

Poetics as a Strategy of Inquiry:

Productive Science in Design Practice and Research

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Abstract

For many years practicing artists and designers, as well as design researchers, have struggled to find useful models for their creative work. To understand this struggle, we will use a model that gives intellectual strength and direction to research and creative projects, offering an alternative to other approaches such as *Design Science*, *Dialectic* and *Rhetoric*. The strategy is called *Productive Science* or *Poetics*, and it is a way of focusing and understanding the struggle of a practicing artist or designer as he or she seeks to develop creative work. There are three central features of the strategy: the identification of the essential functional elements of design; the exploration of those elements with an appropriate degree of precision; and the *integration of those functional elements* in design and artistic practice. The exploration of the elements is the process of designing: phases of analysis and synthesis in concrete production, with reflection on the implications and principles that emerge in the course of creative work. The goal of this paper is to explore the potential and significance of *Productive Science* as a strategy of inquiry in design practice and design research. I will illustrate the importance of this strategy with a concrete example drawn from my own practice-based design research. The deepest hypothesis of my work was that *perception, meaning, and emotional expression work together in creating a unity or wholeness in the products of design and in the experience of the people supported by such products*. Exploring this hypothesis in the different stages of the analysis and synthesis is what this research was about.

Keywords

Poetics; Productive Science; experience; perception; emotions; unity; design practice; aesthetics/acoustics

The term *practice* resonates well with designers as well as with artists through concepts such as intuitive thought, imagination, emotional expression, and what Richard Sennett calls “the spirit of craftsmanship” (Sennett, 2008, p. 286). However, the name and historical lineage of *Productive Science* or *Poetics* may not be entirely familiar to practicing designers and design researchers. The community of researchers and designers has struggled for many years to find useful models for their work. For example, researchers in the Design Methods Movement found it important to seek a new “scientific” basis for designing that would lead to a methodology of design. Whether this effort was successful is open to debate because of conflicts among the various proposals, leaving the issue open for further exploration. As an alternative to other approaches such as *Design Science*, *Dialectic* or *Rhetoric*, we will focus on a model that gives intellectual strength and direction to research and creative projects. The strategy is called *Productive Science* or *Poetics*, and it is a way of focusing and understanding the struggle of a practicing artist or designer as he or she seeks to develop creative work.

There are three central features of the strategy: the identification of the essential functional elements of design; the exploration of those elements with an appropriate degree of precision; and the *integration of those functional elements* in design and artistic practice. The functional elements include the materials of embodiment, the manner or technique of execution, form as the unifying structure or idea, and purpose as the ultimate goal of the work. The exploration of the elements is the process of designing, divided into phases or stages such as finding a meaningful problem, doing background research, finding creative ideas, developing those ideas in the process of creation and iteration, and finally synthesizing a work that has impact and emotional integrity. The final integration of the functional elements of design in practice is the creation of a work with compelling correctness of expression, both in achieving a practical purpose and in bringing appropriate emotional force to the solution. This summarizes the creative aspect sought in *productive science*, but there is a further outcome. This is found in reflection on the implications and principles that emerge in the course of creative work. It is *reflection* that transforms practice into a *productive science*, a systematic study of human creation based on principles. The goal of this paper is to explore the potential and significance of *Productive Science* as a strategy of inquiry in design practice and design research.

Four Strategies of Inquiry

As with most of the methods and strategies of intellectual investigation, the strategy of *productive science* may be traced to the ancient Greeks. Aristotle was the first person to employ the method of *productive science* in the investigation of the human-made world. For him, *productive science* or *poetics* covers any kind of making, including both useful products as well as the products of all of the fine arts. His inquiry is recorded in the *Poetics* (Telford, 1961), a treatise on the art of tragedy. By Aristotle's approach a work of art or an artificial "thing" is a unified structure or synthesis of parts. The unifying structure of the work of art is what Aristotle calls its *form*, while "the parts are the *material* which is unified by the form" (Telford, 1961, p. 63.) By this approach, the problems of making are stated and solved in terms of the requirements of the work of art that arise from the process of thinking, doing and making.

The method of *productive science* has been employed by many writers and researchers in the investigation of literature, the visual arts, music, and in the twentieth century, the design arts. For example, a variation of this method was important at the Bauhaus and in the work of the designer Laszlo Moholy-Nagy. As in the case of other writers (Santayana, 1955; Sessions, 1958; Telford, 1961), Moholy-Nagy (1970) also emphasized the role of inspiration that comes from nature and the importance of the unifying structure or *form* as an interconnecting link of parts or essential elements in the creative process. But it has also been an important method for designers and design theorists holding quite different positions on the nature of design. An example is Herbert A. Simon's *The Sciences of the Artificial*. Richard Buchanan argues convincingly that the structure of Simon's book follows key structural features of Aristotle's *Poetics*. He suggests that Simon's book could be regarded as a modern variation of *poetics* and *productive science*, although Simon employed and positioned the approach well within the framework of his positivist philosophy and his vision of a *design science*. In other words, Simon ultimately turns the pattern of productive science into a strategy of *design science*, seeking the basic elements that underlie the complexities of the material world, and to investigate the processes and mechanisms by which those elements are combined to yield to world of experience and the cognitive processes of designing.

John Dewey's (1958) *Art as Experience* employs a variation of *productive science*, positioned within the framework of his philosophy of pragmatism and his theory of *logic* and inquiry. In *Art as Experience*, Dewey focuses on what he calls "*an experience*" rather than discuss experience in general. *An experience*, Dewey argues, has form and structure. It is a coherent interaction with the world, with a beginning, middle and end that embody the activity of a person and the conditions of the environment. It moves from resistance and struggle to a consummation in a completed work, whether the "work" is practical, intellectual, or aesthetic. The work is not an object. Rather, it is an activity. And the activity has a mixture of practical actions, intellectual dimensions, and emotion. Inquiry, as Dewey argues in *Logic*, "is the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole." (Dewey, 1964, p. 104-105). The strategy of inquiry, in this case, is "to seek the resolution of theoretical, practical or productive problems and move toward the advancement of knowledge in the various branches of human learning and activity." (Buchanan, 2009). Productive Science focuses on the discipline and methods of making, the properties of the made-thing, the analysis of the functional elements of products, and the synthesis of all these functional elements.

However, there are two other important strategies of inquiry: *rhetoric* and *dialectic*. Instead of focusing on methods of making and the production of human-made products, *rhetorical* inquiry focuses on the ethical and inventive character of the artist and designer, and his or her ability to effect social change through argument, communication, and action. *Dialectical* inquiry is most difficult to manage, but at the same time adopted and used in many fields, among them design. Donald Schön (1983), in his book *The Reflective Practitioner*, calls for "reflective conversation" in the work of designing. The central feature of *dialectical* inquiry is to overcome oppositions, conflicts and contradictions encountered in everyday life by bringing them within a system or ordered whole.

These four strategies – *productive science*, *design science*, *rhetoric* and *dialectic* – have significantly shaped the methods employed by designers. According to Buchanan (2009), they also point toward two of the philosophical problems that are significant issues in design practice, the problem of *parts and wholes*, and the *problem of means and ends*. The interplay of these four strategies, Buchanan (2009) summarizes, helps to explain the otherwise bewildering diversity of design practice and design research in the 20th Century.

However, the potential of productive science as a strategy of inquiry is still not fully understood, and the significance may remain unclear for many researchers. For this reason, I will illustrate the importance of this strategy with a concrete example drawn from my own practice-based design research (Tooming, 2007).

A Concrete Example of Productive Science

An idea expressed by John Dewey speaks well to the complex mixture of art and philosophy that a reader will find in my work: “Philosophy is said to begin in wonder and end in understanding. Art departs from what has been understood and ends in wonder” (Dewey, 1958). It is not for me to say whether the ensemble of works produced as the centerpiece of this inquiry are wonderful, but I can say that the philosophical foundations of *productive science* and the philosophical problems of the unity of art and design and emotional expression are a central expression of what I have come to understand about fiber art and design through the inquiry.

The inquiry is an example of what I consider “practice-based research” in art and design. What the term means to me is that the inquiry began in the practical experience of my work as an artist and designer. It continued through practical experimentation with a technique of production, and it has yielded results that have practical as well as theoretical value. It does not matter whether we call the research practice based or something else. It is a design inquiry and an example of design research.

The *central question* of the inquiry was whether fiber art and design could serve a practical purpose in enhancing the quality of sound in interior spaces as well as an aesthetic purpose in adding beauty to an environment. The problem of sound absorption has been addressed in a variety of ways by different professions. They have tended to use unappealing materials in the form of panels attached to walls or suspended from the ceiling. Solutions are typically hidden from view, or when visible they are not aesthetically pleasing. And if solutions are aesthetically pleasing and are not hidden from view, they do not have a high quality of sound absorption. The selection of materials is more often random rather than based on any systematic analysis of acoustic properties. In short, there is limited understanding of the acoustic properties of materials, and the research in this area is often inadequate. Where there is testing of acoustic properties, most of the materials are simply not adequate to solving the problem effectively. The answer to the question “could fiber art serve purposes that are practical as well as aesthetic?” is that it can, under certain qualified conditions. Finding the nature of those qualifications is more than a matter of artistic intuition and sensibility. The artist’s intuition and the engineer’s common sense tell us that the fiber art work must have some proportionality to the total surface area of the environmental space. Beyond this, we know little more, unless we have specific knowledge. Gaining this knowledge, and understanding how it bears on the practical and artistic matter of creation, is one of the problems of inquiry, calling for what I earlier referred to as the exploration of functional elements with an appropriate degree of precision – in this case the exploration of material properties and a manner or technique of execution.

The inquiry pursued two closely related lines of investigation. The first issue was the nature of materials and the manner or technique of production. It was necessary to investigate the acoustic and aesthetic properties of a variety of fiber materials. In all cases, the materials were subjected to careful acoustic testing based on recognized methods of measurement of sound absorption and speech transmission. However, it was not enough simply to test the fiber materials. The materials had to be formed in such a way that they could be tested – and, hence the testing was a study of the technique of handling the materials as well as the materials themselves. The technique employed in this research is called *hand tufting*. Hand tuft technique designates the modern weaving technique by which thread is shot into a vertically suspended backing

by means of a hand-steered machine that is driven by compressed air (Figure 1). This is an emerging technique whose history and characteristics are not well addressed in the literature. Hand tufting is a powerful technique of modern weaving, when it is used appropriately and with imagination (Figure 1-4).



Figure 1. Hand tuft technique

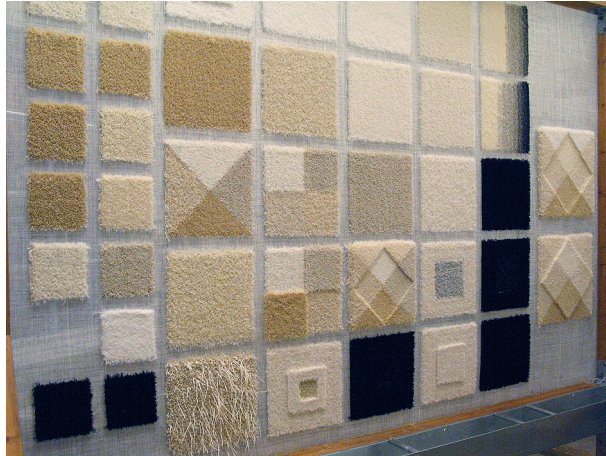


Figure 2. Hand tuft samples on frame.



Figure 3. Kaja Tooming,
Celebration, 1999. 61x61cm



Figure 4. *Celebration*, 1999.
Reverse view.

The second issue, already foreshadowed in the technique of hand tufting, was the artistic and design use of the technique in creating forms that possess some measure of beauty and charm (Figure 3-4). In formal theory and design methodology this is called “synthesis,” but this is a dry, academic term for the struggle of the artist and designer who seeks to bring together all of the functional elements of his or her craft, art, or

discipline. How do we study the *informed intuition* and *inventiveness* of the artist and designer? This is a critical question because it is not enough to understand the acoustic and aesthetic properties of materials. The materials must be formed, and formed by an idea that is progressively realized in the work of art and design.

To pursue these issues, one must settle on a specific strategy of inquiry, and this is when my work turned toward productive science. This involved a deliberate decision to turn away from what is sometimes called design science. Design science, as understood by some investigators, seeks an explanation of issues of design practice by a reduction to the underlying materials of the world and the mechanisms of the mind by which decisions are made in art and design. Instead of a study of the physics of the materials or a psychological study of the fiber artist or a consumer study of the fiber art and its reception by an audience, I turned to the functional elements of art and design – the elements that are necessary for the existence of a work. In the traditional and contemporary use of this strategy, I explored:

- *manner of production,*
- *materials employed by the artist and designer,*
- *qualities of form in the created work, and*
- *purpose or function to be fulfilled by the work.*

I assumed, in accordance with the assumptions of this strategy, that artistic and design creation is the *integration of these functional elements* by whatever means or methods are suitable to the individual artist or designer.

The inquiry began with an analysis of the manner of production (hand tufting) and the fiber materials (various kinds of fibers and threads). It continued with an exploration of form and function, testing through artistic creation the combinations of manner and material that may be suited to the final product. In the course of the work, small samples were developed and then tested in a solo exhibition *Backside* at the *Town Hall Gallery* (see Tooming, 2007, p. 77-83). The *Backside* exhibition was the first step toward formal synthesis of the elements of fiber art in expressive forms (Figure 5-10).



Figure 5. The view of the *Backside* exhibition.



Figure 6. The *Backside* exhibition at the Town Hall Gallery in Kuressaare, 2003.

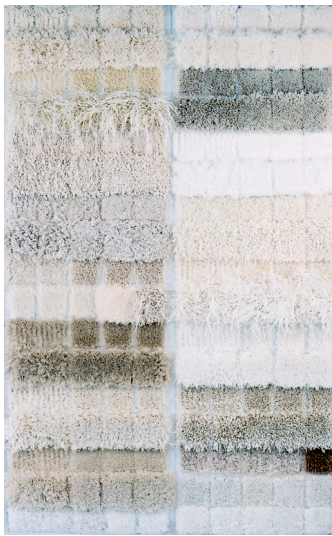


Figure 7. *Backside*, 2003.



Figure 8. The view of the room: *Backside's* back side and reliefs.



Figure 9. Floor installation *The Japanese Garden* with hand tufted rug elements and sand. Detail.



Figure 10. Installation *The Japanese Garden*.

Based on the results, this preliminary step led to the second phase of the research: the creation of an ensemble of fiber art works for a specific architectural environment, where aesthetic and acoustic problems are the central issue. I was using fiber art as a design element in a complex and culturally important building: the *Jonsered Manor*, known in Sweden as the *Jonsered herrgård* (Figure 11. See Tooming, 2007, p. 85-104).



Figure 11. Jonsered Manor, Sweden.



Figure 12. Dining room.

An elegant dining room presented a difficult problem of poor acoustics (Figure 12). When many people were in the room, echoes created disturbing level of noise. The architects have been cautious in attempting to solve this problem because of preservation ambitions; obvious solutions were ruled out because they conflicted with the historical nature of the room. The design constraints imposed by the historical setting of the room suggested that a subtler approach was needed to deal with the poor acoustics. It is in this context that a fiber art approach began make sense. The goal was to meet two needs simultaneously. The first need was for fiber art work that would add an appropriate aesthetic expression, enhancing rather than detracting from the experience of the room. The second need was to design the fiber art work in such a way that they might help to improve the acoustics of the room. Behind this, there also had to be careful consideration of the larger context of the building, including historical, social and cultural factors.

The first step was to investigate the environment through perception, observation, interpretation, and reflection on what factors should influence the final creation of forms suited to the history and traditions of the building and its contemporary use. It was important to experience the dining room in its entirety, as a place of social interaction and communication. This is the “experienced whole”, which brings together the perceptual elements and the meaningful relationships of the space and adds to these the expressive qualities of human interaction. A key point here is that fiber art becomes an art of design when the purpose of creation is more than pure aesthetic expression. In this case, the work of fiber art no longer exists as an isolated object but becomes part of an environment, supporting and sustaining practical experience in the lives of human beings.

My work took John Dewey’s idea of *an* experience as a beginning point. However, I have found it important to develop Dewey’s idea in a somewhat different direction than he did. I found it important to focus on three considerations or three aspects of experience: *perception, meaning, and emotional expression*. Of course, Dewey discusses issues related to these three themes, but for the practicing artist and designer the role of perception is very significant and deserves careful attention as the first step in one’s interaction with the environment of daily living. Therefore, a major part of the early research focused on perception: the perception of materials, sound, and other features of the materials with which the designer must work. This is an analytic, scientific task. I have found phenomenology to provide an initial framework for such considerations and to be helpful in the observational method employed as part of the investigation. A theoretical foundation for this work comes from the phenomenologist Edmund Husserl (1969), and the existential philosopher and phenomenologist Maurice Merleau-Ponty (1963; and 1964).

Perception is important, but how we interpret perceptions and make meanings out of them is also important. That is, the role of meaning is also important for the fiber artist who conceives of his or her work as an art of design. In fact, the designer works in an environment that is rich in associated, traditional, historical, and cultural meanings. Any new work of design must engage and interact with such meanings if it is to be successful in supporting the experience of people in their concrete environment. For this reason, I

have also found structuralism to be helpful, particularly in the form developed by Roland Barthes (1964). The idea that an environment possesses a deep structure of parts and relationships is very useful to the designer. It enables one to explore the details of placement of objects and artifacts in an interior space, and it also enables one to better understand how other meanings – social, cultural, and historical – enter into consideration in the activity of making meaningful experiences.

Ideas about perception and meaning come together in John Dewey's concept of experience, but under a third consideration that is also critically important for the designer: *emotion* and *expression*. For Dewey, emotion is what unifies an experience, whether the experience is artistic and aesthetic or intellectual or practical. In short, if the designer is to be successful in supporting the practical experience of people living in interior spaces, he or she must explore the emotional and expressive aspects of the final solution. As Dewey argues, emotion is not something separate from an experience – something added onto everything else. Rather, it is the heart of an experience – the unifying “glue” of daily life. The deepest hypothesis of my work was that *perception, meaning, and emotional expression work together in creating a unity or wholeness in the products of design and in the experience of the people supported by such products*. Exploring this hypothesis in the different stages of the analysis and synthesis is what the research was ultimately about.

Productive science has an affinity with what is sometimes called “practice-based research.” It is certainly more precise than the vague descriptive phrase “research through design.” Productive science suggests the artistic logic of someone who studies a situation, reflects on all of the factors that bear on creation, carries out the work of realizing an idea in concrete form and materials, and then reflects on the total experience in order to gain deeper understanding of an art. Intuition is informed with the results of analysis, just as this work has been informed with the initial technical studies and then with a careful consideration of the environment of the Jonsäter Manor.

Reflections on Principles and Results

What we have learned from this strategy of inquiry and its organization of the methods and techniques of research is at times surprising and at other times a confirmation of initial ideas. For example, we learned that some of the fiber threads that were tested are nearly ideal in sound absorption, as determined by acoustic science (Tooming, 2007). This was a surprise not only for me but also for the acoustic engineer who performed the tests. We also learned the specific absorption properties of all of the materials that were tested. In addition, the weaving technique of hand tufting appeared to contribute to the quality of sound absorption because of the intertwining of fiber threads and the use of unglued backing.

The solo exhibition *Backside* demonstrated that audiences found the color and forms of the fiber models to be warm, inviting and intimate, surprising, natural, and almost sacred (Figure 5-10). In fact, many viewers were surprised at the combination of aesthetic and practical purpose. We were encouraged that this is a reasonable direction for further artistic and design exploration. The *Backside* exhibition also generated more knowledge on how to use the technique of hand tufting, and to use it in unusual and innovative ways.

The creation of the ensemble of fiber art works for the Jonsered Manor led to more complex insight. For example, it led to the recognition that fiber art and the hand tuft technique could be used to create sculptural forms. There are other examples of fiber art sculpture, but none that we know about that are formed with the double-weave hand tuft technique (Figure 15-16). This is something new and innovative in the field of fiber art that deserves further exploration. We also learned – and this is a personal learning related to professional development as an artist and designer – that it is possible to create fiber art works deliberately within a specific environment, and that a working method which grows out of analysis and research can achieve a degree of alignment with the traditions and history of that environment (Figure 13-16). No strategy of inquiry or method of research can predict the final quality that an artist or designer can bring to a work. At best, we hope to explain the factors that bear on the problem and gain insights that can better inform creative intuition.



Figure 13. Kaja Tooming, *Flow*, 2007.



Figure 14. *Flow*. Detail.



Figure 15. Kaja Tooming, Sculptures *Growing I* and *Growing II*. Figure 16. *Growing I*.

The matter of acoustics is more precise. Acoustic testing at the Jonsered Manor yielded several important findings. The first finding is that the choice of fiber materials and the form of their presentation resulted in an absorption pattern that closely approximated a so-called ideal absorber, as understood within acoustic engineering (Tooming, 2007, p. 59-72). That result was expected, based on earlier testing and analysis. What testing at the Jonsered Manor further revealed was that the total surface area of the works of fiber art was not large enough to considerably reduce reverberation time in a vast, hard-

surfaced space like the dining room of the manor. That is, further use of fiber art would be needed to effect a major change in enhancing the quality of sound in the room. This was not unexpected. Indeed, our initial proposal suggested three alternatives, each of which would have increased the surface area of the fiber art works. An appropriate proposal was selected for a variety of reasons. Nonetheless, the test provided a proof-of-concept that is encouraging for further exploration.

Of special interest for further work is the idea of mobile fiber art screens. Properly designed and fabricated, screens of fiber art could easily support the idea of a “reconfigurable” room or even an office space. The dining room of the Jonsered Manor is a grand room, with high ceilings and many hard-surfaced tables. Sound control in this space is certainly a challenge. In other rooms and kinds of work or social areas, fiber art works, for example screens, could function effectively. However, one thing that has been learned is that fiber art and design, used most effectively, should be site specific. It should grow out of the unique features of each situation and environment as much as possible.

Significance

The final step in poetic inquiry or productive science is a reflection on the nature of unity and emotional expression in a work of design. It speaks to the question “what is the significance of this work and how does it advance understanding and practice.”

The significance of this work is quite practical. It contributes to the body of knowledge that may be useful for architects, designers, and design researchers as they pursue the practical problem of enhancing the quality of sound in interior spaces. We have discussed the nature and value of the double-weave hand-tuft technique, the specific acoustic properties of a variety of fiber materials, and how the exploration of form and function may contribute to enhancing the experience of interior spaces. These matters are certainly an aspect of the unity that we have sought in understanding how fiber art becomes an art of design. Unity is found in an integrative discipline of thought and action, informed with appropriate and relevant technical knowledge.

However, there is also theoretical significance. This approach contributes to the theoretical foundations of the study of design and the place of fiber art and design within the broader domain of the design arts and sciences. This first form of contribution is the demonstration of the strategy of *productive science* as a strategy of inquiry. As Richard Buchanan (2007) has argued, this strategy has emerged from time to time throughout the twentieth century, and the present work shows its application to a new area of design thinking in exploring the aesthetic and acoustic qualities of fiber art and design. While the strategy of *productive science* is perhaps unfamiliar in its name and its formal rigor, it is a strategy that is quite familiar in the common sense of the practicing designer and artist. And, of course, it is familiar to some design researchers, although not necessarily by the name of *productive science* or *poetics*. As noted earlier, the central feature of the strategy is the identification of the essential functional elements of design, the exploration of those elements, and the integration of those functional elements in design and artistic practice. By elaborating this strategy and developing an inquiry around its concepts and methods, we have contributed to further use of the strategy in other inquiries.

The second theoretical contribution concerns the nature of unity and emotional expression. If the first contribution lies in the area of strategy and method, the second contribution lies in the area of principles. We have sought principles in three unities: the unity of the *perceptual whole*, the unity of the *meaningful whole*, and the unity of the *wholeness of experience* (see Tooming, 2007, p. 109-118). In the course of our search, we have discussed the ideas of Maurice Merleau-Ponty, Roland Barthes, and John Dewey – leading figures of phenomenology, structuralism, and pragmatism. By combining some of these ideas in succession, we have found principles in the progression of unities that lead to emotional expression. This has yielded the paradox of necessity in fiber art and design – the *necessary intelligibility of emotional expression* arising from the intimate connections of form and purpose as they work together to integrate materials and the manner of human action. This is the basis of the compelling correctness of the artist's decisions in creating a work of art and design. It is the criterion that we sought for artists and designers through our reflections on principles and unity.

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Author Biography

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Kaja Tooming Buchanan is Assistant Professor of Design Theory at the Cleveland Institute of Art, USA. She is currently investigating the positive social influence of design through perception, the construction of meaning, and the forms of experience in human interaction and services. She received her Ph.D. in Design in 2007 from the Faculty of Fine, Applied, and Performance Arts at Göteborg University, Sweden in 2007. Her doctoral research is an example of practice-based design research guided by the strategy of Productive Science and Poetics, offering insight into the aesthetic and acoustic qualities of hand-tufted fibre art in the context of interior spatial design. A central feature of her work is a philosophical reflection on the nature of unity and emotional expression in art and design. She received her Fil. Licentiate degree in Design from the same Faculty in 2005. She also has Master of Arts in Art History from Göteborg University and a Diploma (5 years program) in Art and Craft from the Estonian Academy of Art. As a practicing artist, she has had more than ten solo exhibitions, and has participated in a dozen international group exhibitions. She has received more than twenty cultural and research grants and fellowships.