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MICROGENESIS AS TRACED BY THE TRANSIENT PAIRED-FORMS PARADIGM

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Two successive, spatially overlapping human faces were exposed for recognition with SOAs ranging from 20 to 160 msec. The subjects effectively perceived one face, which at short SOAs mostly resembled the first stimulus and with increasing SOAs gradually shifted towards the appearance of the second, dimmer stimulus. These results replicated those from the study by Calis et al. (1984) and extended them to the experimental conditions of controlled simultaneity of each of the two temporally separate, extremely brief stimuli and to the conditions of personally unfamiliar stimulus-subjects. In the second experiment we employed a direct measurement of the microgenetic focus in real time by using a procedure by which the subjects' judgments about the relative temporal order of the critical visual stimulus and an auditory click were recorded. Via this procedure it was shown that one of the effects of the *first* visual stimulus is to speed up the microgenetic process for the *second* stimulus which then appears subjectively earlier as compared to the single-stimulus control.

Recent years have been marked by the growing understanding that the phenomenon of visual masking may be a consequence of temporal transition of the focus of perceptual microgenesis within a single-glance perceptual act (Calis and Leeuwenberg 1981; Calis et al. 1984; Bachmann 1984; Leeuwenberg et al. 1985). In other words, there is not so much of an erasure or active inhibition exerted by one stimulus on another, but the focus of perceptual processing – a microgenetic event – transcends in real time from the first segments of input information (which set the direction of microgenesis) to the last, given that these transients are presented to the observer within a temporal interval which does not exceed the duration of an ordinary microgenetic cycle (usually 200–300 msec). This is simply an actualization dynamics,

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performed on (the basis of) physiologically represented data. Some researchers have used the concept of attentional focus to describe an analogous process in the context of backward masking (cf. DiLollo et al. 1974; Bachmann and Allik 1976; Michaels and Turvey 1979), some have proposed even more metaphorical conceptualizations like the clerc-customer analogy (Kolers 1968) or perceptual retouch model (Bachmann 1984).

In the study by Calis et al. (1984) two familiar visual forms – two human faces – were presented to subjects in rapid succession. With SOA increasing from 0 to 60 msec the recognizability of the first stimulus decreased in parallel with the almost symmetrical increase of the recognizability of the second stimulus. The above authors presented rather strong arguments in favor of the microgenetic model of the transiently paired forms interaction. (This paradigm can also be termed *mutual masking*, a term first introduced perhaps by Eriksen and Lappin (1967), and purposely employed by Harcum and Nice (1975), Bachmann and Allik (1976), and Michaels and Turvey (1979), among others. But our theoretical positions and the objectives of the present article enforce us to prefer concepts void of masking.) Nevertheless, several problems have remained. First, Calis et al. (1984) used video-plotting for the presentation of their stimuli, which took up to 40 msec and which then may have enforced successive, 'microgenetic' processes to manifest. Secondly, this temporal interval itself may seem to some of us too long in order to represent a single psychophysical event. Thirdly, Calis et al., in order to *equalize* the stimuli at the outset of the microgenetic cycle in terms of their recognizability, increased the duration of the first stimulus relative to the second one. One may ask whether employing unequal *durations* as related to the crucial *independent* variables in the conditions where the *dependent* variables of interest should reveal the regularities of *temporal* processes, is a proper way. And the last problem we would like to point out concerns the use of the video-portraits of familiar persons. One may speculate that in this case the generalizations on microgenesis as such are based on an experiment with stimuli, which are represented by the too much 'worked in', automatically driven schemata or detectors, i.e. this could be a restricted case.

In order to test the generality of the results obtained by Calis et al. (1984) we will (1) employ successively paired tachistoscopic exposures of very brief stimuli of equal duration; (2) use initially unfamiliar faces from the set of relatively numerous alternatives; (3) and in order to obtain a general measure of the possible temporal range of microgenetic focus transition (the time course of microgenesis) we employ the conditions that enable the crossover of the recognition functions of the paired first and second stimulus-forms – the crossover point on the time scale being then a statistical temporal value indicative of the half-cycle of microgenesis (MG); for this we deliberately chose experimental conditions which yield *unequal* efficiency of the first and the second stimulus at the shortest SOA in favor of the first. An additional aim of the present study will be (4) to use more direct psychophysical methods of tracing the comparative time course of the MG process in the case of single and paired transients, which will be discussed later below.

The general hypothesis says that if we use a more intense first stimulus than the second one, then at short SOAs between the stimulus forms in a pair, the first stimulus has an advantage in terms of recognition efficiency because its visual characteristics will dominate perception, and with gradual increase in SOA value this advantage will gradually give place to the advantage of the second stimulus, because MG, although initiated by the first stimulus, has its endstages on the material provided by the second stimulus; due to the single MG process, shared by the first and second stimuli, the overall level of recognition efficiency, however, should remain unchanged.

Experiment 1

Method

Subjects

Three subjects, one female and two males with normal vision, aged between 25 and 30, participated in the experiment. They were experienced in tachistoscopic experiments, but ignorant as to the general theoretical underpinnings of the present study.

Stimuli and apparatus

Eight achromatic slides – 8 portraits – of the faces in frontal plane were used as the stimuli. Depicted were male persons unknown to the subjects; the stimuli were marked *a* through *h* and respective photographic prints were also mounted on a poster-stand in the experimental room. The faces were chosen so that no extraneous distinctive features could be used as ‘easy cues‘ for inferences about a face’s identity (beards, spectacles, facial abnormalities, highly conspicuous haircuts, etc. were excluded). These stimuli were exposed by means of the classical three-channel T-scope with half-silvered mirrors with calibrated semitransparence. When superimposed in T-scope, the general outlines of the faces were fitting together. Each stimulus in the experimental session was exposed as a transparent slide by a 3 msec flash, generated by the FS-02 unit for photic pulses (the pulses being spectrally close to the sunlight). The luminance of the flash for the first stimulus was set at $2 \times 10^3 \mathrm{cd/m}^2$. The luminance of the flash for the second stimulus was reduced relative to the first one by the neutral density, 30% transmitting, filter. The angular size of the stimuli in their rectangular 'windows' was approximately 3 by 2.4 deg of the visual angle.

Procedure

Before the main experimental session, the subjects' were given 48 training trials with single stimuli in order to familiarize with the procedure and to develop the skills of effortless finding of the respective symbols *a*, *b*, *c*, *d*, *e*, *f*, *g*, and *h*, for a stimulus shown. This was aided by the poster-stand containing respective photographic prints in two rows of 4 stimuli. Actually, during the main session afterwards, most of the responses were given without scrutinized use of the poster-stand: the training had been effective in establishing necessary requisite memory for the general schemata of the stimulus-faces. In the main session the subjects had to observe the paired, successive presentations of the stimuli with SOAs equal either to 20, 40, 70, 110, or 160 msec. All possible pairwise combinations of the stimuli at each SOA value were used in the quasirandomized order (of invariant blocks of four trials), yielding 56 exposures per subject per SOA. Every subject thus received $56 \times 5 = 280$ trials in the main session. The subjects' task was to concentrate – after each 'ready'-signal – his/her attention on the small luminous fixation-point at the center of the dimly lit (approximately 0.1 $\mathrm{cd/m}^2$) fixation window and report which one of the 8 test stimuli he/she saw. Eight-alternative forced choice procedure was used since the pilot data showed that with the employed SOA values and luminance levels and also probably due to the formally similar appearence of the stimuli which depicted *relatively* unfamiliar persons, the subjects were unable to give correct second responses, which would significantly exceed the chance level, no matter that first responses were given easily and efficiently (they corresponded to one of the exposed faces). Introspective data showed that with some trials at 110 msec SOA and with most of the trials with 160 msec SOA the subjects perceived some pattern preceding the clearly seen face, but insufficient to recognize it and separately differentiate from the face which predominated perception.

Results

Figs. 1–3 show the proportions of correctly reported first and second stimuli as a function of SOA for each subject. The highly symmetrie picture of the 'forward and backward masking' functions with the advantage of the first stimulus gradually giving way to the advantage of the second stimulus is evident in all subjects, which supports our hypothesis. The ANOVA showed the lack of the main effect of the stimulus order ($F = 0.423$; $p = 0.582$), the respective mean proportions of correct responses for the first and the second stimulus-faces in a pair equalling 0.37 and 0.34. But, as expected,

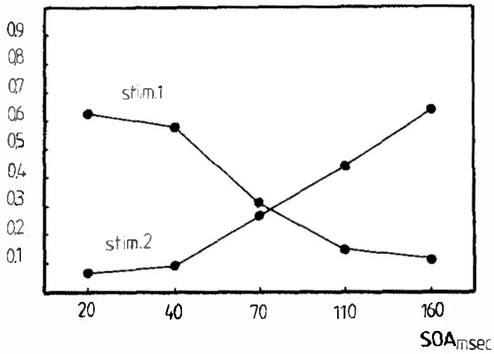

Fig.1.

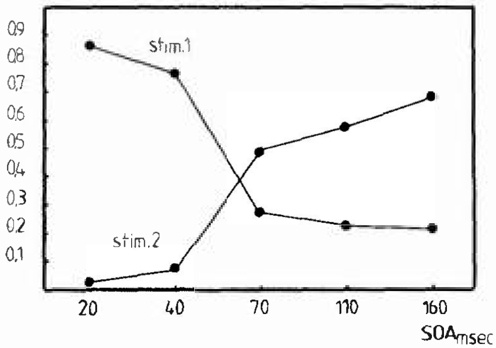

Fig. 2.

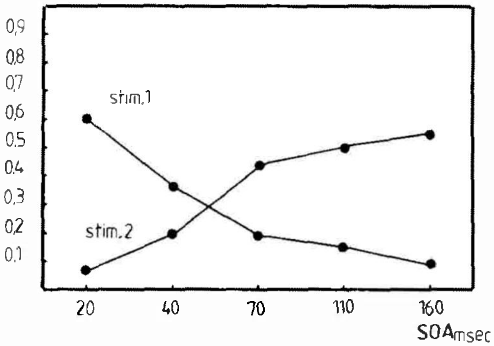

Fig. 3.

Figs. 1–3. Proportions of correct responses to first and second stimuli as a function of stimulus onset asynchrony (SOA). Figs. 1–3 represent the results obtained with the first, second, and third subject, respectively.

the interaction between the factors of stimulus order in a pair and SOA was highly significant ($F = 34.462$; $p < 0.0001$). These results taken together and coupled with data and discussion presented by Calis et al. (1984) substantiate the possibility that the single-glance, paired-forms presentation paradigm may be indeed an appropriate test for measuring the microgenetic focus transition in real time. It is not without interest to see that the crossover points of the first- and second-stimulus recognition functions for different subjects fall around the same temporal value (SOAs of 50–70 msec). This value can conventionally be taken as a measure of the statistical value of the temporal 'half-cycle' of visual perceptual MG within the limits set by the given variables. Naturally, it can be conceived only as a general characteristic of MG *speed* for the class of stimuli and values of physical parameters used, but not conceived as a temporal point, reminiscent of a catastrophe (cf. Thom 1975) by which the *contents* of perception instantaneously change from the first to the second stimulus.

To explain the results on the basis of the single (though multistage) MG act, there are several possibilities with regard to the mechanisms which may underlie it. One general distinction may be related to the energetic (nonspecific) vs algoristic (specific/informational) explanation. In the latter case the phenomenon of microgenetic focus transition from the first to the second-stimulus data is conceptualized as a data-coding process which is started by the first input, which sets the direction of appropriate computations, and is continued as final computations made on the data of the second input (cf. Calis and Leeuwenberg 1981; Leeuwenberg et al. 1985). Given that the moment of subjective actualization is anchored to the moment of MG completion, and because the first stimulus analysis up to the moment of second-stimulus information arrival constitutes the surrogate preliminary analysis of the second stimulus, we may expect the speed-up of the MG for the second stimulus. This conceptualization does not predict energetic enhancement for the second stimulus, however. In the case of the energetic/nonspecific model this enhancement is assumed (in addition to the temporal speed-up), because it can be hypothesized that the first stimulus arrival switches on the relatively slow nonspecific activation needed for the actualization of the exposed sensory data, and thus the *second* stimulus data may benefit from the level of activation that is set in motion by the *first* stimulus (cf. Bachmann 1984). The predictions here include enhancement of apparent brightness/contrast of the second stimulus as compared to the control condition where the second stimulus is presented in isolation. To test this possibility is out of the scope of the present study, however. Before deciding between or combining the different underlying mechanisms of interactive MG – still a hypothetical construct – we should test some predictions common to both, energetic and algoristic, variants. One important common prediction is thus the temporal speed-up of the subjective arrival of the second stimulus after the first one, as compared to the subjective latency with the single-stimulus control. For testing of this possibility we at first performed an informal pilot study with one of the subjects of experiment 1. In random sequences we presented trials with ordinary two-stimulus successions at SOA equal to 80 msec, and control trials with single presentation of the second stimulus. Both conditions were employed 64 times. On half of the trials in both control and main conditions the subject heard a click in the earphones, which actually preceded the (second) visual stimulus by 80 msec; on half of the trials the click followed the (second) stimulus by 80 msec. The subject's taks was to judge whether the click appeared first relative to the perceived portrait-face, or followed it. The results showed that with two-transient exposure the portrait was perceived as preceding the click 40 times while with single-portrait control condition this happened only 12 times (from the total 64). This outcome indeed points to the possibility that one consequence of the MG process, initiated by the first stimulus, is the speed-up of the subjective moment of the arrival of the second stimulus – the signals carrying information of the second input 'use' the activation evoked by the first input and/or reach the subjective state (completed MG), sufficient for recognition, earlier, because the preliminary general computations have been completed already on the first input. These observations were the starting-points for our experiment 2.

Experiment 2

Method

Subjects
Two females and two males with normal vision and hearing, aged between 25 and 30, who were naive as to the purpose of the experiment, served as subjects. All were quite experienced in tachistoscopic experiments.

Stimuli and apparatus
One problem with the above described pilot study was that it is not certain whether the subjects in fact judged the click relative to the first visual stimulus or to the second one –they cannot for sure distinguish them with 80 msec SOA. Thus we had to choose stimuli which can be successfully and easily discriminated on the visual basis, but representing the same general class of the stimuli with the same size as well as employ a shorter and a longer SOA to control the temporal separability of the stimuli.

Two trigrams, each composed of three different dark letters of high contrast on luminous background (BXR, and THV) were used as stimuli. The height of a letter in the trigram was approximately 1 deg of the visual angle. They were exposed as transparent slides in the T-scope (see experiment 1) in paired, successive exposures, 3 msec each, with full spatial overlap between the trigrams. The first trigram (BXR) in each trial may had two principal intensities, i.e. levels of the background luminance – 'bright' (approximately 2×10^3 cd/m^2), and 'dim' (approximately 0.2×10^3 cd/m^2). The second trailing trigram in each trial (THV) had the background luminance approximately at 0.1×10^3 cd/m$^{2.}$ In all conditions the onset of a presentation of the second trigram in this successive pair was either preceded or followed by a click that was presented binaurally through earphones. The click was about 50 dB above threshold. The click preceded or followed the isolated (control) exposure of the second trigram.

Procedure
Before the main series the subjects received training sessions where they had to judge whether the visual trigram subjectively preceded or followed the auditory click (cf. also the method employed by Didner and Sperling 1980). The judgments had to be

made on the basis of the central letter H in the trigram THV in order to narrowly concentrate the subjects' attention and simplify the visual analysis. When the subjects' performance stabilized, we started the main session. It consisted of the counterbalanced order of the trial blocks with the following conditions (24 trials of paired presentations, randomly intermixed with single-stimulus control trials in each block): First, there were two intensity-levels of the first trigram ('bright' and 'dim'), two SOAs between the trigrams 75 or 150 msec), and four values of the click delay relative to the second trigram (-70 msec, -20 msec, $+80$ msec, $+130$ msec). (The temporal asymmetry of the click relative to the trigram in favor of the clicks that followed the trigram was introduced due to the well-known regularity that subjective latency of an auditory stimulus is generally shorter as compared to the visual one. But as our experimental data later showed, perhaps due to the fact that the subjects' attention was captured mainly by the visual modality, actually the auditory and visual perceptual latency appeared to be roughly equal.) Thus each subject received $24 \times 2 \times 2 \times 4 = 384$ trials in the paired trigrams condition which were randomly intermixed with the 384 control trials of single (THV) trigram exposure.

The subjects' task was to judge whether the central letter (H) of the trigram THV preceded or followed the auditory click. A two-alternative forced response scheme with responses being 'before' or 'after', was utilized. Each trial consisted of an aural warning, appearance of the fixation dot exactly below the location of the central letter of a trigram for 1 sec, trigram(s)' and click's presentation, and subject's response.

Results

Fig. 4 shows the mean proportion of 'letter before click' responses as a function of the interval between the click and the THV-trigram and with first trigram intensity level as the parameter separately for the paired and control conditions, pooled for all subjects and for both SOAs (75 and 150 msec). It is apparent that paired presentations have led to significantly more 'letter before' responses as compared to single-trigram control ($F = 68.617$; $p < 0.004$). We remind that the subjects discriminated a letter H easily and on *this* basis made their judgments about the *second* trigram's appearance. There was also a main effect of the delay between the click and the trigram ($F = 10.489$; $p < 0.042$). As a surprise we found no interaction between the click delay and SOA ($F = 1.4$; $p = 0.394$) as well as between the click delay and first trigram luminance ($F = 5.332$; $p = 0.101$). This may provide a hint about the relative independence of the visual and auditory process in the present experiment, which in turn is not an unfavorable fact in the light of the need to validate our audiovisual referencing method.

The main effect of SOA between trigrams was also significant ($F = 40.584$; $p < 0.008$). In general, with SOA = 75 msec the subjects gave more 'letter before' responses (scaled proportions: 0.33 above single-stimulus control vs 0.25 above single-stimulus control). This invalidates a possible methodological objection that the subjects may have based their responses on the first trigram's appearance. In this case the condition of 150 msec SOA should have yielded more 'letter before' responses than 75 msec SOA, which actually turned out to be vice versa. On the other hand, if we suppose that with 75 msec SOA the first and second trigrams subjectively fuse more than with 150 msec SOA, then it is easy to explain the observed effect: with 150 msec SOA the click

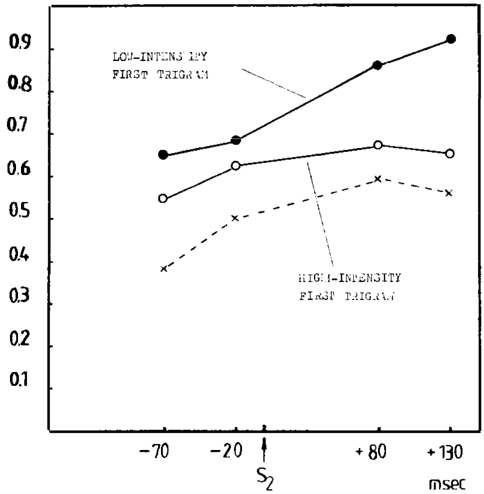

Fig. 4. Means of the proportion of 'letter before click' responses as a function of the interval between the click and the second, reference, trigram (THV) for different first-trigram (BXR) intensities in the paired-trigram conditions (solid lines), and for the unpaired, single-trigram control (dashed line), averaged for four subjects and two SOAs between the trigrams in the paired condition (SOAs of 75 and 150 msec). The temporal position of the second, reference, trigram marked by S_2 and an arrow.

is estimated with regard to the sole second trigram, but with 75 msec SOA just with regard to the fused composite. But *then* the fact that with 150 msec SOA where stimuli should be differentiated in time (although *not both recognized*) the 'letter-before' responses are more frequent than in control condition, once more substantiates the MG speed-up.

There was a significant interaction between the SOA and first trigram intensity factors ($F = 16.953$; $p < 0.026$). This substantiates different effects of the first trigram intensity as dependent on SOA between the trigrams: with 'dark' first trigram there were more 'letter before' responses (anchored to the second, reference, trigram) than with 'bright' first trigram at 150 msec SOA (scaled proportions respectively 0.28 vs 0.12) while at 75 msec SOA 'dim' and 'bright' gave equal proportions of scaled 'letter before' (0.33 even). This is rather a curious interaction which is difficult to interpret. One possibility appears to be that with 150 msec SOA we approach the temporal limits where a single MG cycle starts to be replaced by two separate MG cycles for the two stimuli. If the first stimulus is more intense, then it is more likely to complete an *autonomous* MG cycle within the given time and the second stimulus does not benefit from it (having to start a process of its own), thus the second stimulus appearing subjectively later in time. But at 75 msec SOA and at 150 msec SOA with a dim first stimulus, the *interactive* MG takes place thus enabling the speed-up of the subjective arrival of the second stimulus. Another possible variant of interpretation, suggested by one of the referees, presupposes that in case of short SOA, and also in case of a longer

SOA with a dim first stimulus, the MG may only extract the information 'some letter' from the first stimulus and then continue with the second letter. (In this case the subject rather perceives one letter than two.) Just the vague first letter explains the 'letter-before' responses, because it is not a trivial clearly perceived separate letter preceding the relevant one (as in the case of long SOA and bright first stimulus), but an early stage of one and the same MG process. The main difference between these two explanations relies on the consideration of the point of reference for the subjective arrival of the percept – whether it is hitched on to the preliminary or terminal stages of MG. This intriguing question deserves special future research.

Taken together, the results of experiment 2 seem to show that in microgenetic buildup of the visual image the preceding transient visual event may speed up the succeeding microgenetic process of the following, spatially coinciding second visual stimulus of the same general class – it appears to be actualized considerably sooner as compared to its presentation in isolation. This in turn refers to the possibility that in MG the energetic activation-mechanisms and/or algoristic preprocessing mechanisms may necessarily play an important role. The MG is initiated by the first stimulus and given that the following stimulus arrives within the same single MG cycle – usually less than 200–300 msec – it will be using the activation and/or preliminary computations evoked by the preceding input and hence will be actualized earlier. In single, unpaired exposure its actualization arrives after the time-consuming activation accumulation process or algoristic preprocessing have had enough time to elaborate its specific sensory data.

General discussion

In the study by Calis et al. (1984) it was shown that when two ecovalid visual stimuli – the human faces – were presented within a single-glance temporal interval, then with increasing the SOA from 0 to 60 msec, the subjects gradually transferred to predominant seeing of the second stimulus. Calis et al. interpreted the results according to the conceptualization of interactive MG where the first portrait 'triggers' directing schemata, capable of actualizing relevant information in general, but final identification steps, though *originated* from the previous phases, continue on the second portrait. There were, however, some minor methodological problems, e.g. the artificial stress on successiveness of processing (viz., the use of successively plotted video-display), unequal durations of the paired stimulus-faces, familiarity of the depicted persons to the subjects. Therefore we tried to extend the study by Calis et al. with controlling the simultaneity of each stimulus and extreme brevity of both stimuli, which depicted relatively unfamiliar persons and were of equal (3 msec) duration. In addition, we tried to obtain the crossover of the first- and second-stimulus recognition function and to use more SOAs in order to check the temporal course of this hypothetical MG process. In fact, our attempt was successful and we would like to agree with the general MG model of the single-glance perception. Our data indicated that a 'half-cycle' of this process within the constraints set by our experimental variables may fall around 50–70 msec. Another question is related to the prediction that if the MG is started on the first input, then the subjective arrival of the second input should be speeded up. The nature of the mechanisms which may mediate the phenomena of MG focus transition and speed-up can be at least twofold – algoristic (pre)processing and nonspecific retouch of specific representations. The data from experiment 2 can be interpreted as showing that, regardless of the exact nature of the underlying mechanism(s), the microgenetic speedup effect is obtainable. Naturally, those two main candidate mechanisms – specific algoristic process of schemata-triggering, and nonspecific process of activation – should not necessarily be incompatible. In an earlier article we have presented a model of perceptual processing, where fast specific (algoristic/computational) processes work in ensemble with slower, nonspecific (energetic, 'retouch') processes and provide a pshychophysiological foundation for the process of interactive MG (Bachmann 1984).

The concept of MG seems to have some constructive potential. Although initially our model was developed to explain visual masking in terms of MG, we agree with Calis and Leeuwenberg (1981) in that the term *masking* may cause confusion, if we wish to say that attention is diverted, selection has been redirected, or microgenetic focus transferred from one input segment to another. Indeed, the 'forward masking functions' (cf. recognition functions for the second stimulus, figs. 1–3) and the 'backward masking functions' (cf. respective functions for the first stimulus on figs. 1–3) are simply two sides of one coin which should preferably be referred to as *perception* (though single-glance perception) rather than as *masking* (Calis and Leeuwenberg 1981). The highly symmetrie picture of the functions on figs. 1–3, together with the absence of statistically significant main effect of the order of the stimuli substantiate our arguments.

If someone would nonetheless argue that the transient paired-forms paradigm is nothing more but mutual masking, and the gradual shift from the predominantly first to the predominantly second stimulus' actualization reflects the gradual shift from forward to backward masking predominance (regardless of the arguments presented in Calis et al. 1984; Calis and Leeuwenberg 1981; Bachmann 1984) then we have to find some experimental evidence that would demonstrate the gradual shift of the MG focus without the exposure of *two* transients (a 'test' and a 'masker'). Recently we have collected data interpretable in terms of *autoclitic masking* of a single stimulus by itself (Bachmann 1987). If visual photographic forms, which are presented to subjects for recognition, are preliminarily quantized into pixels with the averaged brightness levels within each pixel, then by manipulating spatial level of quantization and exposure duration it is possible to demonstrate that the microgenetic visual image build-up consists of at least two stages: (1) global spatiotemporal integration (yielding increase in recognition with increase in exposure duration for all spatial quantization levels), and (2) differentiation of the local (detailed) form levels where the outcome of the further increase of exposure duration can be either increase in recognition efficiency (if global and local spatial levels of form are congruent, which is the case with fine spatial quantization), or decrease in recognition efficiency (if local levels are incompatible with global ones, thus yielding 'masking' of the latter by the former). In terms of Leeuwenberg et al. (1985) this is masking due to incompatible interpretation within a single MG act. But in this case it is questionable to term this process of the transition of the actualization focus within the material provided by a single stimulus as 'masking'. Instead it is a lawful expression of the microgenetic trend from global to local levels of form. Supportive data and arguments, also conceptualized in terms of the MG process, have been recently offered by David Navon (1977, 1981), cf. also Watt (1988). It may be possible that in the case of the two-transient, paired-forms paradigm the global processing is started on the first stimulus and gradual shift to the local (detailed) analysis proceeds on the second stimulus. As a byproduct of this regularity, there can be temporal economy for the second stimulus (cf. our experiment 2). (An intriguing affinity striking the eye is the well-known asymmetry of metacontrast with the disc-ring vs ring-disc order of exposure – cf. Werner 1935. By definition global-to-local MG implies this asymmetry if we are to abandon the Procrustean connotations of masking.) These ideas still have to be experimentally tested though. (Some indirect support can be found in data by Calis and Leeuwenberg (1981), who found that perceptual analysis of ground starts before the analysis of figure, as well as in the study by Huik (1986), who demonstrated that in anorthoscopic perception, spatial distortions of the surrounding (more global) ground precede those of the figure.)

From these considerations it follows that in our experiment 1, where the stimuli used provided more or less high level of interstimulus spatial congruence, there should not have been a switch to one or another stimulus (according to the all-or-none law), but a *gradual* shift of the general subjective appearance of a perceived image – the endproduct of the MG – from the one containing relatively more first-stimulus characteristics to that one which contains relatively more second-stimulus characteristics, including local and detailed ones. But our method – forced choice recognition –precluded more precise study of the contents of percept at different epochs of MG. Some other methods, e.g. multidimensional sealing procedures adapted to MG, could be more appropriate for this purpose (e.g. Kirkham 1977; Petersik 1978).

The traditions to show that even a single-glance perceptual data has strong ecological validity, are not new. Already Raymond Dodge (1907) has shown that information acquired during each fixation should have time to be 'cleared up' in subjects' conscious perceptual image. The modern data on oculomotor activity as coupled to cognitive processes also agrees with both, the older observations regarding 'clear-up' time and more contemporary tachistoscopic data on visual MG in that the temporal intervals for visual fixation *in the most-rapid saccadic eye-movement regime* (which provides a subject literally with 'frames' or 'snapshots' of the environmental information) coincide well with the durations of the MG cycle (cf. Russo 1978; Avetissov and Rosenblum 1973). In the *seeing conditions with prolonged fixation* and *absence of the appearance of new visual objects* the 'clear-up' time is reduced to minimum, of course, and the MG process is negligible on the account that it is prepared long before by the analysis of previous, congruent, visual input. Now MG is continuously (re)presented by its invariant endproduct. The ecovalidity of MG also does not mean that all the computed or retouched perceptual data from the previous fixations become fully suppressed (i.e. nonavailable) at the moment of the analysis of the input from the succeeding fixation. The previous input may provide directing schemata and/or data to be integrated with, given the coherence of scenes or patterns from the consecutive fixations (cf. real and apparent motion, scene integration, etc.). But the *focus* of processing is related to the newest arriving perceptual data, rendering the role of context or 'preliminaries' to the older input, which becomes more or less subliminal or marginal, the degree of marginality depending on its congruence with the actual input. But, as was said above, the ecovalid conditions include eye movements with two different forms provided by two successive fixations of very short intervals in between (a bit more so as modelled in our experiment 2, and a bit less so in experiment 1).

Indeed, if we present two mutually exclusive stimuli *within* a single-glance interval of less than 150–200 msec, it does not mean that ecovalid perception *consists* of a sequence of snapshots with intervals even as short as 30, ... , 80 msec and providing two incompatible stimuli, but only that ecovalid perception can be *investigated* (objectively measured) by means of such sequences that push the perceptual system at its limits to see what it does (cf. Calis et al. 1984: 227). Compelling arguments in favor of this strategy of 'perceptual microscope' can be found in the majority of instructive open peer commentary to the article by Haber (1983). But to have more merit, this strategy has to abandon the habits of predominantly qualitative phenomenon-seeking experimentation, and turn to complementary line of quantitative *measurements* of the processes that underlie or exemplify these phenomena. Unfortunately with the present article we have not yet crossed the Rubicon, but our hope is that we are no more on the bank either.

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