

SOME CONSIDERATIONS ON THE FORMAL STRUCTURE OF FREUDIAN METAPSYCHOLOGY

Franco Baldini – Maria Vittoria Ceschi – Edoardo Meroni

Abstract

Some considerations on the formal structure of Freudian metapsychology.

We will present a few brief general considerations about metapsychology, with particular reference to the arguments put forward in Volker Hartmann Cardelle and Dietmar Dietrich's essay in this issue of the journal. In particular we demonstrate that, in opposition to the claims of many psychoanalysts and experts, the differences between the metapsychology model and the model of the *Project* are substantial. These depend on the radical change in Freud's approach to the problem of the mind. We show that a proper neurobiological reduction of metapsychology is impossible. We also show that any parallelism between computer science and metapsychology becomes inadmissible if we consider the mind only in terms of its relationship with an organic substrate. It will also be shown how, despite the fact that the link between physics and metapsychology is generally regarded as a mere analogy, the metapsychological model is actually a physical model. It is specifically physics and not for example *computer science*, which can provide an important aid to a better understanding and development of metapsychology. Finally, although any possible formalization of metapsychology is undoubtedly useful and desirable, we maintain that such formalism must again be translatable into natural language given that the unique character of psychology is that it contains both the instrument for and the object of investigation.

Keywords: *computer science, metapsychology, direct and inverse problem, physics of the mind, formalization, epistemology of psychoanalysis, experimental control, neurobiology, symmetries, mind/body connection.*

1. First of all, we assume that the strategy of *imposing* any kind of formalism on a descriptive theory is *always* wrong when based on generic analogies. Rarely with this sort of attempt if some aspect of the descriptive theory is not subject to the chosen formalism, can it avoid the embarrassing justification that the descriptive theory is at that point «wrong». However doing so leaves no choice except to impose on the descriptive theory *whichever* formalism is congruent with it and declare as «wrong» those points of discrepancy. This is something very similar to the saying «heads I win, tails you lose», a strategy that is absolutely unacceptable in the realm of science.

Formalizable descriptive theories are only those in which an *implicit* formalism can be recognized. Such formalism must emerge, wherever possible, from the descriptive theory without forcing it and in a natural way: the main example of such an occurrence is the work done by Maxwell on Faraday's theory which, as is well-known, did not include any hint of an equation. Of course, the degree of congruence between the two levels of the theory (descriptive and formal) must be very high and not merely limited to some macroscopic aspects. The congruence with other formalisms can be evaluated only if the implicit formalism has been extrapolated from the descriptive theory.

Therefore we need to examine whether Freudian metapsychology contains or not an implicit formalism and given that, what kind of formalism it is.

2. Before proceeding to this examination we want however to address some preliminary questions and above all to express our point of view on Freud's *Project for a Scientific Psychology*, its relationship to metapsychology and its role in Freud's scientific production, which have never been adequately clarified. The debate on this subject has exclusively and constantly focused on the contents leaving aside *the structure* of Freud's entire scientific production and the relationship between metapsychology and the *Project* itself. In regard to these contents, we believe there are two main issues to note:

i - the neurons which Freud talks about are evidently *formal*, with a vague relationship to the material neurons of neurophysiology. The *Project* neurons are more similar to those employed in the neural networks for they are solely considered in their functional properties without any concern about the electrical, chemical, thermal, biological phenomena that occur in reality;

ii – the conceptual content of the *Project* has obviously been absorbed by metapsychology almost entirely.

Therefore, it's not from rudimental psychology or from something completely different from a content perspective, of metapsychology.

So where is the difference and consequently also the reason which led Freud to reject the *Project*?

As we said before *the difference is to be found in the structures of both works*: we find utterly incomprehensible that such an evident fact has never been underlined before.

The *Project* is built in a *deductive* way starting from a small group of axioms based on the concepts of: formal neurons (N) and quantity (Q).

On this axiomatic basis, formal observable models of psychic phenomenology should be generated unequivocally.

This signifies precisely that Freud is trying to explain psychic phenomenology through what is known in mathematics as the direct problem.

We will now briefly introduce the concepts of inverse and *direct problems*. We could say that when the formulation of a problem necessarily implies another one, we are facing two problems that are both the *inverse* of the other.

Here is a simple example. In childhood we learn to solve this problem: given two integers find the product. The inverse of this problem consists in finding a couple of factors of an assigned number. So, the direct problem is the one of multiplication and the inverse one is that of factorization. We can observe that the inverse problem is much more complicated than the direct one. For instance - and this is very important - the inverse one is a problem that generally has no single solution in mathematics. If the issue is extended to the natural sciences, in other words considering them as real-world problems, things are much simpler because in most cases there is a natural distinction between direct and inverse problems.

Much of elementary mathematics is dominated by direct problems, i.e., those problems in which enough information is provided to set a well-defined and stable process that leads to a single solution according to the sequence:

(information, process)→ solution

For example: given the numbers 2 and 3 and the process of multiplication, we have 6. Whereas if the process instead describes a physical phenomenon, or a real-world problem, we can describe the direct problem as:

(cause, model)→ effect

The direct problem consists of assigning the cause and the model and calculating the effect. However, this is only one of three ways in which we can read the process because each direct problem immediately implies two inverse problems:

i - given the effect and the model, find the cause:

(effect, model)→ cause

ii - given the cause and the effect, build the model:

(cause, effect)→ model

So, referring to the area of natural sciences, which is our role, if we want to predict the future behaviour of a physical system knowing its present state and the physical laws that govern it, we can thus say that we want to solve a direct problem. Vice versa, tracing back to the past state of a physical system starting from knowing the present condition or *determining to which physical laws it obeys knowing the evolution of the system* is an inverse problem.

From a purely mathematical point of view, another decisive distinction exists between direct and inverse problems: the direct problem has certain characteristics that correspond to the definition of a *well-posed problem*, while the inverse problem is usually *ill-posed*.

In 1923 Jacques Hadamard gave the following definition of a well-posed problem:

- i – a solution exists (*existence criterion*);
- ii – the solution is unique (*uniqueness criterion*);
- iii - the solution depends on the continuity of the data (*stability criterion*).

A problem is ill-posed when at least one of these three conditions is not satisfied. For example: a problem that has no solution or more than one. The most important and demanding condition is stability. In mathematics, instability consists in the fact that very different causes can provoke very similar effects, thus making futile the attempt to go back to the actual causes of a phenomenon. There are numerous problems that have one and only one solution, but this solution is unstable, meaning that it can be referred to different causes.¹

As explained by A. I. Sardella in his book *Storia della rottura di simmetria*,² until the first half of the 20th century, the approach of physics to problems was that of trying to deduce observed phenomena from the fundamental interactions of the system's elementary components, thus treating them as direct problems. This approach, which Sardella defines as «fundamental», has often been called *top-down*. Since then and as a result of numerous theoretical *impasses*, another approach arose alongside the «fundamental» approach which Sardella defines as «phenomenological» also called *bottom-up*. This approach was not intended to face problems starting from the interactions between the elementary components, but it formed flexible mathematical structures capable of accounting for the empirical phenomenology directly. It was evidently an approach that followed the inverse problem strategy. In doing so, the *impasses* were overcome setting the basis for what would be called the *many-body theory*.

The «phenomenological» method resulted in being able to produce not only a first theorization of empirical data, but also the progressive introduction of new concepts that would otherwise be unmanageable. It is simple to demonstrate how Freud has made the same reversal, in his approach to the psychic. As we said, he initially tried to build a mental function model in a deductive way, in terms of a direct problem. We can describe a schematic story of the critical moments related to this attempt analyzing his correspondence with Fliess:

¹ This is the rule rather than the exception in natural sciences.

² Cfr. Sardella, I. A. (2012), *Storia della rottura di simmetria. Dalla colonna di Eulero al bosone di Higgs, il lungo cammino di un'idea*, pp. 24-28.

- i - 25th May 1895 Freud enthusiastically gives the news that he conceived the first “seed” of the new model;³
- ii - 12th June 1895 Freud expresses the first difficulties and frustrations showing the disappearance of his initial enthusiasm;⁴
- iii - 20th October 1895 Freud shows a new impulse of enthusiasm caused by the mental “vision” of the well-performing psychic machine;⁵
- iv - 20th November 1895 Freud declares his disbelief in his attempt;⁶
- v - 1st January 1896 Freud presents a new version of his model.⁷

In the last letter two fundamental differences from the first version are to be noted:

ω changes his statute and is enriched by the preceptive dimension previously attributed to ϕ . ω also changes its position because it is now placed between ϕ and ψ . It is important to highlight that Freud through these modifications was hoping to solve two problems that he explicitly declared being the reason for the flaw in the first version:

- i - the hallucination problem, that brings retrocession to ϕ becomes a retrocession to ω ;
- ii - the determination of the strength of the excitements ϕ are transferred to ψ neurons.

Freud has realized that the first model presented major flaws. We emphasize that in *The Interpretation of Dreams* the Consciousness changes its position as much as its function: it is only at this moment that Freud realized he had a satisfactory theory of hallucination, a fundamental element to modeling the theory of the dream as a *hallucinatory* fulfilling of a desire. To summarize: there are two versions of the *Project* of which the latter is more schematic and closer to metapsychology. However, Freud was so dissatisfied with it that he was driven to abandon the attempt. His dream had lasted for almost seven months.

In light of what we have said is possible to clearly understand the reason for this abandonment: his model did not present the characteristics of a well-posed problem. It did not satisfy the last two of Hadamard's conditions: the solution

³ Cfr. Masson, J. M. (1985), *The Complete Letters of Sigmund Freud to Wilhelm Fliess, 1887-1904*, pp. 128-130.

⁴ Cfr. *ivi*, pp. 131-132.

⁵ Cfr. *ivi*, pp. 146-147.

⁶ We have been unable to find the significant letter of 20th November 1895 in the English language editions. For the Italian source see Freud, S. (1986), *Epistolari. Lettere a Wilhelm Fliess 1887-1904*.

⁷ Cfr. Masson, J. M. (1985), pp. 158-169. This letter also encloses the *Draft K. Neuroses of Defense (A Christmas Fairy Tale)*.

found was not unique nor stable. This means that it was unsolvable as a direct problem because the data from which it started was insufficient.

Realizing this, Freud overturns his strategy and tries to build a model of the psychic apparatus in terms of an inverse problem: this is precisely how metapsychology is constructed. As we have said before, an inverse problem is not stable because it allows more than one solution, this is to say it is ill-posed, and this is the reason for the progressive modifications in Freudian metapsychology, as is well explained by Freud in several passages. We report one of the most representative:

Progress in scientific work is just as it is in an analysis. We bring expectations with us into the work, but they must be forcibly held back. By observation, now at one point and now at another, we come upon something new; but to begin with the pieces do not fit together. We put forward conjectures, we construct hypotheses, which we withdraw if they are not confirmed, we need much patience and readiness for any eventuality, we renounce early convictions so as not to be led by them into overlooking unexpected factors, and in the end our whole expenditure of effort is rewarded, the scattered findings fit themselves together, we get an insight into a whole section of mental events, we have completed our task and now we are free for the next one. In analysis, however, we have to do without the assistance afforded to research by experiment.⁸

We believe it is not possible to understand the structure of these two different models (metapsychology and *Project*) if *Freud inverts his approach to the problem of the mind* during the passage from one to the other.

3. We want to strongly underline that *there is neither in the Project nor in metapsychology a question of neurophysiology*. As we have already affirmed, the *Project* neurons are formal entities with a vague relationship with the material neurons and the latter share only some functional properties. As Freud takes care to note in many passages, in metapsychology the relationship is in fact completely severed. This is important because if we want to establish a non-abusive parallel between the Computer paradigm and metapsychology it is necessary to consider that we need to reject the analogy between hardware/neurophysiology, since it plays no role in metapsychology. Claiming that metapsychology would assert something about the relationship between brain and mind is in open contradiction to what Freud stated in *The Interpretation of Dreams*.

I shall entirely disregard the fact that the mental apparatus with which we are here concerned is also known to us in the form of an anatomical preparation, and I shall carefully avoid the temptation to determine psychological locality in any anatomical fashion.⁹

⁸ Freud, S. (1932), *New Introductory Lectures on Psycho-Analysis*, p. 174.

⁹ Freud, S. (1900b), *The Interpretation of Dreams (Second part)*, p. 536.

Freud, throughout his entire work, never wavered from this intention. However, Freud's intention is not the only reason that makes the objectivity of metapsychology autonomous in contrast to the objectivity of neurophysiology. There is also one more reason that lies in the structure of the theory itself, which establishes the *impossibility* of connecting in a significant and non-generic way the structure of metapsychology to that of neurophysiology: we are going to discuss this further on.

By now we insist on the fact that not only is the *scientific foundation of psychoanalysis totally independent from its possible neurobiological reduction, but also that this reduction is impossible*.

4. It is now necessary to offer a few words about the experimental dimension of psychoanalysis, as over the years there has been an intolerable confusion about it. To clarify this aspect, it is essential to consider the definition given by Freud:

PSYCHO-ANALYSIS is the name (1) of a procedure for the investigation [*Verfahrens zur Untersuchung*] of mental processes which are almost inaccessible in any other way, (2) of treatment [*Behandlungsmethode*] of neurotic disorders based upon that investigation and (3) of a collection of psychological information obtained along those lines [*auf solchem Wege gewonnen*], which is gradually being accumulated into a new scientific discipline.¹⁰

We would like to draw attention to the fact that according to Freud psychoanalysis is first of all an investigation method, which means it is concerned primarily with formulating, *and especially controlling*, theoretical hypotheses. This kind of investigation *takes place in the psychoanalytical treatment itself*: «One of the claims of psycho-analysis to distinction is, no doubt, that in its execution research and treatment coincide».¹¹

So, psychoanalytic treatment represents the actual experimental dimension of psychoanalysis, in which metapsychological hypotheses - which Freud calls «constructions» - are tested on the test bench of treatment, no other deduction beyond this one is pertinent.

¹⁰ Freud, S. (1922), *Two Encyclopedia Articles*, p. 235. (For related German terms cfr. Freud, S. (1922), “*Psychoanalyse*” und “*Libidotheorie*”, pp. 211-212.) We have slightly modified the definition of the Standard Edition, which originally states in point two: «of a method (based upon that investigation) for the treatment of neurotic disorders».

¹¹ Freud, S. (1912), *Recommendations to Physicians Practicing Psycho-Analysis*, p. 114.

We have discovered technical methods of filling in the gaps in the phenomena of consciousness, and we make use of those methods just as a physicist makes use of experiments (*deren wir uns also bedienen wie die Physiker des Experiments*).¹²

Even though the computer simulation of some aspects of the metapsychology could be helpful, it is not experimentally decisive. In fact, computer simulations are not even decisive in medicine.

Wie die Physiker des Experiments: Freud's position is clear and unequivocal. Despite this, it has long been doubted and denied that Freud had a good *intra-clinical* control method for his theoretical hypothesis - something which still today is generally considered impossible - and yet this was rebuilt by Franco Baldini in 1998.¹³ Through his work, Baldini has proved how the Freudian control method is perfectly valid and establishes the falsifiability of the psychoanalytic theory - despite Popper and Grünbaum's statements. *The objectivity of psychoanalysis is not neurophysiological but clinical*, and as such it is constructed regardless of neurophysiology.

It is often difficult to understand what the experimental control of psychoanalysis, and in general of psychology, consists of. In these disciplines, as it is in medicine, the major obstacle that opposes the achievement of scientific objectivation of the theoretical hypotheses is represented by the phenomenon known in psychoanalysis as «suggestion», and in medicine as a «placebo». Such a phenomenon, where some form of improvement in a pathological frame occurs, makes it impossible to know whether this improvement is due to the suggestion/placebo effect or is due to the therapeutic intervention itself.

The above condition has been recognized as analogous to the uncertainty in physics by one of the world's leading experts of the placebo effect, Fabrizio Benedetti.

By borrowing the Heisenberg uncertainty principle from physics, which imposes limits on the precision of a measurement, we can apply a similar principle to the outcomes of clinical trials. In the same way that the uncertainty principle states that a dynamical disturbance is necessarily induced in a system by a measurement, a dynamical disturbance might be induced in the brain in clinical trials by almost any type of drug. The very nature of this dynamical disturbance is the interference of the injected drug with the expectation

¹² Freud, S. (1938a), *An Outline of Psycho-Analysis*, pp. 196-197. (For related German terms cfr. Freud, S. (1938b), *Abriss der Psychoanalyse*, p. 127.)

¹³ Baldini, F. (1998), *Freud's line of reasoning. A note about epistemic and clinical inconsistency of Grünbaum's argument pretending to confute Freud's therapeutic approach, with reference to the thesis of Stengers on psychoanalysis*, pp. 9-36. For more complete and slightly modified formulation see Baldini, F. (2020), *Nuove considerazioni sul metodo psicanalitico freudiano e in generale sull'architettura empirico-razionale della metapsicologia*, pp. 12-33.

pathways, which affects both the outcome measures and the interpretation of the data. In other words, as in the Heisenberg uncertainty principle, the disturbance is the cause of the uncertainty.¹⁴

It is evident in this context that objectifying a theoretical hypothesis means having a way to distinguish the two possible causes of the same effect. As in medicine this is achieved by an extra-clinical method known as «double-blind» This however cannot be applied to psychology the reason being that in medicine, the administered active substance or placebo is identical for every component of the group, which makes the concept of the group itself operational, while what is administered in psychology is a long series of interactions with every component. These interactions are forcefully different from each other, preventing the concept of a group from becoming operational. For this cogent reason¹⁵ it is necessary - as Freud has always stated - that the method of testing theoretical hypotheses («constructions») is intra-clinical. As we have already said, Baldini has demonstrated that it is perfectly possible in psychoanalysis to falsify the hypothesis/constructions of the analyst intra-clinically.

Frankly we do not see how a computer simulation could reproduce an analogous state to that of suggestion. This, in itself, would be a question of inserting into the system the possibility of making two different inferences, one of which is correct and one incorrect, which in any case lead to the same result. We insist therefore that it is not a matter of a difference like the example of, $3+5=8$ and $2+6=8$ but the difference between real and suggestive causality is more similar to $3+5=8$ and $7+9=8$.

6. As mentioned above - the role that natural language plays in the construction of psychoanalysis as *Naturwissenschaft* - has enormous implications, which have in our view never really been evaluated. In science, natural language has nearly always been considered an obstacle to the clarity and coherence of theories. In this regard Freud's significant contribution - implemented especially in his studies on dreaming, lapsus, and jokes - was finding ways to use it as a reliable tool of accurate observation: without this no metapsychology could have ever arisen. This is a crucial step because while we can consider that elementary particles, chemical substances or cells «express themselves» in formal language - in the sense that the tools by which we interact with them can mostly be considered as materialized formalisms - the object of psychoanalysis, i.e. the human subject, inevita-

¹⁴ Colloca, L., Benedetti, F. (2005), *Placebos and painkillers: is mind as real as matter?*

¹⁵ Besides this one, there are actually several other reasons that make the psychoanalytical method of investigation necessarily different from the medical-pharmacological one. For a complete review of these reasons see Ceschi, M. V. (2021), *I limiti metodologici e teorici della ricerca contemporanea in psicoterapia*, pp. 43-62.

bly expresses itself in natural language. Here is why *natural language retains a fundamental function that cannot be scaled back in psychoanalysis*, which does not depend on a flaw in the theory but on a limitation imposed by the observed object. Something similar happens in the problem of measuring conjugate quantities in physics that led to the formulation of Heisenberg's uncertainty principle. Therefore this imposes on any eventual formal metapsychology the constraints of translatability into natural language which makes the formalizing or not of metapsychology a secondary albeit important, problem. Nevertheless, a formalization remains no less desirable. Its first function would certainly lead to the «debabelization» of the psychoanalytic debate establishing a conceptual *univocity*.

Nowadays, if you ask ten psychoanalysts what, for example, repression is, you will almost certainly get ten different answers without provoking the slightest debate. This is devastating not only for the progressive edification of theory but also the creation of an effective scientific community. It must be strongly emphasized here that for this very reason, despite appearances, psychoanalytic communities *have never been* authentic intellectual communities but professional associations at best.

Its second function, no less important, would be to assure theoretical *coherence*, an aspect that is more easily controlled in formal than natural language.

The third function of any eventual formalism, if truly relevant and well-constructed, would be to generate and suggest new and unexpected directions for research.

The fourth one would be the easier exportability of the formal models of psychoanalysis to other disciplines.

However, as we have already said, what remains unaffected is that in psychoanalysis formalisms have no direct experimental role.

7. It is now time to examine whether Freudian metapsychology contains implicit formalism and, if so, what kind it is. To the first issue, we answer affirmatively, adding that regarding the second one, it is a *type of physical formalism* and not therefore computing. To demonstrate this, it is sufficient to note that the fundamental concept of all metapsychology is that of *drive* [*Trieb*]¹⁶ defined as the energetic investment of representations: the only existing entity in the id: «Instinctual cathexes seeking discharge - that, in our view, is all there is in the id».¹⁷

¹⁶ Although in the Standard Edition the German term «*Trieb*» has been translated as «instinct», we opt for a translation more faithful to the original German word. Therefore, from now on, we will always use the term «drive».

¹⁷ Freud, S. (1932), p. 74

It is well-known that Freud conceives the drive as a force [*Kraft*]: this assumption, which many have considered an unremarkable vague analogy, is instead absolutely relevant. According to Freud, a drive is described by four aspects: source, pressure, aim, and object. This precisely implies that its natural representation is the one of a Euclidian vector, because the concept of *source* perfectly overlaps with that of *point of application*, the pressure with that of *magnitude*, the *aim* - as much as it can be inverted, e.g. in the transformation of the activity into passivity or love into hatred - with that of *sense*, and the *object* with that of *direction* insofar as it is spatially located and thus assigns the drive vector a privileged direction.

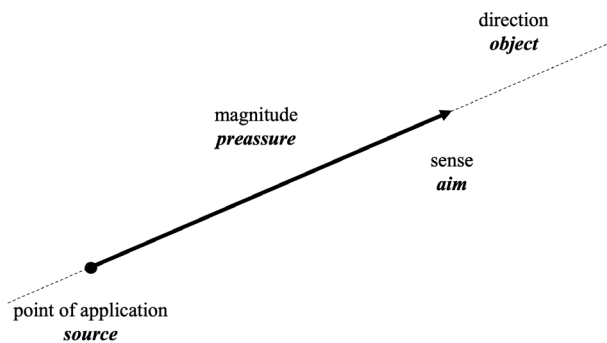


Figure 1: Drive as a vector

We assume that the concept of the object has a particular role in this context, so we quote the Freudian definition of it.

The object [*Objekt*] of an instinct is the thing in regard to which or through which the instinct is able to achieve its aim. It is what is most variable about an instinct and is not originally connected with it, but becomes assigned to it only in consequence of being peculiarly fitted to make satisfaction possible. The object is not necessarily something extraneous: it may equally well be a part of the subject's own body. It may be changed any number of times in the course of the vicissitudes which the instinct undergoes during its existence; and highly important parts are played by this displacement of instinct. It may happen that the same object serves for the satisfaction of several instincts simultaneously, a phenomenon which Adler [1908] has called a 'confluence' of instincts [*Triebverschrankung*]. A particularly close attachment of the instinct to its object is distinguished by the term 'fixation'. This frequently occurs at very early periods of the development of an instinct and puts an end to its mobility through its intense opposition to detachment.¹⁸

¹⁸ Freud, S. (1915a), *Instincts and their vicissitudes*, pp. 122-123.

To this definition we should add that the object has a double nature: it is a mental representation and at the same time a concrete thing in the external world. The former is used to retrieve the latter. In this regard we can undoubtedly say that the drive has an informative content, and that the object retrieval could amount to the acquisition of knowledge, i.e. «information» according to Hartmann Cardelle and Dietrich's definition.¹⁹ Despite this, we do not assume that the status of the drive could be reduced to that of knowledge procurer. This for a simple but very important reason: the fact that in its fundamental state the drive does not need an object implies that there is no privileged direction for it, which is equivalent to saying that it is in a condition of *rotational symmetry*. Can this condition be considered negligible? We do not believe that at all, because in metapsychology such a condition exactly corresponds to the psychic sensation of anguish,²⁰ which is so important in the psychic life of human beings: «At birth no object existed and so no object could be missed. Anxiety was the only reaction that occurred».²¹

This is the specific case that remains the sample of all the following dangerous situations.

The introduction of this element opened up new aspects of the question. Birth was seen to be the prototype of all later situations of danger which overtook the individual under the new conditions arising from a changed mode of life and a growing mental development. On the other hand its own significance was reduced to this prototypic relationship to danger. The anxiety felt at birth became the prototype of an affective state which had to undergo the same vicissitudes as the other affects. Either the state of anxiety reproduced itself automatically in situations analogous to the original situation and was thus an inexpedient form of reaction instead of an expedient one as it had been in the first situation of danger; or the ego acquired power over this affect, reproduced it on its own initiative, and employed it as a warning of danger and as a means of setting the pleasure-unpleasure mechanism in motion.²²

In all of these cases, Freud says, the anguish occurs as «a reaction to the danger of the loss of object itself»,²³ which does not mean that such danger would be produced by the simple *possibility of the loss* of the object when this last one

¹⁹ Hartmann Cardelle, V., Dietrich, D. (2022), *Understanding metapsychology with the computer paradigm, infra*, pp. 144-145.

²⁰ Although in the Standard Edition the German term «Angst» has been translated as «anxiety», we opt for a translation more faithful to the original German word. Therefore, from now on, we will always use the term «anguish».

²¹ Freud, S. (1928), *Inhibitions, Symptoms and Anxiety*, p. 170.

²² *Ivi*, p. 162.

²³ *Ivi*, p. 170.

is still present, it is however - as it results from the context ⁻²⁴ produced by the certainty of the loss of the object. The vectorial drive is therefore to be found in a symmetric rotational condition; *if that is the case the drive does not imply the gaining of any information and so it does not possess any information content.* There is something irreducible in the drive itself which cannot be reduced to the information theory.

The acquisition of information (i.e. receiving of the object) implies something analogous to what in physics is called *spontaneous symmetry breaking*: an event that according to Freud depends on the interaction of the id with the external world. This interaction progressively generates the ego.

8. We will now show that the previous is not an isolated example but only the first of a very long series that establishes the impossibility that a computational paradigm could totally absorb metapsychology. *Metapsychology is essentially physics and not information*, which does not mean that a part of it can be translated into computational terms.

With the concept of drive conceived as a vectorial force, we have introduced the concept of symmetry in the form of a rotational symmetry which describes the drive's fundamental state.

However this symmetry is a long way from being the only one and even though this had been noted, in a very incomplete and misguided way, only by Ignacio Matte Blanco the *id teems with symmetries*. These symmetries precisely define what Freud calls «psychic reality» to differentiate it from what he calls instead «external reality», «factual» or «material».

This has obviously never been grasped before and it proves how the work of Freud is far from being fully understood.

To clearly show what we're talking about we'll start from a Freudian quote taken from the essay *The Unconscious* in which he defines the specific characteristics of this psychic system, traits that - after the occurrence of the said «second topography» - will be gained by the id.

The nucleus of the *Ucs.* consists of instinctual representatives which seek to discharge their cathexis; that is to say, it consists of wishful impulses. These instinctual impulses are co-ordinate with one another, exist side by side without being influenced by one another, and are exempt from mutual contradiction. When two wishful impulses whose aims must appear to us incompatible become simultaneously active, the two impulses do not diminish each other or cancel each other out, but combine to form an intermediate aim, a compromise.

²⁴ «Our starting-point will again be the one situation which we believe we understand the situation of the infant when it is presented with a stranger instead of its mother. It will exhibit the anxiety which we have attributed to the danger of loss of object». *Ivi*, p. 169.

There are in this system no negation, no doubt, no degrees of certainty: all this is only introduced by the work of the censorship between the *Ucs.* and the *Pcs.* Negation is a substitute, at a higher level, for repression. In the *Ucs.* there are only contents, cathected with greater or lesser strength.

The cathectic intensities [in the *Ucs.*] are much more mobile. By the process of *displacement* one idea may surrender to another its whole quota of cathexis; by the process of *condensation* it may appropriate the whole cathexis of several other ideas. I have proposed to regard these two processes as distinguishing marks of the so-called *primary psychical process*. In the system *Pcs.* the *secondary process* is dominant. [...]

The processes of the system *Ucs.* are *timeless*; i.e. they are not ordered temporally, are not altered by the passage of time; they have no reference to time at all. Reference to time is bound up, once again, with the work of the system *CS.*

The *Ucs.* processes pay just as little regard to *reality*. They are subject to the pleasure principle; their fate depends only on how strong they are and on whether they fulfil the demands of the pleasure-unpleasure regulation.

To sum up: *exemption from mutual contradiction*, *primary process* (mobility of cathexes), *timelessness*, and *replacement of external by psychical reality* - these are the characteristics which we may expect to find in processes belonging to the system *Ucs.*²⁵

Regarding the last passage of the text, it is essential to understand that the four characteristics listed by Freud do not all belong to the same order. In fact the *three first define the fourth*: psychic reality (defined by Freud in *The Interpretation of Dreams* as «a particular form of existence not to be confused with material reality»²⁶ constituting the reality of the unconscious (Id) itself) and it *is defined* by exemption from mutual contradiction, primary process and timelessness.

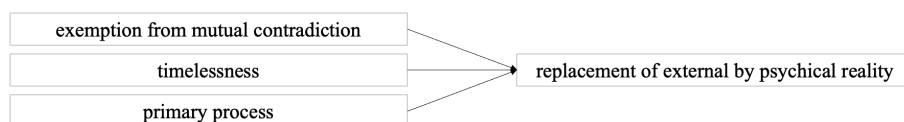


Figure 2: The four characteristics of the *Ucs* system

It is important to understand the three parameters that define the psychic reality, when carefully examined in Freud's entire works, imply a certain number of symmetries that we are briefly going to consider, basing them on quotes from the Freudian texts. Besides the already mentioned rotational one, the following symmetries are easily detectable:

²⁵ Freud, S. (1915b), *The Unconscious*, pp. 187-186.

²⁶ Freud, S. (1900b), p. 620.

I - *Time translation symmetry*

There is nothing in the id that corresponds to the idea of time; there is no recognition of the passage of time and a thing that is most remarkable and awaits consideration in philosophical thought-no alteration in its mental processes is produced by the passage of time.²⁷

This clearly means that the forward or backward displacement in time does not change anything in the system.

II - *T-symmetry*

And, apart from the reversal of subject-matter, chronological reversal must not be overlooked. Quite a common technique of dream-distortion consists in representing the outcome of an event or the conclusion of a train of thought at the beginning of a dream and of placing at its end the premises on which the conclusion was based or the causes which led to the event.²⁸

This quote doesn't require any comment.

III - *Translational symmetry*

In general, indeed, where it is possible, the dream-work changes temporal relations into spatial ones and represents them as such. In a dream, for instance, one may see a scene between two people who look very small and a long way off, as though one were seeing them through the wrong end of a pair of opera-glasses. Here, both the smallness and the remoteness in space have the same significance: what is meant is remoteness in time and we are to understand that the scene is from the remote past.²⁹

Here Freud mentions an equivalence between space and time, which implies that what applies to one - the translational symmetry - is also applicable to the other.

Such symmetry is not just externally valid in the relation between the psychic apparatus and the external world, but also internally in the relationship between the psychic apparatus and the organism where it originates. This is easily understandable analyzing the Freudian concept of drive source.

By the source [Quelle] of an instinct is meant the somatic process which occurs in an organ or part of the body and whose stimulus is represented in mental life by an instinct. We do not know whether this process is invariably of a chemical nature or whether it may

²⁷ Freud, S. (1932), p. 74.

²⁸ Freud, S. (1900a), *The Interpretation of Dreams (First part)*, p. 328.

²⁹ Freud, S. (1932), p. 26.

also correspond to the release of other, e.g. mechanical, forces. The study of the sources of instincts lies outside the scope of psychology. Although instincts are wholly determined by their origin in a somatic source, in mental life we know them only by their aims. An exact knowledge of the sources of an instinct is not invariably necessary for purposes of psychological investigation; sometimes its source may be inferred from its aim.

Are we to suppose that the different instincts which originate in the body and operate on the mind are also distinguished by different *qualities*, and that that is why they behave in qualitatively different ways in mental life? This supposition does not seem to be justified; we are much more likely to find the simpler assumption sufficient - that the instincts are all qualitatively alike and owe the effect they make only to the amount of excitation they carry, or perhaps, in addition, to certain functions of that quantity. What distinguishes from one another the mental effects produced by the various instincts may be traced to the difference in their sources. In any event, it is only in a later connection that we shall be able to make plain what the problem of the quality of instincts signifies.³⁰

The fact that drives are all qualitatively similar has a capital implication: none of the psychic laws are violated even if the same drive pressure is dislocated, i.e. applied to different erogenous zones from the original. However, this property is directly responsible for the onset of a long series of conversion symptoms typical of hysteria.

A precisely analogous tendency to displacement is also found in the symptomatology of hysteria. In that neurosis repression affects most of all the actual genital zones and these transmit their susceptibility to stimulation to other erotogenic zones (normally neglected in adult life), which then behave exactly like genitals. But besides this, precisely as in the case of sucking, any other part of the body can acquire the same susceptibility to stimulation as is possessed by the genitals and can become an erotogenic zone. Erotogenic and hysterogenic zones show the same characteristics.³¹

We again find here the spatial translational symmetry which excludes the ability to assign to a specific drive an absolute position in the organism. This makes it completely irrelevant trying to find the drive's physiological localization in the interests of the scientific foundation of metapsychology. It is an enormous matter as it tells us that it is totally pointless doing experiments to find the drive in the organism: in psychoanalysis it is clinically useless. It is not possible to locate the drive in certain points in the organism and it is not possible to find it due to the definition of drive itself, i.e. for a purely theoretical reason. What we intend to say is not that the drive does not reside in the body. Of course it does, it is however impossible to determine where it lies exactly: it is impossible to know its point

³⁰ Freud, S. (1915a), p. 123.

³¹ Freud, S. (1905), *Three Essays on the Theory of Sexuality*, pp. 183-184.

of application. This, by the way, suggests that Mark Solms's work, who tries to bring the metapsychology back to a neurophysiological base, has no significance to psychoanalysis. Solms thinks he is doing neuro-psychoanalysis - as he calls it - but he is actually doing only neurology. We are not saying that it is not interesting but it has no value for psychoanalysis.

We find all these issues marvelous and of the greatest importance for the scientific foundation of psychoanalysis as an autonomous discipline.

IV - *Parity symmetry*

I must affirm that dreams really have a meaning and that a scientific procedure for interpreting them is possible.

My knowledge of that procedure was reached in the following manner. I have been engaged for many years (with a therapeutic aim in view) in unravelling certain psychopathological structures-hysterical phobias, obsessional ideas, and so on.

I have been doing so, in fact, ever since I learnt from an important communication by Josef Breuer that as regards these structures (which are looked on as pathological symptoms) unravelling them coincides with removing them. (Cf. Breuer and Freud, 1895.) If a pathological idea of this sort can be traced back to the elements in the patient's mental life from which it originated, it simultaneously crumbles away and the patient is freed from it. [...] It was then only a short step to treating the dream itself as a symptom and to applying to dreams the method of interpretation that had been worked out for symptoms.³²

Freud here is saying that all psychic transformations are invertible. He conceives of the mind as a network of representations – like a graph in mathematics - each one of which has an energetic investment, a charge. Thus, we have a substratum and a force overlaying it. These investments, Freud says, at their fundamental state are freely mobile (primary process) and in particular, they can move from one representation to another condensing (accumulating) on one (or more) representation(s). The above quotation necessarily implies that each transformation has to have a reverse form: if an investment moves from A to B it must be possible to return from B to A. Likewise, if some investments move from A, B and C to D, that is they condense, it must be possible they return on A, B and C; otherwise the dissolution process of the symptoms described by Freud would be impossible.

V – *C-symmetry*

This type of symmetry is not only about logic contradiction - as mistakenly believed by Matte Blanco - but is about all types of opposition and contrast that can occur at a thinking level.

³² Freud, S. (1900a), pp. 100-101.

With the following we present two very representative quotations:

The way in which dreams treat the category of contraries and contradictories is highly remarkable. It is simply disregarded.

'No' seems not to exist so far as dreams are concerned. They show a particular preference for combining contraries into a unity or for representing them as one and the same thing.

Dreams feel themselves at liberty, moreover, to represent any element by its wishful contrary; so that there is no way of deciding at a first glance whether any element that admits of a contrary is present in the dream-thoughts as a positive or as a negative.³³

Reversal of an instinct into its opposite resolves on closer examination into two different processes: a change from activity to passivity, and a reversal of its content. The two processes, being different in their nature, must be treated separately.

Examples of the first process are met with in the two pairs of opposites: sadism-masochism and scopophilia-exhibitionism. The reversal affects only the aims of the instincts. The active aim (to torture, to look at) is replaced by the passive aim (to be tortured, to be looked at). Reversal of content is found in the single instance of the transformation of love into hate.³⁴

In the first quotation Freud covers two different processes:

- i - the addition of opposites;
- ii - the substitution of opposites for one another.

As observed by the physicist Luca Guariento³⁵ in a private conversation, the first of these processes is just the manifestation of the *superposition principle effect in physics*, according to which every time a certain effect depends linearly on several causes independent from each other, it results in the outcome of the effects singularly produced by each cause. The substitution of opposites for one another instead, shows an analogous symmetry - *mutatis mutandis* - to the charge conjugation (C-symmetry) in physics: in fact should we change each element with its opposite (as activity to passivity or hatred to love) nothing in the system changes.

³³ Freud, S. (1900a), p. 318.

³⁴ Freud, S. (1915a), p. 127.

³⁵ Luca Guariento is a researcher at Physics Department "Ettore Pancini", University of Naples-Federico II and at the National Institute of Optics (Istituto Nazionale di Ottica, CNR-INO).

VI - *Reference frames symmetry*

It is not easy for us to carry over the concepts of individual psychology into group psychology; and I do not think we gain anything by introducing the concept of a 'collective' unconscious. The content of the unconscious, indeed, is in any case a collective, universal property of mankind.³⁶

This implies for the mind a sort of relativity principle according to which the laws of the mind do not change with the changing of different subjects (reference frame).

9. The symmetries we have isolated in the Freudian formulation of metapsychology *are foundational of the psychic structure, and as so formative of the reality in the Id, since it represents the nucleus of the unconscious, i.e. of the psychic reality. Those are fundamental symmetries.*

This has an enormous impact on the definition of metapsychological objectivity as it qualifies it in terms of a «weak» objectivity like that of modern physics. Jean Petitot outlines this state of things very well in the essay *Per un nuovo illuminismo*:

This decisive role of symmetries in physics gives physical objectivity a very special status, which opposes it to any substantialist ontology of individual individuated and essences, existing transcendentally as separate entities. This old Aristotelian metaphysical tradition is incompatible with modern physics. Physical objectivity is transcendental in the sense that it is a 'weak' objectivity that incorporates into its concept of object the conditions of access and the conditions of possibility to determine its objects. More precisely what it is accessible to theory, its positive content, is defined *negatively*, i.e. by what is inaccessible to it (due to symmetries). Symmetries impose a self-limitation on what the theory is able to know. Saying that they are constitutive it is to say that what the theory can know is determined by what the theory cannot know. This is the basic principle that separates physical objectivity from any ontology.³⁷

Freud's descendants have always tried to comprehend the psychic reality concept in terms of referral to an underlying ontology: for example according to Laplanche and Pontalis the ontology of the psychic reality would be formed by the «unconscious desire and its associated phantasies».³⁸ According to this interpretation, the psychic reality and its constitutive symmetries lead to, or are explained by, something more fundamental. But this is a grave mistake

³⁶ Freud, S. (1934-38), *Moses and Monotheism: Three Essays*, p. 132.

³⁷ Petitot, J. (2013), *Per un nuovo illuminismo*, p. 296-97. [Translation is ours.]

³⁸ Laplanche, J., Pontalis, J.-B., Lagache, D., & Nicholson-Smith, D. (2018), *The Language of Psycho-Analysis*, p. 363.

because the contrary is true, i.e. the structure of the unconscious desire itself is explained by the psychic reality (symmetries). Indeed, the symmetries are the laws of its manifestation. In other words, the symmetries constitute the reality of the unconscious, and not the contrary. The concept of psychic reality does not lead to any underlying ontology because it has an *exclusively formal content*: in a very concise way we can say that the id is reduced to nothing else but the psychic *group of symmetries*. Although it has not yet been translated adequately into mathematics, it does not prevent metapsychology from imposing itself as foundational of psychology since it defines its objectivity i.e. - as Petitot states - it outlines that psychology can know through what it cannot know: under this aspect its epistemic proximity to contemporary physics is impressive. This proves that Freudian metapsychology is on the cutting edge and still far from being understood. It is impossible to comprehend Freud, as has been done up to now, by interpreting it with obsolete conceptual systems.

In summary: in true Freudian metapsychology, and not in one of the numerous imaginary metapsychologies assigned to Freud, the psychic reality:

i - is a form of existence different from the material reality:

If we look at unconscious wishes reduced to their most fundamental and truest shape, we shall have to conclude, no doubt, that psychical reality [*die psychische Realität*] is a particular form of existence not to be confused with material reality [*der materiellen Realität*].³⁹

ii - in its foundational state (id) is highly symmetric;

iii - in its interaction with material reality a spontaneous symmetry breaking occurs, which generates what Freud calls ego (*Ich*), the subject.

We should now ask ourselves if computer science can present something analogous. We admit that within it is the highly debated issue of what is called *computational symmetries*, however according to one of the most important experts in this field Yanxi Liu, symmetry cannot simply be automated or replicated in artificial contexts, such that a fully automated system dealing with it remains currently elusive for real-world applications.⁴⁰ But, in any case, symmetries in information technology do not play the same role they play in metapsychology, since they are not foundational as they are in metapsychology. So, symmetries are treated in a reverse way if we compare computer science with metapsychology: whereas in the latter asymmetries are built starting from a symmetric situation, in the first

³⁹ Freud, S. (1900b), p. 620. (For related German terms cfr. Freud, S. (1900c), *Die Traumdeutung*, p. 625.)

⁴⁰ Liu, Y. (2008), *Computational symmetry in computer vision and Computer Graphics*; Liu, Y. (2021), *Computational Symmetry*.

symmetries are built starting from asymmetries. According to this, although we can certainly find local congruencies, they are two different worlds. As we have already stated: *in its essence metapsychology is physics not information.*

Bibliography

- Baldini, F. (1998). Freud's line of reasoning. A note about epistemic and clinical inconsistency of Grünbaum's argument pretending to confute Freud's therapeutic approach, with reference to the thesis of Stengers on psychoanalysis. *Psychoanalytische Perspectieven*, 32/33, 9-36.
- Baldini, F. (2020). Nuove considerazioni sul metodo psicanalitico freudiano e in generale sull'architettura empirico-razionale della metapsicologia. *Metapsychologica – Rivista di psicanalisi freudiana*, 2020/1, 5–38.
- Ceschi, M. V. (2021). I limiti metodologici e teorici della ricerca contemporanea in psicoterapia. *Metapsychologica – Rivista di psicanalisi freudiana*, 2021/1, 43-62.
- Colloca, L., Benedetti, F. (2005). Placebos and painkillers: is mind as real as matter? *Nature reviews neuroscience*, 6(7), 545-552.
- Freud, S. (1900a). *The Interpretation of Dreams (First part)*, SE 4.
- Freud, S. (1900b). *The Interpretation of Dreams (Second part)*, SE 5.
- Freud, S. (1900c). *Die Traumdeutung*, GW II-III.
- Freud, S. (1905). *Three Essays on the Theory of Sexuality*, SE 7.
- Freud, S. (1912). *Recommendations to Physicians Practicing Psycho-Analysis*, SE 12.
- Freud, S. (1915a). *Instincts and their vicissitudes*, SE 14.
- Freud, S. (1915b). *The Unconscious*, SE 14.
- Freud, S. (1922a). *Two Encyclopedia Articles*, SE 18.
- Freud, S. (1922b). “*Psychoanalyse*” und “*Libidotheorie*”, GW XIII.
- Freud, S. (1928). *Inhibitions, Symptoms and Anxiety*, SE 22.
- Freud, S. (1932). *New Introductory Lectures on Psycho-Analysis*, SE 12.
- Freud, S. (1934-38). *Moses and Monotheism: Three essays*, SE 23.
- Freud, S. (1938a). *An Outline of Psycho-Analysis*, SE 23.
- Freud, S. (1938b). *Abriss der Psychoanalyse*, GW XVII.
- Hartmann Cardelle, V., Dietrich, D. (2022). Understanding metapsychology with the computer paradigm. *Metapsychologica – Rivista di psicanalisi freudiana*, 2022/1, 137-164.
- Laplanche, J., Pontalis, J.-B., Lagache, D., & Nicholson-Smith, D. (2018). *The Language of Psycho-Analysis*. W. W. Norton & Co. Inc.
- Liu, Y. (2008). Computational symmetry in computer vision and Computer Graphics. *Foundations and Trends in Computer Graphics and Vision*, 5(1-2), 1–195. <https://doi.org/10.1561/06000000008>

- Liu, Y. (2021). Computational Symmetry. In Ikeuchi K. (eds.), *Computer Vision* (pp. 1-11). Springer, Cham.
- Masson, J. M. (1985). *The Complete Letters of Sigmund Freud to Wilhelm Fliess, 1887-1904*. Jeffrey Moussaieff Masson.
- Petitot, J. (2013). *Per un nuovo Illuminismo*. Bompiani.
- Sardella, I. A. (2012). *Storia della rottura di simmetria. Dalla colonna di Eulero al bosone di Higgs, il lungo cammino di un'idea*. Aracne Editrice.