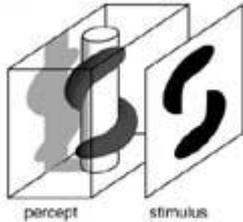


## My Principal Papers:

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### [The Constructive Aspect of Visual Perception: A Gestalt Field Theory Principle of Visual Reification Suggests a Phase Conjugate Mirror Principle of Perceptual Computation](#)



Many Gestalt illusions reveal a constructive, or generative aspect of perceptual processing where the experience contains more explicit spatial information than the visual stimulus on which it is based. The experience of Gestalt illusions often appears as volumetric spatial structures bounded by continuous colored surfaces embedded in a volumetric space. These, and many other phenomena, suggest a field theory principle of visual representation and computation in the brain. A two-dimensional *reverse grassfire* algorithm, and a three-dimensional *reverse shock scaffold* algorithm are presented as examples of parallel spatial algorithms that address the inverse optics problem in perception. The principle of nonlinear wave phenomena and *phase conjugate mirrors* is invoked as a possible mechanism. [Submitted](#) to [Behavioral & Brain Sciences](#) August 2008, [Semi-half-hearted-Rejected](#) September 2008, [Rebuttal](#) October 2008. [Editor's response and author's final comments](#) October 2008. [Invited to submit to Visual Cognition](#) November 2009, [Rejected](#) November 2009, [Wrong paper? No, right paper, wrong title. Author's final surrender!](#)

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### [Gestalt Isomorphism and the Primacy of the Subjective Conscious Experience: A Gestalt Bubble Model. \(2003\) Behavioral & Brain Sciences 26\(4\), 375-444.](#)

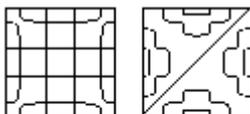
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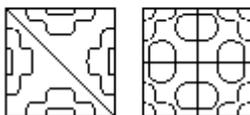
The world of visual consciousness appears in the form of solid volumes, bounded by colored surfaces, embedded in a spatial void. The retinal input on which it is based however is two-dimensional. (in the monocular case) Visual processing therefore computes a solution to the inverse-optics problem, i.e. it performs a transformation from the two-dimensional retinal input to the three-dimensional spatial percept. But the inverse-optics problem is underconstrained, and has no unique solution. I propose that perception resolves this fundamental ambiguity by way of a unique kind of emergent field-like computation as suggested by the Gestalt soap bubble analogy. [Submitted](#) to [Behavioral & Brain Sciences](#) September 1999, [semi-rejected](#) March 2000, resubmitted April 2000, never arrived, resubmitted May 2000. [semi-reviewed](#) October 27 2000. [revise & resubmit](#) February 12 2001. [Author's response](#) September 2001. [BBS responds](#) March 2002. [Author's response](#) June 2002. [Accepted!](#) September 2002. **Published!** March 2004. [\[Summary of Whole Review Process\]](#)

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### [Harmonic Resonance Theory: an Alternative to the "Neuron Doctrine" Paradigm of Neurocomputation to Address Gestalt properties of perception](#)



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The properties of the world of visual experience appear to be inconsistent with contemporary concepts of neurocomputation. For phenomenology presents the mind as a three-dimensional colored structure, while neurophysiology presents the brain as an assembly of discrete local processors in a massively parallel network. Where in that mass of neural circuitry are the three-dimensional volumetric real-time moving pictures that

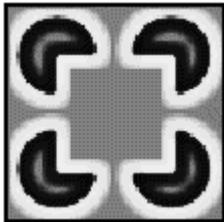
we know so well in conscious experience? A Harmonic Resonance theory is presented as an alternative to the *Neuron Doctrine*, to account for the holistic global aspects of perception identified by Gestalt theory which are so difficult to account for in conventional neural network terms. [Submitted](#) to [Psychological Review](#) July 1999, [rejected](#) November 1999 [Resubmitted](#) to [Behavioral & Brain Sciences](#) September 1999 [Ignored!](#) . [Resubmitted](#) March 2004. [Not Accepted for Review](#) March 2004. [Formal Complaint](#) by author, March 2004. [Paul Bloom Responds](#) March 2004. [Author's Final Word!](#) March 2004.

Submitted to [Journal of Integrative Neuroscience](#) August 2004. [Revise and Resubmit](#) April 2005. [Author's Response](#) May 2005. [Stephen Kerckel Responds](#) May 2005.

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### [Computational Implications of Gestalt Theory I: A Multi-Level Reciprocal Feedback \(MLRF\) to Model Emergence and Reification in Visual Processing](#)

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### [Computational Implications of Gestalt Theory II: A Directed Diffusion to Model Collinear Illusory Contour Formation](#)

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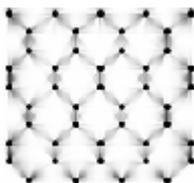


This is a two-part paper that discusses the computational implications of Gestalt theory. I propose a *perceptual modeling* approach, i.e. to model the subjective experience of vision rather than the corresponding neurophysiological state. I propose specific computational interactions to account for the Gestalt properties of perception, and to explain the role of feedback in vision with a specific computational model that replicates a number of visual illusory phenomena. Part II of the paper demonstrates how the more subtle *second order* properties of illusory contour formation can be modeled computationally with a dynamic feedback model, as an alternative to the hard-wired receptive field embodied in the neural network approach. Submitted to [Perception & Psychophysics](#) June 1999, [rejected](#) October 1999. Resubmitted to [Cognitive Psychology](#) November 1999. Due to bureaucratic oversight, each of the two papers were sent to a different reviewer as copies of the same paper. [rejected](#) May 2000. [Resubmitted](#) part 1 by itself to [Cognitive Psychology](#) July 2000. [rejected](#) November 2000. [Author's Response!](#)

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### [Directional Harmonic Theory: A Computational Gestalt Model to Account for Illusory Contour and Vertex Formation. \(2003\) \*Perception\* 32\(4\) 423-448.](#)

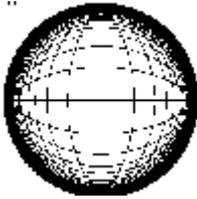
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Neural network models have been proposed to account for the formation of collinear illusory contours as seen for example in the Kanizsa figure. There are however a number of illusory grouping effects which involve perceived vertices defined by the intersection of two, three, four, or more illusory contours that meet at the vertex. A neural network approach to this kind of perceptual grouping leads to a combinatorial explosion in the number of required receptive fields. A Directional Harmonic theory is presented to account for all of these diverse grouping effects by way of a single simple mechanism that involves harmonic resonances, or patterns of standing waves in the neural substrate. A single resonance mechanism replaces a whole array of different receptive fields in a computationally equivalent neural network model. I propose that harmonic resonance is the long-sought and elusive computational principle behind the holistic emergent aspects of Gestalt theory. [Submitted](#) to [Perception](#) August 2001. [Revise & Resubmit](#)

November 2001. [Resubmitted](#) January 2002. [Revise & Resubmit](#) April 2002. [Resubmitted](#) July 2002. [Accepted!](#) September 2002. **Published!** January 2003.

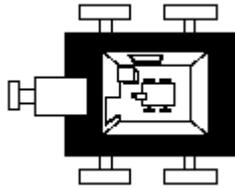
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### [The Dimensions of Conscious Experience: A Quantitative Phenomenology](#)

A short paper on the structure of conscious experience and its implications for the nature of consciousness. Submitted to: [Journal of Consciousness Studies](#) June 2000, [rejected](#) July 2000, [appealed](#) July 2000. [Back & forth](#) July - December 2000 [Rejected](#) April 2001. [AUTHOR'S RESPONSE!](#) Published in *Mind and Its Place in the World: Non-reductionist Approaches to the Ontology of Consciousness*, A. Batthyany & A. Elitzur (Eds), Ontos Verlag, Frankfurt.

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### [The Function of Conscious Experience: An Analogical Paradigm for Perception and Behavior](#)

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A short paper on the function of conscious experience as an analogical representation of the external world. [Submitted](#) to: [Consciousness and Cognition](#) July 2000. [Rejected \(but maybe not?\)](#) January 2001. [Resubmitted](#) February 2002. [Rejected](#) June 2002. [AUTHOR'S RESPONSE!](#)