

STUDY GUIDE

FOR

MARIE-LOUISE von FRANZ'S

NUMBER AND TIME

compiled by

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WORKING NOTES

These notes for the *Number and Time* course are a work in progress. They are working notes and are full of typos and half sentences.

The notes can be a guide for your reading. I have tried to list the main points of each chapter as well as summarize the chapter at the beginning of the chapter heading. I have divided the listing up into two types, "skim" and "read." When the page reference is marked "skim" we'll just go through the pages notes to get the main idea; when the page reference is marked "read" we'll read the text on those pages, often sentence by sentence, to get the meaning.

I occasionally make notes to myself for items I want to follow up on as my time permits. These are marked with [?].

Number and Time is an extremely difficult book, von Franz knew that. But I feel that it is a very worthwhile effort to read and study it. Read for what you CAN understand and don't worry about what you can't. During the class time I will try to present as much of the book as possible, but not infrequently her references elude me too. I am likewise going to focus on what I can understand and not freak out about what I can't. This approach will give us plenty of material to concentrate on as it is. As time permits in the future, I will return to the obscure points and try to follow them up.

In her book von Franz has taken, to my feeling, one of the first real steps in understanding the link between matter and psyche, the challenge that comes to us posed by the next millennium. I believe that challenge and her response to it in *Number and Time* is worth something, and I thank her for the effort.

INTRODUCTION

BACKGROUND AND SUMMARY OVERVIEW OF BOOK

"The modern discovery of discontinuity (e.g., the orderedness of energy quanta, of radium decay, etc.) has put an end to the sovereign rule of causality....Synchronicity is no more baffling or mysterious than the discontinuities of physics." vol 8, pars. 965f. quoted in Card, 28

"Jung's use of the synchronicity concept to provide insight into the nature of acausal orderedness was of even greater consequence. In his investigation of synchronistic phenomena, Jung had discovered that archetypes consistently act as the mediating principle that accounts for the meaningfulness of coincidental mental and physical events. By implication, then, Jung conjectured that archetypes also act as the mediating principle in instances of general acausal orderedness. ...

"This comprehensive function of the archetype makes it the central character in the archetypal hypothesis formulated by Jung and Pauli, which is founded on a perceived parallelism between depth psychology and quantum physics." Card, 28

"When operating in the realm of *psyche*, they are the dynamical organizers of images and ideas; when operating in the realm of *physis*, they are the patterning principles of matter and energy." Card, 29

"The realms of mind and matter--*psyche* and *physis*--are complementary aspects of the same transcendental reality, the *unus mundus*. || Archetypes act as the fundamental dynamical patterns characterizing all processes, whether mental or physical || In the realm of the *psyche*, archetypes organize images and ideas; in the realm of *physis*, they organize the structure and transformation of matter and energy and account for acausal orderedness. || Archetypes acting simultaneously in the realms of *psyche* and *physis* account for instances of synchronistic phenomena." Card, 30

"Jung and Pauli formulated their archetypal hypothesis in the latter years of their lives. Neither was able to investigate in depth the nature of the ... archetypes that act as the dynamic ordering principles in the *unus mundus*." Card, 30

"...I have always come upon the enigma of the *natural number*. I have a distinct feeling that number is a key to the mystery since it is just as much discovered as it is invented. It is a quantity as well as a meaning." [might say "a quality"] Card, 30; *Number and Time*, 9; Jung, Letter to Stephen I. Abrams, Oct. 21, 1957

"In *Number and Time* von Franz has investigated number archetypes as dynamic ordering factors active in both the psyche and in matter. She has provided a qualitative characterization of the number archetypes by examining aspects of number and numeration drawn from a wide variety of cultures both ancient and modern, primitive and technologically advanced. She has discussed in particular detail the qualitative aspects of the structure of the number archetypes that give rise to

the first four integers. In addition, she has investigated the dynamical aspects of the number archetypes and their relationship to physical and psychic energy, and she had discussed historical and mathematical models of the *unus mundus* and the role of number archetypes in synchronistic phenomena." Card, 30f.

"Numbers then become typical psychological patterns of motion ..." in Card 31, *Number and Time*, 74

"Natural number draws psyche and matter together." *Number and Time*, 166

OUTLINE OF BOOK

(1) main point in vF's words:

Natural number is "the common ordering factor of both physical and psychic manifestations of energy, and is consequently the element that draws psyche and matter together. In other words, amorphous energy probably does not exist at all; when energy manifests itself in either psychic or physical dimensions, it is always 'numerically' structured, e.g., as 'waves' or as (psychic) rhythm. Natural numbers appear to represent the typical, universally recurring, common motion patterns of both psychic *and* physical energy. Because these motion patterns (number) are identical for both forms of energy, the human mind can, on the whole, grasp the phenomena of the outer world. This means that the motion patterns engender 'thought structure models' in man's psyche, which can be applied to physical phenomena and achieve relative congruence. The existence of such numerical natural constants in the outer world, on the one hand, and in the preconscious psyche, on the other (e.g., in the quaternary structures of the 'psychic center,' the triadic structure of dynamic processes, the dualistic structure of threshold phenomena, and so forth) is probably what finally makes all conscious knowledge of nature possible." 166f.

(2) outline

chapter 10: the double mandala (*unus mundus*), a timeless dimension and a time-bound dimension which drops into time (178)

chapter 11 (13): the time-bound manifestations of the one side of the double mandala above ("kairos")

chapter 1: the time-bound manifestation in matter and psyche (a consciously perceived order = meaning); number as the common ordering factor of psyche and matter

chapter 9: there is an identical organizing/ordering/regulating factor in matter and psyche

chapters 2-8: number is, firstly, a qualitative entity; she describes integers' mathematical/physical and symbolic properties

chapters 12, 14: the regulating factor manifests in "chance" and can be "read"

chapter 15: eros and order

REFERENCES

Charles R. Card, "The Archetypal View of Jung and Pauli," in *Psychological Perspectives*, issue 24 (spring-summer 1991).

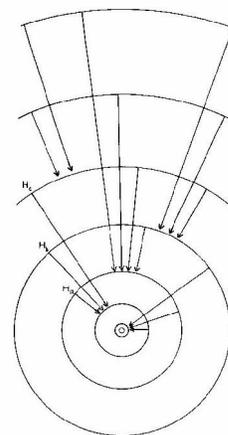
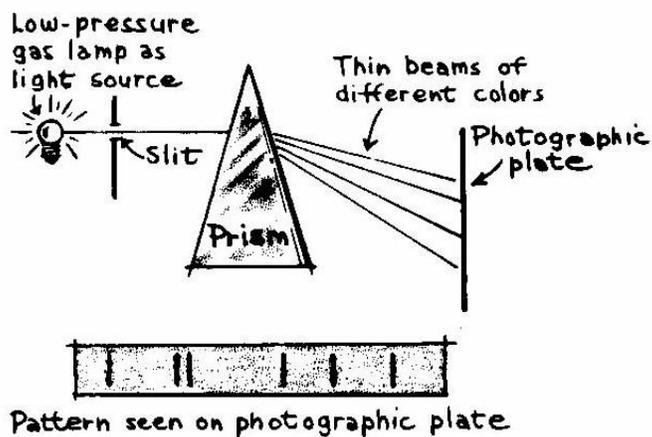
THE QUANTUM AND RADIOACTIVITY

TIME LINE

- 1895 discovery of the electron by J.J. Thompson
- 1897 the radioactive properties of radium discovered
- 1900 Max Planck discovers the quantum
- 1911 Ernest Rutherford discovers the nucleus
- 1913 Niels Bohr postulates the quantum theory of electron orbits
- 1927 Niels Bohr (Werner Heisenberg, Wolfgang Pauli) Copenhagen Interpretation of Quantum Mechanics

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THE QUANTUM



From *Physics for Poets*, p. 167

From *Men Who Made a New Physics*, p.

101

"The electron does not move in all the orbits which are possible but only in those where its energy is proportional to Planck's constant multiplied by one of the whole numbers. **Energy is discontinuous.**" 100 [bold emphasis mine]

"The electron may shift from one of the specified quantum orbits to another but these orbits represent its *only* energies. The electron may go no further toward the nucleus than the innermost quantum orbit." 100

"When enough energy is added to the atom (by heating, for example) the electron is forced outward from an inner orbit, associated with low energy, to an outer high-energy orbit. Radiation

is emitted as the electron, attracted by the nucleus, falls back to an inner orbit. The jump from high energy to low produces a definite portion of light energy. The frequency of this is equal to the difference in energy between two orbits, divided by Planck's constant." 100f.

"The quantum jump of the electron from orbit to orbit means that energy is sent out (and absorbed in quanta." 101f.

"The key to the atom's structure was to be found in the spectrum of its emitted light." 112

"What lies behind this limiting quantum rule? 'What causes it to be?' Thus in the case of Bohr's rule there immediately arose such questions as 'How is the electron able to pick out a particular orbit in which to circle the nucleus?' 'What keeps its energy from falling below a certain point so that it does not plunge into the nucleus?' ... Not only was there no reason for the quantum rules, they seemed to suggest that the electron possessed astounding properties. For example ... , Bohr's theory said that an electron headed for orbit 5 would vibrate at a different frequency than it would if it were headed for orbit 4 or 3 or 2 or 1. In each case the electron's **behavior at the start of a jump had to be geared to its goal**. How could this be? If was as if the electron *knew* beforehand where it was going to jump; as if it *decided* what frequency at which to vibrate. 118f. [bold emphasis mine]

RADIOACTIVITY

"In both cases we do now know what causes a particular atom to act in the way it does. We do not know what triggers the electron's jump to one particular orbit rather to another; **we do not know what triggers the nuclear change which is responsible for radioactive decay**. Therefore we may predict by considering a vast number of like cases and so learn what it is most probable to expect." 121 [bold emphasis mine]

REFERENCES

Barbara Lovett Cline, *Men who Made a New Physics*

Robert H. March, *Physics for Poets*

<http://www.weburbia.com/pg/historia.htm>

PART ONE

PREFACE

ix-x, read: how the book came to be, statement of intent

CHAPTER ONE: The Problem of the Unity of Psyche and Matter

Summary: images are segments of a transcendental continuum that "drops in" to time and space (9); the continuum can be grasped in a numerical way (10).

3-4, skim: physics and psyche discovered at the beginning of the 20th century

4-5, skim: archetypes, the "spectrum" of the psyche describes link of matter and spirit; likewise there are similar thought models in psychology and physics

6, skim: synchronicity as a link between matter and spirit

8-9, read: *unus mundus*

10 & n. 11, read: Wang Fu Ch'ih's description of the *unus mundus*

"Between heaven and earth there exists nothing but law and energy. The energy carries the law and the law regulates the energy. Law does not manifest itself (has no form); it is only through energy that the image is formed, and the image yields the number. (Image here equals idea, number is the intelligible aspect of law as embodied in the idea.) If this law becomes blurred the image is not right and the number is not clear. This reveals itself in great things and expresses itself in small things. Thus only a man of the highest integrity can understand this law; basing himself on its revelation he can grasp the symbols, and observing its small expressions, he can understand the auguries. In this way the art of the image and number (that is, consulting the oracle) comes about by itself." *Chou I nei-chuan*

"To Wang Fu-chih, therefore, number is the phenomenal form of the law, that one of its expressions in which it is intelligible." Wilhelm, 127

11, read: more on the *unus mundus*

11-12, read: acausal orderedness

12, read: *creatio continua*

12-13, read: *unus mundus* and numerical procedure

CHAPTER TWO: Images and Mathematical Structures in Relation to the *Unus Mundus*

Summary: the unconscious spontaneously produce mathematical structures consisting of natural numbers, thus displaying a special relation to the world of number and vice-versa (20, 27, 28)

15, skim, archetypes create the symbols that give expression to the unknown when the mind meets it

16, skim: her next point is that models and theories of the universe portray number as the "ultimate order of existence."

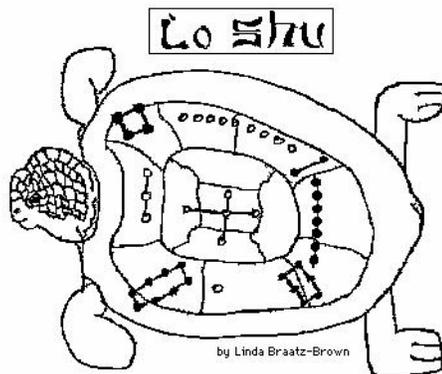
16-17, read: she cites Wang Fu Ch'ih, Einstein, quantum physics, Niels Bohr, de Beaugard [?]

17-18, skim: Does the ultimate order of existence consist of images or of numerical structures? Jung feels the archetype is "pre-image-creating" and "premathematical." Pauli feels the "basic intuitions of mathematics, the idea of an infinite series of whole numbers, for instance, and the idea of a geometric continuum, should be included in Jung's concept of archetypal ideas."

18-19, read. The point is "certain mathematical structures rest on an archetypal basis." Be sure you grasp the point here.

20, summary: This leads to **the main point of the chapter**, that mathematical systems can originate from inspirations from the unconscious.

21-26, read: the examples he gives from Poincaré, Gauss, Klein, Descartes, Lo-Shu, I Ching, matrix algebra



4	9	2
3	5	7
8	1	6

<http://mathforum.org/alejandre/magic.square/loshu1.html>

27, 28, read: she repeats **the main point of the chapter** and enlarges it, "the unconscious is able spontaneously to produce mathematical structures consisting of natural numbers," and thus "the unconscious psyche displays a special relation to the world of number."

27, read: "natural integers contain the very element which regulates the unitary realm of psyche." and "number serves as a special instrument for the becoming conscious of such unitary patterns."

To sum up: there is a regulatory "something" in the psyche and in matter. This "something" is given symbolic expression in the form of numbers as archetypal images.

27-29, read: traditional mathematical models give us one way of visualizing nor understanding what is going on in synchronicity, because our view of number must be broadened to include the irrational (this sets the stage for her approach to numbers in chapters 4-7)

30-31, read: there are places to go to find the irrational character of number, though generally the role of the unconscious in the formation of numbers is lacking.

32-33, skim: she cites several number theorists but we can largely dismiss this; the main point here is that the unconscious participates in the formation of numbers.

33-34, read: Jung's view of the formation and power of numbers.

CHAPTER THREE: Number as the Basic Manifestation of the Mind and as the Unalterable Quality of Matter

Summary: numbers are in matter and the psyche (37) and establish order (45).

36, skim: the relation of mathematical structures to reality

37, read: in mathematics there is a commonality between matter and the mind

37, read: a commonality between matter and spirit

37, 52, read: number shows a relation to matter and psyche

38-41, skim: numbers are qualities

41, read: number and time

42-43, read: East and West

45, read: numbers establish orderedness = spirit

46-50, skim: "music of the spheres"

50, read: note the list of her main points

50, read: note, again, number is a quality of psyche and matter

50-51, read: numerical structure of the electron

53, read: link of psychology and physics in (1) parallel concepts (2) number

53, read: number and spirit, again

54, read: spirit in matter and psyche

55-56, read: *unus mundus*, psychology and physics

REFERENCES

Charles R. Card, "The Archetypal View of Jung and Pauli," in *Psychological Perspectives*, issue 24 (spring-summer 1991).

Richard Wilhelm, *Understanding the I Ching: The Wilhelm Lectures on the Book of Changes*.

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