into existence for the purpose; but this is less than half the story. The truth is we often cannot "stomach" certain experiences - for example, some babies respond extremely badly to frustration at feeding or to mother's absence. In such cases, the "idea of absence" may not form. Absence is not mastered, and a terrible feeling of absence dominates baby's mind. We all have had experience as adults of "indigestible" experiences, those that cannot be symbolised - the loss of someone loved, a hurtful remark made to us, and, at the other end of the spectrum, a traumatic event like being held at gunpoint which a person may never digest in a lifetime. To generalise then, Bion's vision of the mind is that it is engaged, from birth to death, night and day, in the activity of unconscious phantasy, in digesting experiences old and new - *the new experiences being digested in terms of the old*.

This idea of seeing the new experience in terms of the old experiences forms the basis of how we use "models" in dealing with everyday experience. Let us follow Bion back to Freud to understand this better:

Any experience may be used as a "model" for some future experience. This aspect of learning by experience is related to, and may be identical with, the function Freud attributes to attention when he says it had "periodically to search the outer world in order that its data might be already familiar if an urgent need should arise".[1]

The value of a model is that its familiar data are available to meet urgent inner or outer need. What Bion and Freud seem to be getting at here is the notion that when we (like the animals) are in a state of uncertainty we search for precedents, or models of a state or affairs, in order to make things clearer.

Model theory and psychoanalysis

Bion's theory of mental processes was inspired by model theory (invented in the 1950s by Alfred Tarski). This theory has become famous in the last half of our century as a method for proving that certain mathematical problems are insoluble and that this explains why no-one has been able to solve them! This method enabled Godel and Cohen to demonstrate once and for all that the Continuum Problem had defeated all the best minds because no solution is possible. Model theory draws freely on the intuitions that we all use in representing new experiences in terms of the old.

A standard example of the use of a model can be found in the early attempts to explain the strange world of the atom and its complicated mathematics. Some intuitive person hit on the image of a solar system - such as our own local universe supplies - to make things clear. The sun represents the nucleus and the planets can represent the electrons which can therefore be said to "orbit" the nucleus. Thus the unfamiliar new experience of sub-atomic reality became clear to many through the *familiar* image of our planetary system. Model *theory* emphasises the underlying reality by virtue of which differing models may be assigned to the same "set of facts", the same logical theo-

ry. Thus, for example, there are several non-euclidean geometries based on the same familiar euclidean theory of physical space. Model theory thus investigates the relationship between theories and models.

Consider the statement Ex and suppose we interpret it as "x is a planet". If we plug in "Saturn" for x , we shall get "Saturn is a planet" which is a true statement: "Saturn is a planet" is therefore said to be a *model* for Ex . Similarly, "6 is even" - but neither "6 is a planet" nor "7 is even" - is a model of Ex . There is, however a refinement of this: when 6 is substituted for x in "x is even", we say that 6 *satisfies* "x is even", or that 6 is a *realisation of* "x is even". The double meaning implicit in "satisfaction" and "realisation" is exploited by Bion in very interesting ways for his own psychoanalytic purposes. He favours the word "realisation" over the more static "model" as it has a more psychological feel.

According to Bion, the baby has a preconception of the breast which we can symbolise as Bx . Let us symbolise the actual breast feed "b", then if the baby is fed, we say "b satisfies Bx and write Bb . Bion sometimes says that Bx is "realised" or "has a model". If, however, the breast is not forthcoming, satisfaction does not occur and there is no model. In extreme cases there will be what he calls "negative realisations", the forming of a state of mind in the infant of something like a black hole.

Clearly there are sequences of satisfactions and dissatisfactions in the life of the baby. Bion's view is that a pattern of expectations is built up. We can visualise this like the contours of a landscape being built up step-by-step. Thus all the baby's preconceived needs can be represented logically as Ax, Bx, Cx, \dots , their satisfactions as Aa, Bb, Cc, \dots and their dissatisfactions as $-Aa, -Bb, -Cc, \dots$. We can see that a baby's needs can be represented as a network or complex formula of preconceived needs. This is somewhat superficial in that it is a static picture, but it does capture the step-by-step building up of the mental landscape. However, this approach neglects the crucial psychodynamic aspect. What we need to capture is the feeling of *process*, the fact that, for example, baby's last feeding experience has an effect on the expected *next* feeding experience. Obviously, to generalise for a moment, we are considering the foundation in the baby of expectations which will, according to Klein and Bion, underly the whole adult life.

In order to draw out the mathematical analogy further, we must now distinguish between properties or qualities of objects and *functions* of objects, such as "x squared" or "the cube root of y". The difference is this: if we plug in a number for x in "x is even", we get a true or false statement, but if we plug in a number for x in "x squared" we get neither true nor false statements but another number. This is because a function represents a definite process of transforming objects into other objects, whereas properties are static, they either obtain or they do not. Thus, if we plug in 6 to "x squared" the process of squaring 6 gives us 36, another number. This can also be generalised: we can write fx in place of "x squared" and interpret it differently - for example, as "the square root of x" or " $\log x$ ".

It should now be possible to see the mathematical analogy more clearly: adult mental processes are a function of

the childhood and infant mental processes which are themselves deeply influenced by the quality of mothering received. This is a restatement of the now familiar idea that we see new experiences in terms of old experiences - the central axiom of psychoanalytical, and also model, theory. The earliest experiences of modelling provide the functions that will process later experiences. If the earlier experiences have formed a bizarre or lop-sided view of the world, later experiences will be cast in this mould. For example, a baby who had a psychotic mother who would wake up the baby in the middle of the night to be dressed and put back to sleep again, and who would only feed it when it was not hungry, is laying down a foundation process for very bizarre models of the world, in which authority figures can act in utterly unexpected ways. Thus, depending on whether the early emotional processes form a flexible and stable pattern, the adult modelling of the world will be correspondingly benign or malign.

The development of a baby into childhood, adolescence and adulthood involves a continuous changing of models if growth is to occur. For Klein, there is a crucial developmental bridge to be crossed in the earliest months of life; this involves relinquishing one dominant process or world-view (or family of models) in favour of another. This first world-view or "position" is one in which the baby who feels at the mercy of the world copes with change by splitting good experiences from bad experiences. This has the effect of simplifying baby's world for all experiences can only fall into one of two categories. Experience, then, is split off into separated areas, which become little universes in themselves which do not interpenetrate. The overall impression is of disharmony and helplessness.

As we can imagine, this splitting of good from bad inevitably leads to mother being split into two; the baby believes that the good mother and the bad mother are completely separate. In this new second position, the baby comes to realise that the two are in reality one and the same. There is then a feeling that the loved mother is in fact the one that has been attacked in anger and a kind of healing regret is felt, sometimes called "reparation". The Kleinian view is that the creation of new models for adulthood is rooted in this reparative process. Broadly speaking, the task of the psychoanalyst is to enable the patient to pass more securely out of the first position - the "paranoid-schizoid position" - and further out into the "depressive position".

Problem solving

Models help us to gain understanding when we are confused, but there are further uses of models which are more imaginative and inventive. If the model is an unusual one it can bring new conceptions into existence. This was the case with the non-euclidean geometries of Lobachevsky and Bolyai which re-interpreted the underlying logical theory of euclidean geometry in a completely new way, producing highly unusual models. Einstein adopted one of these unusual models when articulating his theories of relativity. This new geometry gave a unifying framework for his new conceptions and is one example, of many, of a highly creative use of models.

This raises the general question of scientific creativity, and, in particular, the role of model making in solving problems. Bion seems to suggest that the process takes place at a deeply personal level, that of dream process. There is little doubt that scientific problems *are*, to some extent, a personal matter – how is it that we are drawn to one problem and not to another? Why, for example, was Cantor drawn to the improbable area of infinity? These few remarks merely hint at the personal dimension in problem-posing and problem-solving.

We have already seen how the paranoid-schizoid position is dominated by the deep disharmonies of splitting. Bion seems to link this with the sense of disharmony the scientist experiences when inhabited by a scientific problem. I say “inhabited” intentionally, for this is what it feels like, that we live with a problem inside us until it is integrated or we expel it as unsolved. We might also add that when we harbour a problem of any sort, this is experienced emotionally as something damaged inside us. That is, we live with the bits of the problem split from each other in us, and, according to Bion, we feel persecuted by the separateness of the “bits”. In Pirandello’s play *Six characters in search of an author*, the characters seek a harmony in the mind of the author. He is to be the solution to their problem, the problem of their separateness. Similarly, the scientist, persecuted by the separateness of things, seeks the benign experience of resolution.

Henri Poincaré compares the scientist, before discovery, to someone who seeks to find the curve determined by a “chaos” of points.

Since he wishes to study the curve for itself, he will distribute the points to be observed regularly, and as soon as he knows some of them, he will join them by a regular line, and he will then have the complete curve. But how is he to accomplish this? If he has determined one extreme point on the curve, he will not remain close to this extremity, but will move to the other end. After the two extremities, the central point is the most instructive, and so on [2]

Poincaré sees the “coming together” phenomenon as being due to selection of a key fact in the field – called by him the “selected fact”. Bion quotes Poincaré on scientific creativity with approval:

If a new result is to have any value, it must unite elements long since known, but till then scattered and seemingly foreign to each other, and suddenly introduce order where the appearance of disorder reigned. Then it enables us to see at a glance each of these elements in the place that it occupies in the whole. Not only is the new [selected] fact valuable on its own account, but it alone gives a value to the old facts it unites. Our mind is frail as our senses are; it would lose itself in the complexity of the world if that complexity were not harmonious; like the short-sighted, it would only see the details, and would be obliged to forget each of these details before examining the next, because it would be incapable of taking in the whole. The only facts worthy of our attention are those that introduce order into this complexity and so make it accessible to us [3]

Bion is interested in this coming together of seemingly disparate phenomena and he cites the emergence of number theory as a case in point. In the 17th and 18th centuries it was a handful of scattered individual insights, until they came together into a body of knowledge called number theory. According to Bion, this is just what happens in the clinical situation when the patient is in the process of relinquishing the paranoid-schizoid position in favour of the depressive position, for this is a move towards integration. He claims that in the clinical situation the analyst may be able to offer the unifying “selected fact” to the patient in passage between the positions.

Interpretation which draws fragments of experience together into some kind of coherence can perform this unifying function. Bion notes that when a patient forms new models of the world, this is precipitated by a selected fact often supplied by the analyst’s interpretation. He makes it clear that such transformative interpretations involve depth symbols such as the breast or penis. In view of the above, it would seem that a radically new world-view can only come about by a symbolic transformation. This reminds us of Kekulé’s dream of the snakes with their tails in their mouths, which led to the new model of the benzene rings. Bion seems to be suggesting that it is depth symbolisation that allows transition from old to new models.

Bion introduced an innovation into Klein’s theory of the two positions. What he did was to link them to each other, so that a person is always in a state of movement between the two familiar Kleinian processes which Bion abbreviates PS and D. Klein’s perspective tends to stress the “getting well” process – the transition from PS to D, the move towards integration (making models) which is the tendency to conserve and repair what you already have – what might be called a conservative tendency. Bion, whilst agreeing with this, sees a role for the reverse transition in the healthy individual. Transition from D to PS might represent the break up of established patterns of knowledge (breaking old models) to break the mould of familiarity, to induce chaos allowing something new to emerge – an impulse to destroy which might be called an anarchic tendency. Applying this to the sciences, we can see that there is not only place for a creative movement towards unity, but also an equally creative tendency to destroy old modes of thought.

Bion viewed the scientist’s “containing” a problem as someone trying to bring together split-off aspects of reality – that is, aspects split off from each other. This is exactly analogous to the analytic situation where patients seek to unite different parts of themselves which are split off from each other. Both the analyst and scientist seek the ‘selected fact’ in order to dissolve splits. Thus we can see that for the scientist, the scientific problem can be seen as his or her client or patient seeking a kind of integration. But, this said, we must remember that no situation or integration is ever final; at best, each resembles an uneasy truce.

References

- [1] W Bion, *Learning from experience*, London: Heinemann, 1962, p5
- [2] H. Poincaré, *Science and method*, New York: Dover, (n.d.), p20
- [3] H Poincaré, *op cit*, p30