Preface: Natural Computing and Computational Aesthetics

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Computational aesthetics already has had a long history. As early as 1928, G.D. Birkhoff introduced the concept of the aesthetic measure (M) and defined it as the ratio between order (O) and complexity (C): M = O/C. In Japan, in September 1964, art philosopher H. Kawano published the first computer-generated works in *IBM Review* (see the Website [http://on1.zkm.de/zkm/stories/storyReader$7663] of the exhibition: "Hiroshi Kawano –The Philosopher at the Computer," 2012, ZKM, Karlsruhe, Germany).

Now there exist multiple societies for computational aesthetics such as Computational Aesthetics in Graphics, Visualization and Imaging (CAe), and the International Society for Mathematical and Computational Aesthetics (IS-MCA). Especially the latter covers a wide scope: computer-aided design and manufacturing, robot motion design, analysis of artistic masterpieces, scientific theory building and reasoning, and software design.

However, these societies concentrate their attention almost exclusively on aesthetically designed objects or on designing objects aesthetically, even though their compass ranges from automobile to scientific theories. To us this seems somehow one-sided.

This section contains three chapters. Each offers a point of view different from that of already existing computational aesthetics. Akiba proposes computational aesthetics of "nature." In order to do so, he retrieves the wider scope of Kant's aesthetics in *Kritik der Urteilskraft* from the narrow interpretation made by existing computational aesthetics; he points out that in the idea of "harnessing" in natural computing we can find a successor of Kant's aesthetics and a possibility of computational aesthetics of nature.

Goan et al., on the basis of G. Bateson's learning theory (stepping up from logical types in a dead-end situation) and J.J. Gibson's concept of ambient space, and through the elaborate workshop at the art museum, show that "there could exist a way of perceiving the ground–ground switch, the perception of surfaces' layouts, by stepping up from the logical type of figure–ground reversal perception—the figure–figure switch." At the same time it also shows the critical responses to Akiba's idea of computational aesthetics of nature and to the idea of "indirect control" in natural computing.

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Watanabe introduces us to unique interfaces that he and his colleagues developed, such as “Saccade-Based Displays,” “Save YourSelf!!! [Galvanic vestibular stimulation],” and the workshop called “Heartbeat Picnic.” Experience mediated by such interface technologies “induces appreciation about self, and makes us aware of new rules as to how people relate to their environments.” He also relates self-awareness experience to the idea of Kant’s aesthetic judgment, formal purposiveness, and subjective universality, opening up another computational aesthetic of human nature for us.

Of course, these chapters contain much more than what has been mentioned here in passing. We hope readers will find further possibilities in this work to develop the future relationship between natural computing and computational aesthetics.