

Book Reviews

Neuman, Yair (2014). *Introduction to Computational Cultural Psychology*. Cambridge, United Kingdom: Cambridge University Press. 226 pp. ISBN 9781107661585.

The Case of Neuman's "Computational Cultural Psychology": An Innovative Theoretical Proposal and Welcomed Toolbox Advancements

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Europe's Journal of Psychology, 2014, Vol. 10(4), 783–791, doi:10.5964/ejop.v10i4.806

Published (VoR): 2014-11-28.

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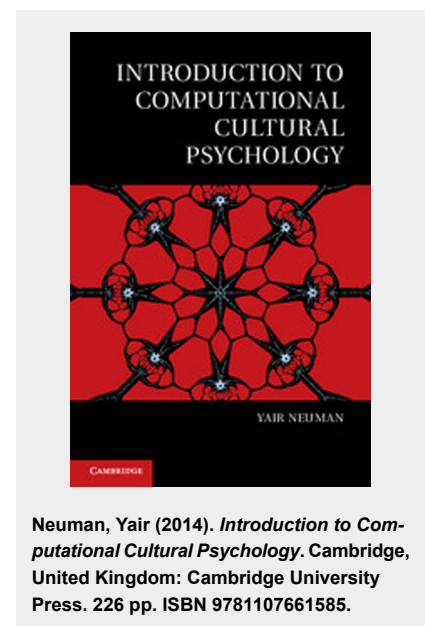


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The book "*Introduction to Computational Cultural Psychology*" (Cambridge University Press, Cambridge, 2014), written by Professor Yair Neuman (Ben-Gurion University of the Negev – Beer-Sheva, Israel), is a further important contribution to the development of Cultural Psychology. The book is innovative, interesting, capable of cutting across different disciplines and scientific fields with ease but without ever slipping into banality or speculation.

Cultural psychology is developed and implemented in this book through the use of computational tools. In general terms, Neuman, through a complex semiotic perspective, raises the possibility of using new analytic and computational tools for the study of meaning-making processes. Over this remarkable work, he presents a broad overview of various computational tools capable of handling the complexity of the meaning-making process "in-between" cultural systems.

Neuman's endeavor focuses on running a series of in-depth studies through the development of computational tools that are capable of dealing with an extensive textual corpus. So far this task has proved quite impossible because of the enormous size of such a corpus and because of the weakness of certain theoretical perspectives underlying the use of previous tools of analysis. The results of Neuman's efforts appear solid, fruitful and very promising in this regard.



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Neuman's mastery of traditionally discrete domains of knowledge is considerable. He manages to deal, from a multidisciplinary perspective, with cultural psychology, semiotics, psychoanalysis, dynamical systems, chaos theory, theoretical biology, and the use of statistical and computer tools.

Those who have read Neuman's two other books - "*Processes and Boundaries of the Mind-Extending the Limit Line*" (Published by Springer, New York, 2003), and "*Reviving the Living: Meaning Making in Living Systems*" (Published by Elsevier, Oxford, 2008) - already know the fluid and clear style of argumentation and discussion which Neuman is apt to adopt. Issues of great complexity and importance are discussed through numerous examples, anecdotes, dialogues, including the description of personal episodes. This clarity never detracts from the rigor and meticulousness of a clear, precise and detailed argumentation. The style is fascinating and keeps the reader glued to the text. We emerge from the reading enriched not only by the amount of information offered, but also by the quality of the questions and open issues which keep on crossing the reader's mind long after finishing the book. Even readers not intimately familiar with statistical tools can enjoy reading this book. Those less interested in the detailed descriptions of the statistical instruments can skip the paragraphs of the chapters where these tools of analysis are presented.

The field of cultural psychology is bound to benefit from this work. In addition to the technical aspect of the various analytic procedures, crucial theoretical and epistemological issues of cultural psychology are addressed. Culture is discussed and analyzed in its ability to mediate between multiple levels of interaction. The somatic level, the subjective level, and the cultural and social level are ingeniously interwoven by Neuman's studies and reflections. The corporeality, action, and materiality of interactions and routine practices are observed and described in their complexity and non-linearity as semiotic cultural processes.

Culture is not presented as a Platonic idea or a set of instructions already given and passed down by genetic inheritance. On the contrary, it is a semiotic interface enabling the relationship between a person and her environment (whose materiality is always mediated by the presence of Others). It is not a rigidly structurally defined system but a non-linear process of transformation in continuous development. Neuman hearkens the lessons of two great semioticians, often regarded as antithetical and irreconcilable: Saussure (structural linguistics) and Peirce (interpretive process of semiosis). This connection is further strengthened by the lessons of Vygostky's historical-cultural school and Bakhtin's attention to dialogic-interpretive activity.

In this regard, it is important to emphasize that the recursive circularity between language and thought is discussed in depth in each section of the book. Furthermore, the language-thought relationship is discussed from a keen perspective which recognizes the primary importance of the bodily processes (smell, taste, visual perception, etc.) and of social relations (De Luca Picione & Freda, 2014). In this sense, text-making always takes place within culturally defined practices and in the presence of other persons, for communicative, pragmatic and constructive purposes. In fact, textualization is considered a way of being and acting, that contributes to the organization of the world. Language takes shape in the constant pragmatic exchange with others, in a wider discursive field of speech. Language is a semiotic device that enables human beings to implement their material relations with the world, and make them more complex. A text, in its most general sense, is a gateway to the understanding of a culture because culture is semiotically mediated (Valsiner, 2007). Both in continuity and in dialogue with the Cultural Psychology of Jaan Valsiner (2007, 2014), the focus on specific semiotic processes of sense-making recurs throughout the whole book. This focus is extensively developed through several concrete and specific applications.

From Neuman's perspective, the mind is a semiotic embodied mind which develops from a shared cultural background and a symbolic mediation made possible thanks to others. The mind is constituted by processes of meaning-making. The construction of meaning is performed through two fundamental processes: the *perception of differences* and the *social mediation* of others. We find here an interesting development of Gregory Bateson's ideas from a cultural perspective.

The basic unit of the mind – whether the mind of a chicken, the mind of the immune system, or the mind of a human being – is as explained by Gregory Bateson (2000, 318) a “difference which makes a difference [...] Signs, as units of meaning, exist in every complex biological system. We may therefore define the “mind” as the general term for a *meaning-making system*. [...] There is of course a difference in the way different systems are involved in meaning making. Human language and its written representation create a sharp demarcation between human beings and the rest of the animal kingdom. Despite similarities with other signaling systems, human semiotic systems are complex and abstract in a unique way (Neuman, 2014, p. 8).

Language, with its possibilities for abstraction, creates the conditions for the further development of the mind. The relationship between subject and environment is made possible through the mediation of signs (which are transformed into differences, differences that generate differences). In this sense, the mind is a continuous social and relational process, because signs can exist only at the level of collective communication. Subjectivity - from a perspective critical of the solipsistic Cartesian rationalism - is restored as a profound and radical bodily and social experience. The social-material has precedence over the metaphysical, transcendental, and individual self.

The rejection of all metaphysical and transcendental perspectives leads to consider the notion of context as central in cultural psychology for understanding any process of meaning-making. Understanding a different culture in its context entails that we understand cultural situations. It depends on our ability to grasp the material environment with its symbolic value as well as the common knowledge of the participants and their evaluation of the situation from within their set of values (Neuman, 2014, p. 13).

From these considerations, Neuman's ambitious, specific project takes on its own specific *form* and *substance*:

“While there is no news in understanding cultures and the way they interact with the psychology of the individual, there is news in the way I propose to address this challenge. Cultural psychology has gained insights from close ethnographic analysis of other cultures as well as from some quantitative studies. However, in recent years we have been experiencing a change that cannot be ignored or dismissed by cultural psychologists. The emergence of the Web, the establishment of huge data repositories unprecedented in human history, and the development of powerful information technology tools for text processing and data analysis have changed the scope of our research. Whether such a changing landscape is an opportunity or a fashion is still an open question, but my aim is to introduce a new field and some preliminary evidence that this is indeed an opportunity” (Neuman, 2014, p. 15).

Neuman faces in his book a great, insidious challenge: is it possible to understand the nature of the human mind, semiotically mediated (and understood as a system of meaning-making), through computational tools? This is the real challenge posed to an innovative *Computational Cultural Psychology*. Neuman deals with such a transition and methodological transformation in terms of a *quantum leap* in psychology. The ability to develop and use innovative tools cannot be ignored, discounted, or denied. Neuman's purpose is being able to detect and study the time course and complexity of the systems of meaning-making by means of statistical and computational tools.

This follows exactly in the footsteps of an influential reflection by [Salvatore and Valsiner \(2010\)](#) about the possibility of developing an idiographic approach capable of creating generalized knowledge. In this sense, the classical opposition between the qualitative and the quantitative becomes immaterial.

They state that every science is idiographic in its relationship to the phenomena under investigation, but it is also nomothetic because it is always focused on theoretical assumptions which define a phenomenon. ([De Luca Picione, 2013](#); [Salvatore, Gennaro, & Valsiner, 2012](#); [Salvatore & Valsiner, 2010](#)).

In the detailed, in-depth examples in Neuman's book, one can find the full synthesis of a qualitative interest for relational phenomena with the precision, accuracy and formalism of computational tools. The statistics and the systems of algorithms designed by Neuman and his colleagues are not developed as a purely formal exercise, but are in fact tools which can be used and implemented to yield new knowledge.

"My suggestion is that in order to be relevant to the study of complex systems and to cultural psychology in particular, psychology should undergo a change, becoming interdisciplinary in nature by relying on enormous resources of digital information through the platforms provided by modern information technology and by adopting powerful computational tools for the analysis and simulation of real world data" ([Neuman, 2014](#), p. 22).

Reading Neuman's book and his proposal of a Computational Cultural Psychology, I was reminded several times of the French mathematician Benoit Mandelbrot who, in the '60s and '70s, could visualize, by using the early computers, fractal figures unimaginable until except by intuition. Computers allowed Mandelbrot to explore the possibilities of fractal geometry ([Mandelbrot, 1975](#)). The development of this geometry was not an exercise of pure formalization; it was rather an endeavor toward a qualitative topological geometry, interested in isomorphism and in relationships between the parts and the whole. This geometry has been successfully applied to a variety of disciplines, from biology to economics, from astronomy to medicine, from geography to social phenomena. Likewise in the case of Computational Cultural Psychology: the use of computer resources becomes a springboard to explore complex, non-linear relationships in the meaning-making processes which every cultural system develops through interactions between people.

Neuman always adopts a critical approach, and his enthusiasm for the innovative tools proposed is never blind to inherent difficulties. Unlike the general idea of "computational social science", computational cultural psychology focuses on the way the human mind is mediated through sign systems, and the way this mediation may be studied through computational tools and new data repositories. Neuman is well aware that our hermeneutics and interpretative skills are not replaceable, and that men and women cannot be summarized and described by linear descriptions. In this volume, one never finds a static representation of human beings; we are rather presented with fascinating and dynamic descriptions of the complex processes of human sense-making engendered by mundane intersubjective situations.

It is impossible for this review to dwell on a detailed description of the computational tools used by Neuman. The book presents and describes every tool and every procedure in detail. However, I am interested in presenting here a general overview of the chapters and some of their contents which can be considered central to any semiotic process of sense-making, and to its study, comprehension and research.

In this regard, in Chapter 3, the computational tools used by Neuman are aimed at identifying the level of concreteness and abstraction of signs and words. This purpose is a remarkable one because it concerns semiotic devel-

opment and recursive transformations between the referential-denotational function and the abstracting-generalizing function of signs. In two detailed statistical studies, starting out from a large textual corpus on pairs of terms "sweet-sweetness" and "dark-darkness", Neuman reaches conclusions of great interest.

Our sign system, which is social by nature (Saussure, 1972), starts with referential denotational signs to the concrete reality/experience, whether external or internal reality (Danesi, 2003). This reference to the embodied experience should be clarified in order to sharpen the difference between human and nonhuman cognition. In contrast with animal communication, human language "deals mainly with entities" (Vauclair, 2003, 12) rather than with holistic situations (e.g., the presence of a predator). Therefore, our language is a language of "reification" (Neuman, 2003), as it allows us to "crystallize" the dynamic flux of sensorimotor experience into objects of reflection and contemplation (i.e., signs). (Neuman, 2014, p. 52).

In this seminal research, Neuman provides empirical support for Peirce's hypothesis about the processes of *reification* and *hypostatic abstraction* whereby a predicate is transformed into an argument (Neuman, 2014, p. 53). Human thinking is characterized by internalization of symbolic interactions with others relating with objects in the world. By social-semiotic interaction, human thoughts become more abstract, and the signs - now used to reflect on the external and internal reality - drift far away from their embodied origin.

In Chapter 4, Neuman describes another equally interesting study on the difficulty and the importance of understanding another cultural mind through a careful analysis of language and thought. Starting from a wide, long and deep reflection, Neuman produces evidence from mathematics, philosophy, and linguistics, for the idea that *culture is what is lost in the translation process* (p. 57). The seemingly paradoxical methodology, discussed in-depth, is used to identify the *themes* that are lost through the back-translation made by a translation machine (MT). Structural and semantic criteria are used in a complementary way, and it is possible to analyze large amounts of texts, through an automated procedure, in a short time. Starting from these findings, important implications are discussed in terms of utility and applications.

Another disputed question is addressed in Chapter 5: the use of metaphors in language. Metaphor is a psycholinguistic device used to describe a concept in terms of another.

According to the metaphorical view, human thinking is deeply rooted in conceptual metaphors that underlie processes of knowing, learning, and experiencing. That is, our thoughts are mediated through language and conceptual metaphors are one of the main tools that guide this mediation. We may conclude that understanding people is possible by understanding the metaphors they use (Neuman, 2014, p. 79).

Neuman's purpose in his fifth chapter is, first of all, to characterize the way metaphors can be identified and their underlying conceptual structure extracted. This intent is the basis for the development of the automatic processing and analysis of large textual corpora. Here too the starting point is the importance of distinguishing first the level of abstraction and concreteness. Furthermore, an important part of the analysis of metaphors is the identification of the *semantic frames* and *different syntactic structures* involved in the construction of a metaphor (that is, what verbs, nouns, adjectives are chosen and used, and how). This chapter too expatiates on detailed algorithms, statistical analyses, and an extensive discussion and conclusions about the possible uses of these computational tools.

Chapter 6 presents another admirable discussion about the circular relationships between body, language and culture. There is an interesting study about the human sense of smell. By highlighting the inadequacy of a

simplistic model where each odor corresponds to a specific receptor, it is argued that the meaning we attribute to a smell is weaved through "multiple threads of memory, comparison, language, and judgment, all of them deeply rooted in our cultural schemes and practices" (pp. 100-101).

We find here an interesting discussion about the multidimensionality of each experience and the need for action and cognition to simplify and reduce the continuous and undifferentiated flow of experience. This complexity reduction is made possible by symbolic mediation providing discrete lower-dimensional tools. These symbolic representations are transformed recursively into objects of reflection and - via a complex dynamic and developing network of associations, connotations, metaphors, and metonymy - they become themselves objects of greater complexity. Culture contributes directly and efficiently to this complex continuous circle between high dimensionality and low dimensionality, introducing variability and novelty. The specific study of smell fits into this theoretical framework, and Neuman's computational model is developed based on how connotation (the extended *sense* of the word) emerges from denotation (the literal *meaning* of a word). From the meaning of the sensory-motor denotative content of a term, one can generate a connotative process through "*association-by-inference*" (p. 109).

In Chapter 7, we find an interesting study on the psychosocial representation of love. Here as well Neuman's computational cultural psychology shows how it is possible through the use of computer tools to go beyond the usual *clichés* found in a popular love song of the '70s, towards a deeper understanding of cultural processes. The text of the song is compared with a vast textual corpus taken from Google Book Search. A historical period of over two hundred years is considered. Through the analysis and study of the frequency of occurrences of adjectives and nouns, a profound, interesting discussion is developed about the synergy between different attempts to understand the modern representation of love.

Chapter 8 is devoted to a topic of paramount importance for cultural psychology: *the relational matrix of the ego* (p. 126). In this chapter, semiotic studies by Bakhtin and Peirce are beautifully linked with the psychoanalytic studies by Bion, Winnicott, and Lacan. Here the uniqueness of "*I*" as sign is taken into account. Unlike all other signs, "*I*" has no clear reference. The sign "*I*" fulfills the mysterious function of associating the lived experience of the individual with a communicable and social form of expression (p. 128). The use of the pronoun "*I*" imposes a tragic, inbuilt gap between the mature subject and herself, a break created by language and the way it distances the subject from lived experience. The unique psycho-semiotic status of the first-person-singular pronoun exposes a duality, a separation, between the inner "*I*" and the social, communicable "*I*". Starting out from this finding, Neuman states that the only way to understand the "*I*" is by carefully *weaving the matrix of objects and relations in which it is embedded*. One may even argue that what we describe as the *I* is no more than the sum of objects and relations in which the so-called individual is embedded (p. 129).

There is no intent here of understanding the *inner life* of a person through a sort of an "archaeological excavation". A person is not *beneath* the surface. Understanding a person implies focusing on the weaving of a tapestry showing what is *in-between* the singularity of the first-person perspective, and the second- and third-person perspectives. This point is crucial for cultural psychology because people need to be understood neither as isolated atoms nor as puppets of social forces. The individual is comprehensible only as the dynamic entity existing in between the singularity of the first-person perspective and the social perspectives where language, or more generally our semiotic systems, function as the "glue" (p. 129).

This discussion leads us to search for a *regularity in patterns of mediation*, rather than a Platonic transcendental self. In a nutshell, Chapter 8 presents a specific perspective on issues of language, interpretation, validity, truth,

and reality, inasmuch as the psychological reality does not reveal itself through linguistic analysis *per se* but from the *emerging patterns of meaning* associated with a “linguaging” activity in context (p. 138).

In Chapter 9, Neuman develops an innovative analysis tool apt to support the interpretations of group dynamics. This methodology is designed to identify emerging themes in the dynamics of small groups. The group matrix - a concept originally used by Foulkes in the '60s to define the network of connections and relationships within a group - is here understood as a *semiotic matrix* of the group. It has a twofold course of development: it emerges from group dynamics in a bottom-up manner and then it directs the dynamics in a top-down manner. In this dynamic, complex perspective, it becomes important to identify *network motifs*, i.e. those particular occurring patterns of connection (consisting of nodes and edges) that represent *units of meaning*. They are conceived of as *basic modules* (basic meaning structures that configure relationships) making up the group as a relational whole. Two in-depth studies are conducted by means of computational tools to identify these motifs. Notably, human interpretation remains central and necessary, but the *motifs* provide empirically grounded anchors for that interpretation.

In Chapter 10, Neuman – following up on his keen interest for the interconnection between corporeality/cognition/culture - investigates the interplay between the function of *eating* as an action aimed at nourishing the body, and *dining* as a symbolic-cultural practice. The study deals with the symbolic value of *soup* through a historical, cultural and contextually determined research (with reference to European habits and texts). By analyzing the time series and simultaneous occurrences of different *recurrence plots* in a textual corpus extending over two hundred years, Neuman studies the measurement of the level of *synchronization* (with reference to the dynamical systems perspective) and non-linear relationships between different words. Interesting considerations of epistemological, social and economic value intertwine in the study about the practice of dining, understood as a *gestalt* evolving in a non-linear way, weaving dimensions of continuity and transformation.

In the last chapter (Chapter 11), we have the opportunity to read about a study on the value of *revenge* and its genesis. The discussion and reflection develop by intertwining cultural psychology and psychoanalysis: cultural practices and subjective feelings are not discussed as separate dimensions only subsequently to be connected to each other. From the critique of Kohut's perspective on the feeling of revenge linked to narcissistic feelings, Neuman discusses the value of law, the desire for order, the painful experience of disorder, comparing in an innovative and fruitful manner several authors such as Bakhtin, Bion, Matte Blanco, Lacan. The result - reached through an in-depth study of two entire novels and other historical documents, all analyzed using computational tools - is topical and teeming with useful potential applications in terms of social safety.

As a final consideration for this review, Neuman's semiotic approach - note that there is no mention of "semiotic theory", only of semiotic approach and perspective - shows us how to take the sign as a basic unit of analysis and how to transcend the language-thought dichotomy in order to move between different scales of a system, from the individual subject to the culture.

Neuman never refrains from discussing, in an honest, clear manner, the hard, complex issues dealt with in his book. He applies great honesty and intellectual rigor to bolster his innovative theses, studies, and methods. Neuman warns more than once that human interpretation is irreplaceable, so computational cultural psychology is a rigorous, meticulous attempt to introduce powerful tools into a systematic analysis interpreting and understanding meaning-making processes.

Finally I want to focus on some issues deserving further development. The book is definitely innovative; however, it could perhaps have the limit of coming across as a large collection of studies carried out in computational cultural psychology. The tools appear to have been developed *ad hoc* to be applied to specific topics and studies. How can their use be extended to other studies? I believe that such an extension and generalization of tool use is a task up to the readers, scholars and researchers interested in it. This book is not a handbook and that is not its purposes. From my point of view, the book is only the first step in a long, still untraveled path. As this is the first worldwide presentation of this approach (although Neuman has published in the last years a large number of papers in leading international journals dealing with semiotics, cultural psychology, intelligent systems, psycholinguistics and psychoanalysis), his intent is to show how it is possible to run in-depth studies and to support interpretative processes through computational tools. The readers can evaluate their real novelty, efficiency and consistency only by specific, concrete examples. In other words, only starting from specific case studies can the readers broadly evaluate both their strengths and their shortcomings.

A last important consideration: Neuman's efforts in dealing with the resources that the Web provides is just an initial step forward, but it does not exhaust the matter. As researchers and scholars, we face the task to reflect in anthropological, psychological and sociological terms about the progress of the Web, its exponential growth and the scope of its transformation of sense-making processes as well. Neuman's semiotic approach should take into account that the web - a contemporary collective symbolic device of construction of reality - is not only an immense ready-for-use text resource. Indeed the web itself is to be studied to understand its new specific ways of producing culture, social relations, new potential connections with the bodily processes and the current transformation of meaning-making processes.

In conclusion, Neuman's book deserves to be read not only for its innovative techniques of computational analysis. Thanks to its interdisciplinary approach, this volume provides an important opportunity for discussion, debates and confrontations among cultural psychologists, semioticians, psychoanalysts, anthropologists, sociologists, scientists, epistemologists, mathematicians and philosophers of language. The book not only presents techniques and tools in a deeply rigorous way, but also provides a real opportunity to develop new knowledge.

Funding

The author has no funding to report.

Competing Interests

The author has declared that no competing interests exist.

Acknowledgments

The author has no support to report.

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