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EDITORIAL

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Visual perception in a snapshot

Impossible! It was impossible to comprehend the world around us up to our satisfaction, until Mother Nature had her clever ways to equip us with our well-developed visual systems. And then the world was given to us in our perceptions. But a man is never satisfied. He urges to know not only what is out there, in the landscapes and faces and sounds, but also what is in here, in our brains and minds that make it possible to enjoy these riches. Moreover, it is doubtful that we could understand deeply enough the outer world when we would not understand how the visual system is functioning when solving the wider than wide variety of different information processing tasks humans encounter...

To study visual perception in its sub-second scale of time continues to be timely: we have more unsolved puzzles than bits of a firm undisputable knowledge about how our perceptions are created in a snapshot of time. Even though microgenesis of mental states and reactions over an observable, actual progression of time intervals has been often studied by the proponents of the microgenetic approach within educational psychology and language development studies, the stage-by-stage development of visual percepts within about 0.1–0.3 s has remained somewhat disconnected from the concept of microgenesis when psychophysics and experimental cognitive psychology are concerned. While de facto microgenetic research has been popular recently (e.g. Öğmen & Breitmeyer, 2006), (and this is regardless of the frequent disguising of this concept by the terms like formation and information-processing), we still do not know what precisely is visual masking, how masking and attention interact, what types of mental operations can be successfully carried out without explicit, conscious perception and what cannot (and what are the interdependencies between them). There is no certainty about what regularities characterise the fine-grain timing of the emergence of explicit perceptions and what are the key factors in analysing the timing of microgenesis; what is the relative role of feedforward and re-entrant processes in conscious vision. And of course, are there any good psychophysiological, objectivised signatures that can be meaningfully and reliably used to analyse such fast and largely hidden processes?

Curiously enough, psychophysicists, cognitive psychologists and psychophysiologists in the Central and Eastern Europe have long been intrigued by the precise timing of the processes underlying visual perception. [For instance, consider works by Wundt, von Helmholtz, Baxt, Nikolai Lange and the early twentieth century highly promising seminal studies explicitly stated as microgenetic approach (German Aktualgenese) by Felix Krüger, Friedrich Sander and Heinz Werner in the first half of the twentieth century.] Therefore, it seems not to have been accidental that when the idea to organise a symposium between the German and Estonian universities emerged, the topic of the meeting emerged almost by default: microgenetic processes in visual perception (with the emphasis on the paradigms essential in trying to shed light on the current hot topic of feedforward versus re-entrant nature of the basic visual–perceptual processes).

The German–Estonian Inter-University Symposium on "Visual Processing in Microgenesis: Feedforward or Re-entrant?" took part on the Hiiumaa island of Estonia, from 26th until 28th of July, 2004. The present Special Issue is based on the papers that grew out of the

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talks presented at that meeting. All of us the ad hoc Editors were participants of that meeting; similarly, the overwhelming majority of the authors of the articles in this Special Issue were participants and presenters at the meeting. In a few cases, invitees who were unable to travel to the Eastern Baltics nevertheless contributed (e.g. Odmar Neumann, Werner Klotz). There were also some participants who for various reasons did not take part in submitting their papers for this Issue.

We are glad to acknowledge that in the works presented here we find a sufficiently rich set of historical, theoretical and empirical contributions to the actual problems of visual perception in general and visual microgenesis in particular. The volume begins with a historical overview of the many year old long tradition of linkages between German scientific psychology and Estonia. We seem to know that many of the facts and commentaries presented in that paper by Jüri Allik probably are surprising and certainly are fun to read. The remaining papers that are both theoretical and empirical can be divided between two larger sets: (1) *Masking and unmasking in visual microgenesis* (Neumann and Scharlau, Luiga and Bachmann, Põder, Herzog et al., Kammer); (2) *Timing and motion in visual microgenesis* (Neumann & Scharlau, Scharlau, Elliott et al., Klotz and Ansorge, Kreegipuu and Allik, Carbone and Pomplun). We are satisfied that, and because the topics fit perfectly, Odmar Neumann was willing to present his two already classic papers on metacontrast and perception timing as translated for the first time into English. We are sure that these translations both help to set the theme for the two conventional sub-parts of this Special Issue and become widely studied by the wider collegial audience who have not had access to these important works before or who do not command German. (Moreover, this opportunity helps to credit Peter Wolff who actually was the one who developed the original idea of using the metacontrast mask as the target for choice RT and who did create the now classic square/diamond shaped stimulus configurations widely used in Bielefeld, Munich, Braunschweig, Houston, and many other places.) The main messages inherent in the Neumann papers are that (a) metacontrast can be explained as an outcome of two processes: sensory integration and attentional higher level processing, (b) preconscious visual processes can have a direct access to the visuomotor response systems, (c) a preceding stimulus, even if masked, can speed up the processing of the following stimulus for visual awareness.

Iiris Luiga and Talis Bachmann present the results of their experiments showing that the component of visual spatial attention involved in the substitution-masking model of James Enns and Vincent Di Lollo can be locally driven (working in a feedforward manner) but not necessarily the central variety of the (top-down driven) attention. This seems to be a theoretically important and methodologically significant specification. In the paper by Endel Põder, we find that target perception in the crowded displays can be facilitated if the target background is marked with an isoluminant patch of a different colour. This clearly favours space-based theories of selective attention and sets some constraints on object-based accounts of visual selection; also, this finding conforms to feedforward functional architecture of visual processing. Michael Herzog, Frank Scharnowski, and Frouke Hermens present data and arguments that set some puzzles for the traditional theories of masking and for the feedforward and re-entrant accounts of processing for conscious awareness. Unmasking by a shine-through mask within a feature fusion paradigm was shown to occur with very long inter-stimulus intervals. This suggested that the unmasking resulted from an inhibition mechanism with an important role for the decay of the target signal. Thomas Kammer contributed a paper that nicely reviews trans-cranial magnetic stimulation effects (''TMS-masking'') thus helping to understand time course of conscious vision, limitations of various masking theories, and important neuro-anatomical conditions for explicating what goes on when rapidly presented stimuli interact within the microgenetic domain of processing.

Perceptual latency priming (PLP) has become one of the mainstream approaches to study timing of visual conscious perception and temporal interactions between rapidly consecutive stimuli. The paper by Ingrid Scharlau succinctly reviews the corresponding research and provides arguments in favour of the weather station model of attention in explaining PLP. It is well known that also pre-conscious, explicitly unseen stimuli can produce PLP, which offers a good paradigmatic case for studying the interaction of pre-conscious and conscious visual processes. Mark Elliott, Zhuanghua Shi, and Fatma Sürer demonstrate that and how a subthreshold, synchronised stimulation has its effect on the explicit perception of simultaneity. In a related domain of research, Werner Klotz and Ulrich Ansorge have found that offset-evoked potentials from the stimuli that were rendered invisible by motion-induced blindness displays were nevertheless augmented, provided that the corresponding stimuli were earlier processed at the above-threshold levels. Kairi Kreegipuu's and Jüri Allik's empirical contribution included data that enable us to regard visual EPs as a reliable signature of timing for manual responses (as measured by RT methods). Finally, Elena Carbone and Marc Pomplun present their neural model that helps to successfully simulate the Fröhlich Effect. There, feedback connections seem to be useful, if not necessary.

Altogether, the papers in this Special Issue help shed light on the ways and regularities of interaction between sub-threshold and above-threshold stimulations, set some limits on the well-known theories of visual masking, advance our knowledge of the involvement of the spatial-attentional processes and mechanisms in visual perception, and specify some neural prerequisites and participating systems in the microgenetic visual processes. The papers collected here help to stress the persisting controversy between feedforward and re-entrant

accounts of fast visual processeng (in masking, recognition, spatial attention, and movement detection) and they appear to show that whether bottom-up activity is sufficient or not very much depends on specific tasks and conditions.

It is our pleasure to invite the reader to take advantage of the novel data and ideas offered in this set of papers. But before letting you go, a pleasant duty of acknowledgements: we are greatly indebted to the outside reviewers who considerably helped to improve the manuscripts; we are very much thankful to Peter Frensch for his willingness to offer the fine pages of Psychological Research for our endeavour and for his support at various stages of this project. Finally, we are grateful to the Estonian Center for Behavioural and Health Sciences for financial help that made the Symposium possible at all. Some things are still possible and it is thrilling to perceive their outcomes.

References

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