

# Chapter 5

## Contextualizing Rummel's Field Theory

Richard W. Chadwick

### 5.1 A Genealogical Preface

I first met Rudy<sup>1</sup> in 1962 when I was an incoming graduate student at Northwestern University. Harold Guetzkow was then the principal investigator of the Dimensionality of Nations (DON) Project, Harold appointed Rudy as his project supervisor while Rudy was working on his dissertation. I was recruited by Harold to work on the project as a data collector and statistical analyst. We worked well together because of the rigor with which Rudy pursued his work on the DON Project, an integral part of his thesis research. My job was initially to run basic statistical analyses on published data put into tables by other graduate students. I also collected data on conflict behavior within and between states for the period 1955–57 by content analyzing microfilmed *New York Times* (NYT) indexes. Rudy and Harold developed an initial typology of conflict, defining threats, accusations, protests, ultimatums, anti-government and anti-foreign demonstrations, numbers killed in domestic and in foreign violence, and other variables. We modified these definitions many times because the initial definitions were incompatible with the terminology used by the NYT Index. At first, we found that inter-coder reliability correlations between three NYT data coders (including me) using the same sources and years with the same definitions, was almost exactly zero. At the same time,

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<sup>1</sup>I use Rudolph J. Rummel's nickname. To honor the friendship we had in the first decade we knew each other, 1962–72. We parted ways at the University of Hawaii long after the DON Project finished, over our politics and related matters, the details of which would probably shed far more heat than light if they were not long since forgotten.

Rudy independently collected data from the *NYT* itself, which provided much greater detail. The reliability problems were eventually resolved using a refined coding procedure (Rummel, 1966a).

In the course of these labors Rudy and I, often with Harold, had many extended and lively discussions about the meaning of what we were doing. Rudy was a Korean War veteran and in the middle of his pioneering dissertation research and Harold had a long professional history in psychology. When they spoke about their concerns, fears, and hopes, I, barely 22 years old with no similar experience, listened and probed. Out of such conversations, I formed the impression that we did not know enough as scientists, nor obviously did politicians, to prevent catastrophes such as wars, even potentially nuclear war.<sup>2</sup> Secondly, it was possible to learn more that might help to avoid war by studying social, political, and economic systems. And finally, quantitative modeling with the data we were collecting, might serve to structure the environment in laboratory-based human interactions designed to simulate foreign policy decision-making. In turn, this might further our knowledge of decision-making sufficiently to offer some progress towards reducing the likelihood of war. The urgency of this need for knowledge was widely recognized, and was at the core of Harold's creation of the Inter-Nation Simulation (INS) and the DON Project. INS had been set up to simulate foreign policy decision-making environments and DON was created to collect data to test hypotheses that would emerge from the INS work as well as to improve the quality of INS experiments. The intent was, as I understood it, that INS and DON would work together synergistically, the research output of each becoming input to the other over time. When Harold turned over the DON project to Rudy, he also closed INS and began the Simulated International Processes (SIP) project, which in time turned to all-computer simulation despite Guetzkow's initial preference for man-computer simulation. Though on a much smaller scale, the hoped-for INS-DON synergy was very much in the spirit of Wright's (1957) plea for a 'world intelligence center' to develop and disseminate knowledge aimed at reducing the likelihood of a global nuclear holocaust.

## 5.2 Field Theory Genealogy: Take-off Traces

The latent actor/agent-environment sketched above was a key component to field theory frameworks as well as constructivist thinking a generation later (Onuf, 1989) and quite distinct from the 'inherited traits' and Pavlovian and Skinnerian conditioning literature. I am not implying that their orientation was fully constructivist, only that the thinking of the many researchers who earned their MAs and Ph.D.s on these two projects had a common orientation towards decision-making and leadership which recognized that decision-makers and their environments were in large measure defined by the beliefs, attitudes, and situational orientations of participants.

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<sup>2</sup>For a fuller discussion of this point, see Chadwick (2011).

In the classic S-O-R model, there was now substance not only in the 'O' but in the '-O-', the dashed lines representing communication in its symbolic and semantic fullness. As Richardson (1960: 12) put it, 'Critic: Can you predict the date at which the next war will break out? Author: No, of course not. The equations are merely a description of what people would do if they did not stop to think.'

One can see in this simple dialog with an imagined critic the latent field theory and constructivist insights, and also the need for the careful ontological synthesis done by Onuf, Wendt, and others two generations later. With this focus, Rudy was quite sensitive to social science theories and methods that might offer some pointers to make progress in the direction of more volition-oriented theory. It was in this learning process that Rudy introduced me to Quincy Wright's *The Study of International Relations*. In particular, he introduced me to Wright's review and interpretation of the general field theory approach to theory development (Wright, 1955: 524ff). Wright (1955: 546) introduces his field theory formulation with 'six capabilities and six value dimensions' ..., 'the rapidity and direction of movement of each depending in considerable measure upon the relation of its four structural levels. This cannot, of course, be represented visually in three-dimensional space, but imagination may picture a twelve-dimensional semi-opaque cheese, within which maggots crawl around, the larger ones representing states with the government at the head and the people at the tail.'

Wright did not take the representation further to develop a quantitative theory of international relations. He apparently got the idea of representing the movements of states as vectors in an n-dimensional space of countries' attributes from his brother, Sewall Wright, a geneticist and developer of path analysis. Jack Sawyer introduced Rudy to the basics of factor analysis, the technique used in the DON Project to uncover patterns in relations between variables. As I recall, some 236 variables were collected across 82 countries but because of insufficient data fewer were actually used. In the process I learned about factor analysis from him. I had an opportunity to return the favor after Rudy left first for Indiana University and then Yale, where Betty Bockelman assisted him in much the same manner. We were concerned with how to compare factors in analyses of different data sets with the same variables. Wandering through Northwestern's library my eye caught a book in the psychology section written by Ahmavaara & Markkanen (1958), which solved precisely the same analytic problem, though the substance was different (comparing the brains of alcoholics and non-alcoholics on various cognitive dimensions). The trick was to treat the factor loadings as ordinary variables and do multiple regressions of each factor's loading from one data set on the factor loading matrix of the other data set.

### 5.3 Systems Thinking

Systems thinking was then a relatively new paradigm for understanding the nature of creative change in beliefs, technology, and behavior of large aggregates of people. It starts with the assumption that there is continuous interplay between individuals and their environments complicated by the fact that individuals are a

large part of each other's environment. From a paradigmatic perspective field theories are a type of systems theory that searches for causal explanations for individual interactions or events not in prior events or environmental circumstances, but in the purposive behavior of individuals shaped by their collective beliefs, perceptions, and experience of what is real, what is possible, and what is desirable. Understanding human behavior and communication in large aggregates over time is not something for which we humans have good natural perceptions, not to mention methods of organizing perception into data recordings, and even less explaining such systematic observations with theory. For example, Sawyer & Levine (1966: esp. 730f) applied factor analysis to cultural characteristics and concluded that comparative economic efficiency of types of social and political organization, rather than geographic cultural diffusion, accounts for similarities and differences among different cultural groups. Incomplete as it is, their work represents a very high level of grounded theory generalization about large scale human social systems, undetectable by individuals within those systems unless they have a prior appreciation for their system. A generation later, Inglehart & Welzel (2005) reach a similar conclusion, that economic development influences value change in increasingly democratic ways. For decades, these and similar results have pointed to the need to use dynamic factor analysis in foreign policy studies. Thus, over-time relationships can be perceived between changes in historical contexts, values, political policy judgments, and cultural changes related to economic and political development. Unfortunately, as Ricci (1984), Zegart (2015), and others have pointed out, the gaps between academics, operational policy analysts, and philosophers remain as abysmal as ever. We are still mired in historical institutionalism, path analysis, and social network analysis, or even neural net analysis, none of which enable us to see the forest for the trees, that is, the nature of human systems dynamics.

## 5.4 Field Theories

Field theory in the social sciences has an underlying system approach or paradigm, but it did not begin that way. 'Field theory' began its use as a term to describe models of magnetic and gravitational fields. By analogy, people are embedded in fields that attract or repulse them, not in the sense of electrical energy force fields but in Lewin's sense of culturally conditioned linguistic and conceptual environments that induce their psychological and behavioral predispositions. 'Fields' exist as individual and collective memories, motives, expectations, goals, and purposes distributed over a geographical region and fluctuating over time as people interact. The way Rudy put it much later, 'We are a dynamic field of needs, attitudes, sentiments, emotions, expectations, and perceptions; a subjective field within which the world is given a unique interpretation; a perspective through which reality is transformed.' (Rummel, 1976b, Sect. 2.1.) To use 'analogy as a source of knowledge' (Lorenz, 1974), consider computers. You cannot tell how people will behave unless you know how they are 'programmed,' what they are prepared for or 'need' for input, how they are being used, what is presumed to be available for output, and

what decisions are made which creatively regulate that output. The 'political system' concept in the work of Easton (1953) fits this model, yet Easton himself, to my knowledge, did not take the next step to a 'field' framework.

Early development of field theory in the social sciences begins with psychology, chiefly in the work of Lewin (1939). In his framework, individuals (and groups) are conceived of as goal-seeking life forms in environments which, over time, induce learning. Environments are perceived as opportunities and obstructions to goal attainment, motivating people to adapt their behavior. The goals themselves vary as basic needs at the biological level are adequately met.<sup>3</sup>

All these ideas constituted my own 'little field' as I tried to understand the purpose of the DON Project and what my mentors were about. As I recall, Rudy began his thinking about fields with Wright's idea of states propelled by interests and power in an n-dimensional space defined by their attributes, and Lewin's idea of people interacting in fields constituted by their personalities. Over the next four or so decades, Rudy made their insights for understanding international conflict quantitatively and systematically researchable, at least in principle, and applicable to Guetzkow's and his concern with preventing war.

Lewin sketched his theory as an equation,  $B = F(P,E)$ . Behavior B is a function of the life space of an individual, the personality P and environment E (Fig. 5.1). Here, the irregular sections represent an 'intellectual geography' or life space, that is, events or situations through which a person travels over time and which influence the person P moving from some origin O towards a desired goal G. Both the person and the environment are in flux, thus different people at different times experience different situations. Each person (or group) may well constitute one of those irregular shapes in the graph—each shape representing their 'field' of beliefs and predispositions, as each pursues their own goals in interaction with P. Although Rudy takes exception to this graphical representation, at the end of his critical review of the literature, he notes that he is in substantial agreement with Lewin's equation.<sup>4</sup>

Further, consider one of Rummel's concluding graphs (Fig. 5.2). As I see it, this is clearly a more detailed rendering of one of Lewin's irregular shapes, some details applying Maslow's concept of basic needs.<sup>5</sup> Thus, Rudy is integrating a variety of theories and, as such, makes an original contribution to at least one type of field theory.

Rudy represented his field theory of international politics by this simple equation,

$$X_{ij} = \alpha_{j_1}f_1() + \alpha_{j_2}f_2() + \dots + \alpha_{j_p}f_p() + U_{ij}$$

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<sup>3</sup>While researchers and theorists are cognizant of environmental, anthropological, and genetic perspectives, the feedback dynamics at various levels of analysis are not explicitly modeled in this field theory approach.

<sup>4</sup>See at: <http://www.hawaii.edu/powerkills/DPF.CHAP3.HTM> (search for Lewin). However, Burnes & Cooke (2013), building on Rudy's critique, find the graphic representation superior to the mathematical modeling attempted by Lewin himself.

<sup>5</sup>Rudy discusses Maslow's theory of basic needs extensively in Chap. 21; see at: <http://www.hawaii.edu/powerkills/DPF.CHAP21.HTM>.

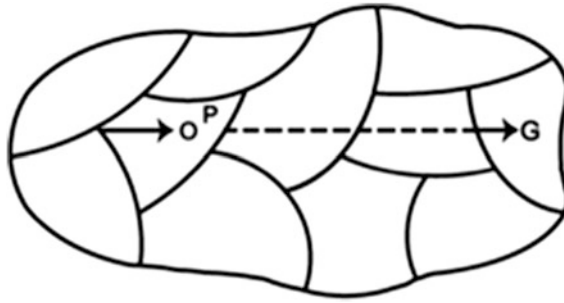


Fig. 5.1 Graphical rendering of Lewin's field concept. Source [https://commons.wikimedia.org/wiki/File:Lewin%27s\\_field\\_theory\\_2.png](https://commons.wikimedia.org/wiki/File:Lewin%27s_field_theory_2.png)

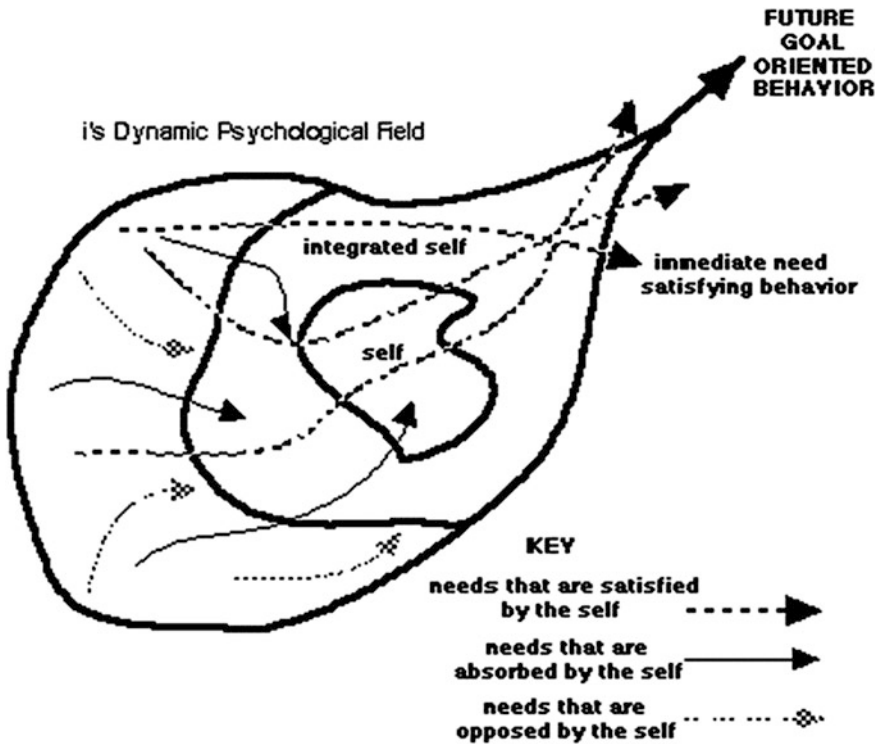
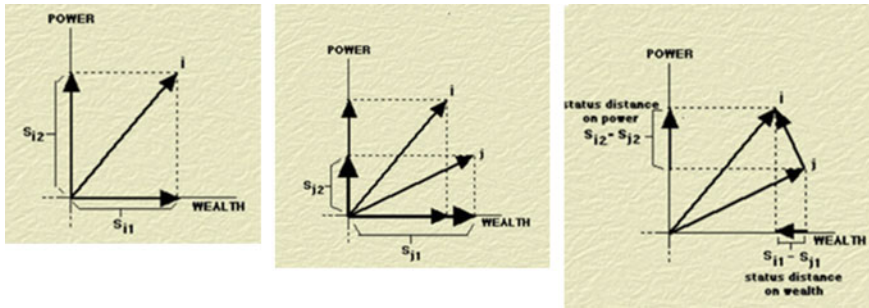


Fig. 5.2 Rummel's sketch of the dynamic psychological field. Source Rummel (1975), Fig. 28.2; see also Chap. 3



**Fig. 5.3** Rummel's power and wealth distances and vectors. *Source* Rummel (1975), Fig. 17a–c. Models based on this framework can become quite elaborate; for instance, see <http://www.hawaii.edu/powerkills/WPP.FIG7.1.GIF> applying it to totalitarianism

where  $X_{ij}$  is a 'behavioral manifestation'  $j$  taken by an actor  $i$ , the  $\alpha$ 's are parameters regarding the behavioral manifestation, the functions  $f_{1...p}()$  in the equation are intentionally left blank to represent the myriad latent functions composing a personality and an environment, and  $U_{ij}$  represents the person's uniqueness.<sup>6</sup>

To connect to traditional international politics research, consider Fig. 5.3. Here power and wealth are represented as vectors motivating states as decision-making units to pursue survival through increasing power and wealth. So far, this is fairly standard realist theory, expressed in a field-theoretic language.

Several key ideas in Rudy's field theory make his perspective unique. The first is 'distance',<sup>7</sup> usually conceived in a multidimensional space of differences between states' attributes, and typically related to estimates of power differentials. I write 'usually,' because although the vast majority of his work related differences in states' attributes to differences in their behavior (as did Wright, 1955), some of his earlier work (Rummel, 1966b) used a variety of functions, multiplying attributes for instance, with significant results. In discussions with him, I inquired as to why he abandoned all but differences in attributes to produce differences in behavior; the only answer I recall is that alternatives just were not elegant. Simplicity and beauty are hallmarks of great theories, true enough, but then there is also evidence.

Another key characteristic of Rudy's field theory is the construction of data tables on pairs of states (dyads). Tables with dyads in rows and attributes or attribute differences in columns are hallmarks of his theory. But quite apart from the role such tables played in his field theory, that very format was a stroke of creative genius, independent of whether the dyadic contents were conceptualized as 'distances' or some other function of attributes I had not seen a prior use of data in that format. The closest, even in principle, was Richardson's (1960) differential equations modeling

<sup>6</sup>This equation is found in Rummel (1975), Chap. 11 and is, I think, fairly representative of the generality of other equations in other chapters on related topics.

<sup>7</sup>The 'distance' concept is explicated throughout Rudy's writing, but see Rummel (1976b). Rummel (1966b) experimented with a departure from 'distance' as a key concept.

conflict dynamics between two nations and his speculation about extending such analysis to  $n$  nations, where  $n > 2$ . In Richardson's work, it was the military capabilities of a state's rivals that impelled states to arm or conversely, disarm, depending on the interpretation of their intentions. The fear parameter in Richardson's equations amplified and dampened the effect of power differentials between states. While fear was included as a parameter in his best-known equations, that parameter was defined by Richardson as the difference ('distance' in Rummel's terms) between pairs of states' conflict and cooperation. (Cooperation was seen as a function of trade in the Kantian tradition.) Thus, it was not simple differences in attributes that produced behavioral differences. Rather, attribute differences evaluated by differences in conflict and cooperation levels between them, create variable levels of fear that in turn produce behavior (arming or disarming). One might infer that mathematical 'field theory' has a longer history than conventionally assumed, since Richardson first published his work as early as 1919.

The power and wealth vectors in Fig. 5.2 could be roughly measured with DON data or similar collections, to calculate differences between states, but 'rough' also implies—for the obvious reasons of validity and reliability—low associations with behavioral data. Van Atta & Rummel (1970) used 1963 international relations and state attribute data to test the differences cause behavior hypothesis. They found no relationship (no variance in behavior explained by differences alone); however when they controlled for certain 'uniqueness' of states, they found about half the variance in behavior explained. Aside from the technical questions posed by using the method of canonical factor analysis (the first canonical factor accounted for about half the variance in the 'space' defined by the first three behavioral dimensions), the difficulties of operationalizing a field theory are formidable. Consider that the 'field' contains the psychological dimension, the beliefs goals, values, worldview, and so on, none of which were made operational with data. Given these handicaps, the results, though disappointing, might have been expected.

Rudy wrote a critical overview of other field theory approaches,<sup>8</sup> which focuses on the research being insufficiently cross-disciplinary in theory construction and integration, on being insufficiently grounded in data, and on being insufficiently sophisticated in mathematical formulation. These criticisms, valid as they are, are fairly representative of scientific enterprises in general and Rudy's would seem to be no exception: The equations and graphical illustrations shown above are not much different in detail, his data difficult to come by and analyze, and his integration of his theory with other disciplines incomplete. By the late 1970s, Rudy himself shifted from further development of this framework to immersing himself in traditional international relations and cognate fields' literature mostly devoid of mathematical representation and rigorous logical deductive formats.<sup>9</sup>

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<sup>8</sup>See <http://www.hawaii.edu/powerkills/DPF.TAB6.1.GIF> for a tabular summary and Rummel (1975), Chap. 6 for the detailed review.

<sup>9</sup>Rummel (1976a) was drafted much earlier, and contains a self-analysis of why he moved to non-quantitative literature for inspiration.



To stop at this point in evaluating field theory in general or his in particular would be a disservice to both, for one needs to understand the larger context of this shift from quantitative, empirically grounded research to the traditional library research of scholars. The DON Project research agenda required substantial funding and the principal supplier was ARPA. This funding ceased by 1975. However, research of a quantitative nature into international politics continued inside the intelligence community. For instance, this is where Stuart Bremer's GLOBUS Project ended up, after starting at the Berlin Science Center thanks to Karl Deutsch. It had created a massive database and embodied a variety of theories about the international behavior of states. Similarly, Mihajlo Mesarovic's WIM computer simulation, originally supported by the Club of Rome, morphed into the Pentagon's Globesight model and Aristotle database.<sup>10</sup> For several decades following Guetzkow, relatively large-scale quantitative international relations projects were well funded, and as uses for them were found they lost their public funding and drifted into the world of intelligence. To think that field theory and its parallel constructions failed to develop would, I suspect, be a mistake.

## 5.5 Parallel Constructions

Burnes & Cook (2013) have written an extensive review of 'field theory' research by that name. A broader framework, however, placing field theory in a larger social science context, would be highly desirable. Only a few generations ago, about all that existed of 'political science' was what we now call leadership theory, public policy and administration, and political philosophy. Psychology was dominated by the psychoanalysis schools inspired by Freud and behavior conditioning theories of Pavlov and Skinner. Crowd psychology, especially mob psychology (Le Bon) hinted at a crude form of field theory. But so far as I can see presently, it was the insight of Adam Smith and the dynamic 'invisible hand' of the market place (the idea that the behavior of individuals and communities in interaction had a dynamic of their own that needed to be understood as distinct from individual psychology or crowd dynamics), that ushered in a third 'level of analysis,' the system level. Today, of course, there is wide acceptance of the insights by Singer (1961) and others' that at least three analytic levels (individual, organizational or bureaucratic, and systemic) are needed in international relations theory, each with their own structures and functions. But even today, there is no systematic effort to integrate them into a multi-level theory, not to mention to follow the work of Richardson to examine longer term multi-nation dynamics. In this context of inchoate theory development, Rudy's field theory transcends earlier efforts in relative clarity and comprehensiveness.

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<sup>10</sup>For a short time in 1990 I acted as a 'scientific adviser' for the Pentagon to evaluate Globesight and Aristotle at DRMEC (Defense Resources Management Education Center) at the request of its then Director, Robert von Pagenhardt, in the Naval Postgraduate School.

Rudy did not extend his formal field theory research to other problems than those of understanding the behavior of states, preferring more expressive modalities, art and literature appreciation, painting, and writing novels to express his deeply held humanitarian values such as the avoidance of nuclear war. However, using Rudy's field theory equations and his more philosophical discussions of their implications, one could imagine reinterpreting theories that are more partial in scope, for example, operationalizing an historical institutionalism framework with dynamic factor analysis, applied to historical trends in the satisfaction of basic needs, trends in the organizational structure of corporations, governments and empires, and so on. One could imagine reinterpreting social network analysis projects in terms of field theory 'distances' between 'nodes' (people, groups, ...). Similarly, in business management, Deming (1982, 1993), who became well known for his systems approach to understanding the dynamics of corporate-consumer relations, assumed that we all live in systems (organized relations) which determine our average behavior, that all systems decay and require intentional effort to be maintained and reinvented as technology changes. His insights can easily be incorporated into field theory. And as long as field theory equations are understood to be describing the behavioral dynamics of human interaction at different levels, even constructivist interpretations in terms of 'rule making' (Onuf, 1989) can find a place. Rules and rule changing can be understood to be both the outcome of adapting to the patterns described by field equations and the independent (exogenous) sources of new patterns in 'differences' described by field equations. Such speculation is a far cry from imaging states as Wright did, as maggots with states as heads and people as tails, vaguely sensing each other and moving by instinct in a 12-dimensional green cheese. But we still have a long way to go.

## 5.6 Implications and Possible Applications

Sooner or later, a generation of better mathematically equipped political scientists will take advantage of the power of computers and big data to test theories of human decision-making at multiple levels, and find ways to integrate such models into our political and social cultures through education.<sup>11</sup> That is, if we do not disintegrate first in some 'spasm' nuclear war, nuclear winter, man-made pandemic, or some such. I am reminded in that regard of an archeological dig in Petra, Jordan, of a culture that excelled at sandstone carving, building thereby a city of over 30,000 people by some estimates, in the middle of a desert. They had learned to harness water resources which gave them an economic advantage throughout the region. They were apparently destroyed by a series of earthquakes that obliterated their dams and wiped out the entire infrastructure, a catastrophe from which they never

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<sup>11</sup>Cattell (1972) expressed this viewpoint quite eloquently and referenced Rummel as one of many pioneers in this path.

recovered. From a field theory perspective, it was the interaction of the environment with the culture and the motivational landscape of the people in it and other cultures that related to it, that created the disaster, hence could have been avoided.

For me the question arises, do we have equivalent 'fault lines' in our thinking and our cultural edifices? There is a long list of current dangers to our civilization, developed by a number of scholars.<sup>12</sup> Do we have the time to develop this field theoretic perspective, as I am sure Rudy would hope, given his focus on freedom and democracy, to identify such fault lines and educate ourselves at all levels so that we can in fact empower ourselves as a species, if not a culture, to survive them?

I've come full circle from Guetzkow's and Rudy's concern with the catastrophic potential for nuclear war, via Cattell's review of the infant steps of political science to address such issues and the details of Rudy's field theory developments following the efforts of Wright and Lewin, to a number of complementary developments in systems theory of which field theory is a part. I also noted the non-mathematical developments in constructivist thinking which complement field theory rather than compete with it, if field theory is understood to describe the environment within which people learn to make decisions and in turn change their environments. As with the human actors in Guetzkow's Simulated International Processes Project, perhaps the least developed aspect of field theory is precisely that noted by Rudy when he hypothesized that 'We are a dynamic field of needs, attitudes, sentiments, emotions, expectations, and perceptions; a subjective field within which the world is given a unique interpretation; a perspective through which reality is transformed.' We have mapped much of the environment of human decision-making, but very little in decision-making in comparison with the work ahead. Field theory is still in its infancy, but current researchers like Inglehart and Schwartz are teaching it to walk.<sup>13</sup>

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<sup>12</sup>For a modest effort of my own at coming to grips with one of them, see Chadwick (2014).

<sup>13</sup>See Inglehart & Welzel (2005, 2010) and Schwartz (1994) and Dobewall & Strack (2014) for a comparison.

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