

# Neuropsychologic Rehabilitation: Quest for a Holistic Approach

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Head injuries constitute a major problem in the health care delivery system.<sup>1,2</sup> Lishman<sup>3</sup> has recently pointed out that by now it has been established with virtual certainty that in the majority of those who survive moderate and severe head trauma, the long-term mental (including the cognitive, behavioral, and emotional) sequelae outstrip the physical sequelae as the primary causes for the difficulties encountered by these individuals in their later vocational, personal, and social adjustment.

Yet, as shown by a recent longitudinal research project by Diller and associates,<sup>4</sup> which followed the natural course of recovery of a surviving group of moderate and severe head trauma patients, only one third of the sample followed were referred for any sort of rehabilitation services on discharge from acute care and approximately 65% of those patients remained unemployed at least 1 year after injury.

In this article we wish to limit our consideration to some of the key issues concerning the development of a rational (that is, explicit, systematic, empirically validated) approach to the neuropsychological remediation and rehabilitation of traumatically head-injured persons, specifically, neurologically plateaued young adults. The overall orientation of this work is remedial ("interventionistic") and rehabilitation-focused. In a rehabilitation context, the principal concern is with the need to resolve the clinical problems that stand in the way of better management and the achievement of more successful rehabilitation outcomes, in the case of many who have damage to the brain, than has been attained hitherto by conventional rehabilitation practices.

Our approach, furthermore, is anchored in the

belief that the eventual attainment of a rational approach to the clinical management and remedial rehabilitation of persons who have had traumatic brain injuries (as opposed to hitherto prevailing ad hoc approaches to neuropsychologic remedial intervention) must be ultimately founded on: (1) a clear understanding of the underlying physiologic and neural mechanisms that make possible, and therefore provide an explanatory basis for the recovery of functions following brain injuries; (2) the formulation of sound principles and strategies of remedial interventions as derived from these neurophysiologic mechanisms; and (3) innovative methods of neuropsychologic remedial training, of proved clinical efficacy, which are capable of producing functionally meaningful improvements in the brain-injured patient's daily living.

A number of possible neurophysiologic mechanisms of recovery of functions following brain injuries have been suggested,<sup>5,6</sup> which provide a rationale for systematic remedial interventions. Broadly speaking, these mechanisms, or theories, can be classified into three major groups: the so-called artifact, the anatomic reorganization, and the functional adaptation theories. The most explicit case, to date, for the rehabilitation applications of these theories of recovery has been made in a volume that was edited by Bach-y-Rita,<sup>7</sup> and in Miller's<sup>8</sup> most recent state-of-the-art review. It is not in the scope of this article to discuss the relationships between the various theories of recovery of functions and their systematic application to clinical practice. Suffice it to point out that, although there is much promise in the fast-growing literature on this subject, we are still in the early stages of the process. Our position, however, is that even though there still exist some gaps between the theories of recov-

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ery and actual clinical remedial practices, it is desirable, for now, to pursue the efforts in developing innovative methods and techniques of remedial training, with the aim of enhancing the functional rehabilitation of the brain injured, leaving the comparative testing of their clinical efficacy and generalizability for later stages.

The pioneering contributions to the field of clinical neuropsychology of rehabilitation by the New York University, Rusk Institute of Rehabilitation Medicine group have been widely acknowledged by students of the field.<sup>8-10</sup> In the early phases of their work, from 1964 until 1974, this group<sup>11-17</sup> concentrated on the systematic remediation of constructional praxis and on visuospatial disorders in stroke patients and on articulating a rehabilitation-focused model for remedial intervention.<sup>18,19</sup> Since 1975, the work has been expanded to include the traumatically head injured as well, and the approach to neuropsychologic rehabilitation became holistic in nature and scope.<sup>20-23</sup>

In this article we wish to restate briefly the clinical-theoretical underpinnings of the NYU Head Trauma Rehabilitation Program; outline in brief its structural features; describe its constituent programmatic, cognitive, and interpersonal-remedial elements; point out how these are coordinated so as to achieve an integrated program, capable of producing better functional rehabilitation outcomes (in traumatically brain-injured young adults) than have been attained by conventional approaches to rehabilitation in the past; and summarize the highlights of findings to date.

## PATIENTS AND METHODS

The NYU Head Trauma Program was originally established as a model clinical demonstration program and was fully funded for the first 6 years (1978-1983). Subsequently, the program has become a clinical outpatient service, but it is, nevertheless, retaining its original research cast, since it is operated as part of the activities of the Research and Training Center, which is sponsored by the National Institute of Handicapped Research (NIHR).

Nearly 100 traumatically injured young adults have completed treatments within the program to date. Participants in the program had reached a neurologic plateau (most had had the injury more than 2 years before entering the program) and had reached, by then, the point of maximum benefit from physical, occupational, and speech therapy. In the majority of cases, they had failed, as well, to benefit from conventional vocational counseling and

were unemployable at the time of entering the program. The failure to restore these patients to productivity was attributable in nearly all instances to various combinations of attentional disorders, insufficient awareness of the effects of one's injuries, coupled with unrealistic expectations, difficulties in learning, retaining, and generalizing new information (thus proving to be poor candidates for any sort of retraining), various types of behavioral disturbances (eg, impulsivity), inadequate interpersonal communications skills, and/or social "inappropriateness", poor morale, or difficulties in adequately modulating one's affective responses.

All subjects had had diffuse brain injuries (open or closed head, penetrating or nonpenetrating) that were mostly sustained during motor vehicle accidents. Duration of unconsciousness ranged from several days up to 3 months. The subjects ranged in age from 18 to 55 years, the average age being in the middle 20s. Approximately two thirds were men.

Acceptance into the NYU program is conditioned on: independence in ambulation and basic activities of self-care; the ability to engage in reliable two-way verbal communication (ie, having no more than milder forms of aphasia or dysarthria); the ability to engage in vigorous cognitive and interpersonal remedial "exercises," for several hours a day; a minimum testable IQ of 80 at the point of entry; at least a minimum degree of motivation to attend a rehabilitation program (a willingness to follow instructions and to persist at assigned tasks); the absence of blatant, severe, acute psychiatric disturbances; the ability to respond to noncoercive, "social" forms of restraint or disciplines; and a degree of "malleability" (the capacity to modify one's behavior in response to social and psychological supports, as well as to inspirational and exhortatory techniques).

Prior to commencing treatments, qualifying candidates undergo an extensive evaluation period, lasting up to 2 weeks (or an average of 6 full days). The assessment consists of a wide variety of neuropsychologic and cognitive measures, including measures of academic skills; an assessment of functional competence in 19 areas of daily life (at home); a variety of formal and informal behavioral observations and psychometric tests designed to assess degree of intactness of interpersonal and social skills. The candidates' "significant others" are also assessed and briefed about the program objectives at the same time. Finally, the patient-candidate and his significant others are interviewed together by five or six members of the staff in order to assess the nature of relationships among the members of the patient's family and the manner in

which the patient is treated by his significant others.

Following the assessment, if the patient has been accepted into the program, he is put on a waiting list. Patients from this waiting list are accepted for treatment, two or three times a year, in groups of ten trainees at one time. The treatments are provided in two phases. During phase one, the ten patients (who have just been accessed together as a group) receive (4 days a week, 5 hours each day, for 20 consecutive weeks) a “mix” of treatments that are administered individually, in small groups, or in larger “community” settings (for example, sessions including all trainees, all staff, usually 7 to 8 persons, plus significant others and assorted visiting professionals). The setting is that of a specially modified “therapeutic community” for severely brain-injured persons.

Upon completing phase one of the program, each trainee is assigned on an individualized basis to commence the second phase of the program. This involves a series of “tailor designed” prework or actual work explorations. Patients are assigned to perform, usually within the Medical Center, a variety of guided “occupational trials” that are non-paying, part-time or full-time, work experiences. Occupational trials vary from 3 months to 1 year.

Once a patient’s work potential has been established, he receives a final “employability” rating. This consists of a clear statement concerning the level of work competence achieved by the patient; the types of jobs for which he has been found to qualify; and whether or not he is capable of engaging in competitive work, or in productive but noncompetitive or “sheltered” work only.

The program assists the trainee in finding work commensurate with current abilities and in becoming properly integrated at the newly found workplace. When necessary, it also provides follow-up counseling and “maintenance” therapeutic supports for indefinite periods after discharge from the program.

In the following sections, we wish to restate the underlying rationale of this holistic program for cognitive, interpersonal, and vocational rehabilitation of outpatient head-injured persons.

We shall begin by identifying the principal challenges that must be successfully met by a typical brain-injured patient if he is to attain his rehabilitation potentials. Following that, we will point out how, by virtue of its special structure and the manner in which a multidimensional spectrum of remedial interventions is coordinated and timed, this program is capable of providing both the therapeutic milieu and the tools with which those challenges can be successfully met by the brain-damaged patient.

## COGNITIVE REHABILITATION

We started from the basic premise that in a clinical “interventionistic setting” it is futile to attempt to separate the cognitive deficits, the psychiatric sequelae that are directly (ie causatively) related to the brain injury, and the so-called functional disturbances that are presumed to be exacerbated versions of preexisting “dynamic” or personality problems from those affective responses of the patient that are reactive in nature (that is, in response to the patient’s awareness of “losses” resulting from the head injury and the anticipated, real or imagined, future consequences of the brain injury). A remedial program that aims at achieving optimal functional rehabilitation outcomes, such as self-sufficiency in daily life, a stable personal and interpersonal readjustment, and the resumption of leading a productive worklife, must be holistic in nature, comprehensive in its scope, and must address all of the patient’s problems.

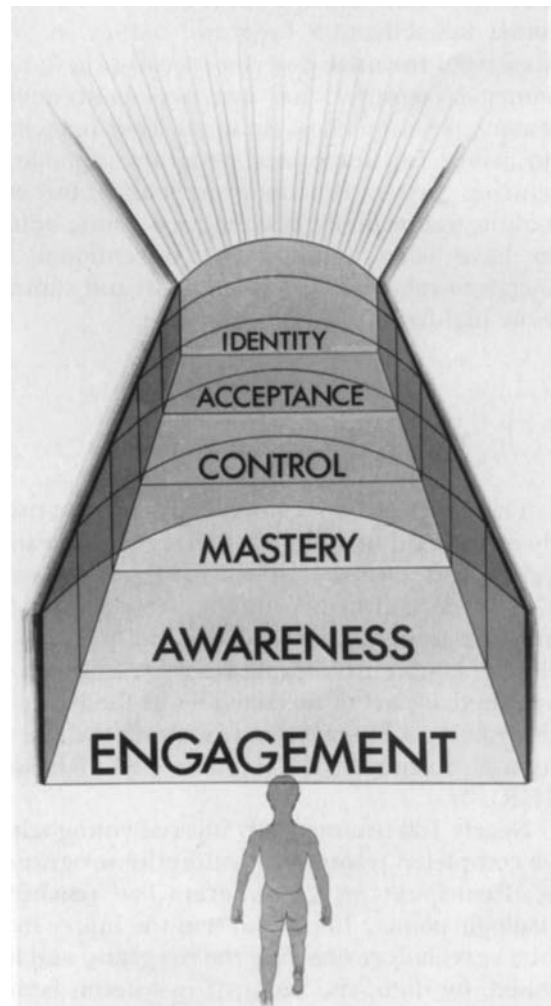


Figure 1. A hierarchy of stages in rehabilitation.

Figure 1 depicts, schematically, our hypothesized hierarchy of six challenges that must be met successfully by a brain-injured patient while undergoing rehabilitation. Each of these challenges represents a continuum, ranging from the more basic neuropsychologic-cognitive to the more psychologic (“assumptive”).

### **ENGAGEMENT**

The first challenge is that of engagement. On the neuropsychologic end of the scale, engagement refers to the need for the patient to become optimally activated (counteract his mental, subtle or blatant, “adynamia”<sup>6</sup>) and ameliorate his basic and higher level disturbances in attention and concentration. At the other end of the scale, engagement refers to the need for the person to become personally motivated to engage in a purposeful and deliberate manner in the various remedial tasks and to view them as being relevant to his ultimate rehabilitation goals.

### **AWARENESS**

One of the most prevalent problems encountered by rehabilitation professionals in patients with closed head injuries is the patients’ lack of awareness of even their most blatant deficits. The lack of awareness, in turn, accounts to some extent for the corollary observation that head trauma patients have very unrealistic expectations with regard to rehabilitation goals. To be sure, denial phenomena can be and often are rooted in purely dynamic, neurotic problems. Still, as shown by extensive clinical experience, lack of awareness plus its corollary, lack of realism, in many head-injured patients is the direct result of the patient’s cognitive deficits and may be ameliorated relatively fast by special intervention techniques.

Thus, the second challenge is that of becoming aware of one’s problems, without being overwhelmed by this knowledge and without having one’s morale and determination to work hard to overcome them shattered.

### **MASTERY**

The third challenge, mastery, can be met if and when the patient has succeeded in compensating for his cognitive deficits. Compensation involves, in certain instances, shunting around intractable deficits, to the point that the patient can again achieve a satisfactory functional adjustment, despite the presence of interferences that are caused by the generic cognitive deficits. In certain other instances, compensation is the result of the process

of reacquisition of a given function by directly strengthening the component skills upon which the affected function was originally based.

At the cognitive end, mastery is achieved by the deliberate and diligent practice of remedial exercises until the specific, sought-after functional results have been achieved. On the psychologic end, mastery means the attainment (often after years of repeated failure to cope) of the feeling that one can again successfully solve problems in daily life, and that one is “competent” again.

### **CONTROL**

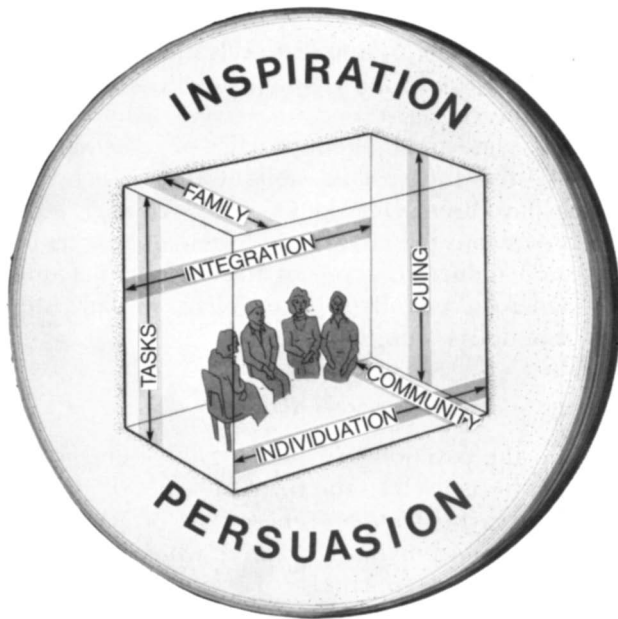
On the psychomotor and cognitive end, control manifests itself in the form of “smooth” (ie semihabituated) execution of those tasks on which the patient was systematically trained; whereas, on the psychologic end, control is experienced by the patient as being able to again concentrate relatively effortlessly on the idea behind the act and on its ultimate objective, rather than on the “mechanics,” or the means by which the act is to be carried out (for example, to think of what is being written, instead of how to spell or how to hold the pencil).

### **ACCEPTANCE**

Acceptance is the by-product of the successful attainment of the foregoing, for only by achieving those landmarks in the rehabilitation process can the patient accept with calm resignation the fact that some things cannot be further improved upon. Only thus can he adopt an accepting attitude toward what is possible, and let go, sadly but willingly, of what is desirable. The practical test of acceptance is whether the patient can again feel that his life, as is, is worth living and that he can still derive some measure of pleasure in his present life.

### **IDENTITY**

Although it remains yet to be established through further research whether or not it is possible for all patients with a severe head injury in all cases to reestablish their ego identity, we hypothesize (based on extensive clinical experiences) that the ultimate attainment of optimal and stable rehabilitation outcomes is realizable only if the patient proves successful in reconstituting, to some extent at least, his ego identity. The scope of this article does not permit a detailed discussion of this point. We merely wish to point out that by the term “ego identity,” we refer to Erikson’s<sup>24</sup> concept, which consists of three evolving and interrelated aspects of the self, the so-called imitative component, the sense of continuity of the self, and the culmination



**Figure 2.** Components of a holistic rehabilitation program.

of the former two, which is that aspect of one's self to which one refers as the "true me."

### NYU HEAD TRAUMA PROGRAM

What type of program is capable of facilitating the successful attainment of the foregoing rehabilitation landmarks? Figure 2 is a schematic summary of the concept behind and the organizational features of the NYU Head Trauma Program. Each of its constituent elements is briefly described in the following sections.

#### COMMUNITY

Since a patient undergoes the treatments during the first phase of the program with nine other trainees, and since the various remedial interventions are administered individually, but in the presence of other peers, conjointly with several peers, or in formal small group situations, or in larger "community" settings (including all staff, all trainees, and all significant others, plus visitors), the community format presents a most effective means of shaping and influencing the individual's thoughts and behaviors, as well as of providing approval, support, and a sense of belonging.

#### TASKS

Daily, the patient, along with his peers, is faced with a variety of remedial tasks. All the individual-

group-administered cognitive and interpersonal exercises and the various types of community activities are conducted according to a fixed, carefully designed curriculum. They are conducted according to the principles of "saturation cueing." This principle plus the methodologies, the specific modules or packages of remedial exercises and the specific techniques used to ensure their proper assimilation by the patients have been described in detail in a series of rehabilitation monographs.<sup>20</sup>

#### CUEING

We have already mentioned that various types of remedial exercises are conducted according to a preset curriculum that outlines the specific contents as well as the order of their administration within each given training package. Added to that is the fact that the training exercises are designed to enable the staff to provide the trainee, systematically, with a hierarchy of cues, which are gradually removed as the patient becomes increasingly able to perform the tasks unaided. Thus, the organized program of contents plus the systematic cueing methodologies produce, in time, more and more success in problem solving. This in turn results in the attainment of mastery and control.

#### INDIVIDUATION

In addition to being subjected to the various organized individual and group training exercises, each trainee is also assigned a personal counselor from among the seven or eight members of the team with whom he comes in daily contact. It is the individual counselor's function to act as personal advisor and ombudsman, to follow up on and assist in the proper assimilation of the various "messages" that are being delivered to the trainee during the various program activities, and to meet with the trainee and his significant others and assist in the "carry-over" (the application in the home environment or job) of lessons learned in the setting of the program.

#### FAMILY

From the outset, significant others are: invited to attend, from time to time, a full day of the program and observe how the various treatments are administered; encouraged to attend, if possible, and participate each day in the discussions that take place during the final "community" hour; contractually obligated to attend the weekly discussion group that is organized for all the significant others, combined; plus obligated to attend all the ad hoc meetings, with or without the patient, that are called for

by the personal counselor or the program leader. Over the years, we have found that nearly one third of the significant others have been attending the all-day program activities; that compliance with the request to attend the weekly group session for significant others ranged from 50 to 90%, and that compliance with the request to attend the ad hoc meetings with the counselor or the program leaders has been nearly 100%.

### **INTEGRATION**

Integration is achieved by: the careful timing of the various program interventions—each day and over the entire 20-week period during phase one, and the coordination of the various contents, so as to make them maximally complementary to one another; the formulation of individualized treatment plans (which is done jointly by all staff members), plus the fact that all members of the team can observe on a continuous basis each other's clinical interventions and can complement each other's responses to the various individual trainees; the constant exposure of the trainees to one another (by virtue of the fact that they perform all of the exercises in close physical proximity); and the fact that the rationale for each of the program activities, feedback about how the trainee performed each time and the implications for his future rehabilitation are constantly restated by all members of the staff.

### **PERSUASION AND INSPIRATION**

A final comment is in order concerning the special atmosphere that is created by the program and that can be characterized—in terms of the cognitive style of communication—by the word persuasion and—in terms of its emotional tone—by the word inspiration. We use the term “persuasion” to distinguish our principal mode of instructing the patient (both during the cognitive and the therapeutic exercises) from the conventional forms of (college or high school) instruction, which involve the so-called Socratic dialogue. Owing to their cognitive deficits, severely brain-injured patients learn best when provided by others with maximum articulation of cause-effect relationships, a clear idea as to what, under the specific circumstances at hand, are the correct choices one could make from among possible alternatives, and what are the likely consequences of choosing one alternative over another. The role of staff therefore is to assist the patient actively in learning how to reason again and to persuade him to accept such assistance voluntarily and without feeling defeated or “pushed around.” On the emotional side, the program seeks to create

an atmosphere of frank exhortation and inspiration, as a very effective means of galvanizing brain-injured persons into action and of dispelling at least the milder forms of depression.

## **RESULTS**

How effective has a holistic, remedial rehabilitation program of this type been, when compared with the more conventional forms of rehabilitation of persons with traumatic head injuries? Preliminary results of our 6-year clinical study have been summarized in a rehabilitation monograph series<sup>20</sup> and in our annual reports to the NIHR. These are available on request. The final results of this study will be published in a series of articles that are now in preparation. In the present context, we wish to present some of the highlights of various outcomes of the study.

### **AWARENESS OF PROBLEMS AND ACCEPTANCE OF RECOMMENDATIONS**

Of the total 100 subjects to date who were engaged in some or all of the phases of the program, 6 subjects withdrew from the program before completion of the first (the 20-week, remedial intervention) phase of the program, and 4 additional subjects refused to accept and follow through with staff recommendations during the second (the occupational trials) phase of the program. The program has, therefore, proved to be successful in 90% of the cases in confronting the patients with their basic problems, in preparing them for the occupational trials phase, and in getting them willingly, albeit sadly, to comply with recommendations that were based on the realistic assessment of their current, empirically tested work potential.

### **EFFECTS OF REMEDIAL TRAINING ON COGNITIVE FUNCTIONS**

Various statistical analyses have been performed to attempt to tease apart what may be the underlying cognitive factors, accountable for the significantly improved post-treatment performance scores on an extensive battery of psychometric tests. Based on these preliminary group analyses, we tentatively conclude that the improvements in the cognitive functions are attributable mainly to a generalized improvement in the ability to maintain focused attention and an enhanced ability to process information more efficiently. The results strongly suggest that, in the main, gains achieved by the patients in the cognitive domain through their participation in a program of sys-

tematic remedial interventions represent an improvement in the effective functional application of residual cognitive abilities, rather than an increase in the capacity levels of these underlying cognitive abilities per se.

### **EFFECTS OF THE PROGRAM ON INTRAPERSONAL AND INTERPERSONAL FUNCTIONS**

Patient performances on five structured criterion measures of intra- and interpersonal functions were evaluated. It was found that, following the treatments, significant improvements in scores occurred on four measures: self-esteem, self-appraisal, ability to display interpersonal empathy, and a measure of social cooperation. These results support the overwhelming clinical impressions that the program has been proved to be efficacious in improving the patients' intra- and interpersonal functions, as well as in enhancing their ability to apply more efficiently their residual cognitive abilities.

### **VOCATIONAL OUTCOMES**

In the present context, we wish to report briefly on two specific vocational outcomes of the study. The first concerns the employability ratings that were achieved by the program participants at 3 months subsequent to the commencement of the occupational trials and the second concerns the employability ratings that were received by the same patients 9 months later. It should be recalled that the first employability rating was based on the outcome of the guided (nonpaying) work trials that were conducted at the Medical Center, whereas, the ratings given 9 months later were in the majority of cases for actual work status in the community.

Accordingly, it was found that 3 months after the commencement of the occupational trials, 76% of the trainees received employability ratings that qualified them for some work in the open work market (approximately 50% were deemed to be competitively and gainfully employable and 25% employable in subsidized or parttime capacities only); 11% were rated as capable of performing productive work within sheltered workshop environments only; and 13% were rated as unemployable in any capacity, due to a combination of reasons ranging from poor persistence, the need for excessive amounts of personal supervision, to a variety of behavioral problems.

When the employment status of the same patients was assessed 9 months later, it was found that approximately 65% were still employed in various capacities in the open work market, 15% were engaged in productive work in sheltered workshops,

and 20% were unemployed at the time. A case-by-case analysis revealed that the majority of these latter patients were comprised of those who were originally found during the occupational trials to be unemployable, plus some of those who subsequent to the occupational trials were actually employed for some time, but who dropped out from work. The reasons for a failure to maintain one's employment status were traced, in nearly all instances, to inadequate follow-up, maintenance, support systems, involving primarily those patients who came to the program from distant places.

### **SUMMARY**

The program has been shown to be effective in the rehabilitation of a group of neurologically plateaued young adults with traumatic brain injury, who have hitherto proved to be problematic and failed to benefit from conventional methods of rehabilitation. Limitations in space do not permit a discussion of the many theoretical, heuristic, and clinical implications of this study. These will be the subjects of a series of future publications, which are now in preparation.

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