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Editorial

Special issue on "Visual Gestalt Formation"

This special issue appears on the occasion of Emanuel Leeuwenberg's retirement. During 40 years of research on visual perception, Leeuwenberg studied a wide range of topics, such as judged complexity, neon effects, subjective contours, visual pattern completion, ambiguity, assimilation and contrast, temporal order, beauty, object handedness, veridicality, and visual regularity. To him, the empirical study of these topics is not a goal in itself but rather a means to focus on underlying principles of perceptual organization. Most prominently, he advocated the simplicity principle which states that, from among all possible interpretations of a pattern, the visual system selects the interpretation with the simplest description.

In the 1960s, Leeuwenberg implemented the simplicity principle in a visual coding model that became known as structural information theory (SIT). Guided by empirical and theoretical findings, SIT developed into a competitive theory of visual structure. For instance, nowadays, SIT includes not only comprehensive models of visual pattern completion and symmetry perception, but also a Bayesian integration of viewpoint-independent and viewpoint-dependent factors (quantified in terms of object complexities rather than object probabilities). Furthermore, SIT's simplicity principle can be said to yield sufficiently veridical vision in many different worlds—a claim that is sustained by recent findings in the mathematical domain of algorithmic information theory.

This special issue features contributions by students of perception who, like Leeuwenberg, find inspiration in Gestalt psychology. The simplicity principle, for instance, descends from Hochberg and McAlister's minimum principle and, further back, from the law of Prägnanz that Koffka proposed as the unifying principle underlying the separate Gestalt laws proposed earlier. The articles in this special issue may be proof that Gestalt psychology is not just something of the past but, in fact, is a subject of renewed interest. Indeed, many modern developments in visual perception research find their origin in the seminal ideas of the early 20th-century Gestaltists, and there seems to be a growing awareness that, for modern developments to prosper, further elaboration of these ideas is needed. We hope that this special issue contributes to this Gestalt revival.

In the first article in this special issue, Julian Hochberg reviews past, present, and future of simplicity approaches to Gestalt formation. He not only assesses that

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substantial progress has been made, but also points at shortcomings that still should be dealt with. In particular, he points at the still open question of how much visual input (in space and time) can be taken to form a stimulus to which any simplicity approach is to be applied.

Then, Lars Strother and Michael Kubovy test the adequacy of two simplicity approaches regarding perceived pattern complexity. They consider two objective complexity measures that are both related to Garner's seminal idea of inferred subsets, but one starts from separate pattern features while the other starts from pattern codes that integrate features. Their findings suggest that the latter measure performs better but still fails to account for cases in which Gestalt formation seems to mask simplicity.

Subsequently, James Pomerantz, Alpna Agrawal, Stephen Jewell, Martha Jeong, Hana Khan, and Sandra Lozano focus on the central Gestalt question of how local elements group into larger configurations. Their results indicate that local grouping is weakened by global context. This suggests that the Gestalt formation does not simply proceed from smaller to larger Gestalts but, rather, involves an intricate interplay between local and global stimulus structures.

In a similar vein, David Navon revisits the paradigm based on using compound stimuli for studying global and local processing. He counters existing worries about this paradigm, and presents new results that further strengthen his idea that, in Gestalt formation, global stimulus structures are actually more important than local stimulus structures.

Not only spatial stimulus structures but time, too, is a relevant factor, as is assessed by Stephen Palmer, Joseph Brooks, and Rolf Nelson, who focus on the time ordering in which different types of grouping occur. Their findings suggest that Gestalt formation is not an isolated stage in perception but, rather, an aspect that pervades all stages in perception.

Does perception also include a stage at which knowledge guides Gestalt formation? Walter Gerbino and Cristina Zabai show that joints (i.e., physical connections between objects) may have a hallucinatory effect on objects that seem to occlude each other partially. They found that such objects are amodally completed in a way that, on the one hand, depends on the relative position of the objects along the gravitational vertical but that, on the other hand, may conflict with logical expectations about these objects.

The seeing versus thinking issue is also addressed by philosopher Gary Hatfield who, among other things, elaborates on Koffka's motto that things do not look as they do just because they are as they are. Perception of course has to be sufficiently veridical for organisms to survive, but, he argues, perception does not seem to achieve this merely by an internalization of external world properties. Instead, perception follows its own rules of organization that yield sufficient veridicality for guiding action.

This is also the thrust of the last article, in which Emanuel Leeuwenberg reviews various remarkable consequences of the rules of perception. Among other things, he evaluates the relationship between perception and the elusive notions of handedness and subjective time direction. All in all, his article *Miracles of perception* expresses a fascination with Gestalt formation that no retirement can undo.

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