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The influence of lateral implicit visual affective stimuli on the evaluation of neutral stimuli in humans

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Abstract . It is now well established that implicit affect influences explicit judgments. Findings from neurobiological studies indicate a relationship between the functioning of the human cerebral hemispheres and emotions. The aim of the present research was to examine: (1) the direction of influence on neutral targets of suboptimal primes exposed for a duration of 16 ms, (2) whether the influence of affective suboptimal primes on neutral targets depends on the hemisphere to which the prime is directed. We predicted that affective primes exposed centrally would influence the evaluation of neutral target stimuli in a direction opposite to that of their explicit effect. Second, we posited that the influence of primes on the evaluation of neutral target stimuli would be different depending on the visual field in which the primes were exposed. We present combined data from four experiments, conducted in a visual affective priming paradigm. Neutral target stimuli (ideographs exposed for a duration of 2 seconds) were sub-optimally primed by photographs of faces expressing joy or disgust exposed in either the LVF, RVF or CVF. Subjects were asked "to state how negative/positive the character trait that is represented by a given ideograph is". The hypotheses were supported. The evaluation of ideographs after negative priming was more positive than the evaluation of ideographs after positive priming (indicating a contrast effect). This effect appeared only when affective priming stimuli were exposed in the central visual field. The evaluation of ideographs differed depending on the visual field of prime exposure conditions: exposure of affective primes in the right visual field resulted in more positive evaluations of ideographs than ideographs following primes in the left visual field.

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INTRODUCTION

Studies of the influence of implicit affect on stimulus evaluation on the one hand, and studies on human brain lateralization on the other, serve as the context of our research. It is now established that implicit affect influences human evaluative judgments and behavior (Dijksterhuis et al. 2005, Jarymowicz and Kobylinska, submitted, Kolanczyk et al. 2004, Murphy and Zajonc 1993, Murphy et al. 1995, Zajonc 1980, 2004). Implicit affect is defined as an emotional response which is relatively independent of cognitive processes and is derived from stimuli that are not consciously recognized and analyzed – or at least their influence is outside conscious awareness. In this respect, awareness is defined as subjective, declarative knowledge of the fact that something is the object of perception (Dijksterhuis et al. 2005). If an affective stimulus is to influence a person's judgments outside of consciousness, it must be detected by the senses, processed by the nervous system and must activate certain brain circuits without the whole process being recognized by the person.

Evidence for the thesis presented above is found both in neurobiological studies of the human brain and in psychological studies initiated by Robert Zajonc. He observed that affective reactions may occur before the cognitive recognition of a stimulus, and that such reactions are effortless, unavoidable, holistic and hard to verbalize (Zajonc 1980). Primary affect, as he called it, is produced automatically as a reaction to the sensual parameters of a stimulus. Affect is nonconscious or implicit when the person is not aware of its source, its target, or of either (Bargh 1994).

One of the first reports suggesting the possibility of affect elicitation independent of cognitive processes that lead to stimulus recognition was that of Kunst-Wilson and Zajonc (1980). They analyzed research that had consistently shown that when the frequency of exposure to a particular stimulus is increased, the stimulus is better liked. They found evidence showing that this repeated exposure effect is independent of subjective recognition of the stimulus. In many studies "(…) the initial stimulus exposures were so degraded that subsequent tests revealed no more than chance discrimination between old and new stimuli (ex. 4 milliseconds). Yet despite this lack of conscious recognition, the stimuli increased in attractiveness as a function of the actual number of degraded exposures. This means that the growth in preference with repeated exposures is as true for degraded stimuli as it is for optimally presented stimuli" (Murphy et al. 1995, p. 591).

Most data showing the influence of implicit affective stimuli on evaluation come from research done in an affective priming paradigm. The paradigm was introduced by Murphy and Zajonc (1993) who presented evidence of the existence of nonconscious affect and its influence on conscious judgments. They presented neutral target stimuli – Chinese ideographs – preceded by 4-milisecond exposures of photographs of faces expressing either positive or negative emotions[1]. These affective primes were capable of inducing affect that became displaced onto the Chinese ideographs. When preceded by a positive facial expression, the ideographs were judged more positively than when preceded by a negative facial expression, even though neither the facial expression nor even the presence of any image was accessible to the participants' awareness. In contrast to affective primes, the neutral suboptimal primes (e.g., geometric figures of different shapes) failed to influence the participants' judgments.

This was the first effect observed in affective priming research. However, it turned out in later studies that the reverse effect is also possible (Glaser and Banaji 1999). The first effect – when neutral stimuli preceded by positive primes are evaluated more positively than stimuli preceded by negative primes – is referred to as the assimilation effect. The reverse effect occurs when neutral stimuli preceded by negative primes are evaluated more positively than stimuli preceded by positive primes – is referred to as the contrast effect. It turned out that which of the two effects is obtained is not a matter of chance but is likely related to important psychological and neurobiological processes occurring at the time the affect is elicited (Murphy and Zajonc 1993). Results indicate that in conditions of implicit affective priming the contrast effect, relative to the assimilation effect, results from slightly larger contributions of cognitive processes (defined as recognition of features, reasoning, and opposite to affective processes) in the evaluation process (Kobylinska

[1] Should such exposures be called subliminal. According to Dijksterhuis and coauthors (2005), short exposures can be called subliminal when they exceed the objective absolute recognition threshold (recognition of stimulus that was presented from the set of stimuli that exceeds the chance level), but do not exceed the subjective one (the subject is not able to identify the stimulus), which means he/she does not have any conscious awareness of the fact that a stimulus was presented, but it still influences subsequent processes. We agree with the suggestion of Murphy and Zajonc (1993) that it is better to call very short exposures (which are not consciously perceived by participants) suboptimal and not subliminal, as we do not measure individual recognition thresholds. In our research, the most important fact is that participants are not aware of presentation of the priming stimuli.

2001a,b, Kolanczyk 2001, Staple et al. 2002). In many studies, the contrast effect was obtained in the affective priming procedure when (1) the exposure duration of primes was 16 ms (the assimilation effect was observed when the duration was 4 ms) (Kobylinska 2001b); (2) when more affectively weak stimuli were used (Glaser and Banaji 1999); (3) when the procedure and task for subjects activated analytical thinking (Ohme et al. 1999); and, especially interesting for the aims of the present article, (4) when both primes and targets were presented to the left cerebral hemisphere (Stefanski, unpublished PhD thesis). Research that demonstrates the latter effect will be presented below in more detail as it is directly connected to our hypotheses and method. But first, the second source of research questions and hypotheses (apart from knowledge gained from studies on affective priming) will be briefly discussed.

The variety of factors considered by priming studies in connection with generation of the assimilation and contrast effects, including affective suboptimal priming, testify to the difficulty of identifying a single coherent theoretical conceptualization that would explain these effects. There is, however, something that all these studies and approaches have in common. The contrast effect occurs when (1) automatic correction processes are triggered that lead to effects that are opposite to those coming from priming (automatic correction process, according to Glaser and Banaji (1999), is an uncontrolled mechanism that requires neither cognitive resources nor intentional effort to be activated and that corrects for the biasing influence of silent but nonconscious affective stimuli on evaluation), (2) additional cognitive resources are engaged and some cognitive effort is made by the individual, (3) there is awareness of priming or of its influence on target tasks, or (4) analytic information processing and verbalized standards of evaluation, based in the left hemisphere, are activated. These processes make relative evaluation possible (Jarymowicz 1999). The contrast effect is, then, linked with some minimal kind of corrective mechanisms, perhaps spontaneously activated by an individual's cognition. This kind of autocorrection (automatic control) could activate certain dimensions of judgment and lead to evaluations of a relative nature. For example, a Chinese ideograph may seem quite pretty, when compared to a face distorted in disgust. This may induce negative affect. Neurobiological knowledge concerning functional lateralization of emotional processes in the human brain was an important point of reference for our research. Many studies show that emotional processes are lateralized (e.g., Buck 1999, Davidson et al. 2000a, Grabowska and Nowicka 1996, Ornstein 1997), though the data obtained are not consistent.

There are two main hypothesis concerning emotion lateralization in the human brain. According to the first one, emotions, independent of their valence, are connected to the functioning of the right cerebral hemisphere (e.g. Ornstein 1997). Data confirming this hypothesis comes from research on recognizing and expressing emotions. According to the second hypothesis, negative emotions are connected to the right cerebral hemisphere and positive ones to the left cerebral hemisphere (Davidson 1992, 2001, Davidson and Irwin 1999, Sutton and Davidson 2000). Apart from these two hypotheses, some data indicate that the left hemisphere modulates emotional reactions produced by activation of the right hemisphere, specifically those related to the activation of subcortical brain regions (Borod 1992, Davidson and Fox 1989, Davidson et al. 2000b, Ochsner and Gross 2004).

The theoretical and empirical context described above became the source of new research questions for psychologists interested in the relationship between affect and cognition, and it was a logical next step to check whether the influence of affect on evaluative judgments depends on the cerebral hemisphere to which the affective stimulation is directed. Stefanski (unpublished PhD thesis) was the first researcher to study whether exposing affective primes and neutral targets in either the left or right visual fields, rather than central exposures, influences the results of the priming procedure. He replicated the study of Murphy and Zajonc (1993) and added one more independent variable: the visual field in which the stimuli were exposed. In this experiment, black and white photographs of a male face expressing emotions were used: joy as a positive affective prime and sadness as a negative one. A photograph of a neutral face was exposed in the control condition. Chinese ideographs were used as neutral target stimuli (they were chosen earlier as those evaluated most neutrally from a larger set of stimuli). The exposure duration of primes was 4 ms, and of targets – 1 000 ms. Both primes and targets were exposed in either the center of the visual field (CVF), in the left (LVF), or in the right (RVF) visual field. There were two conditions of lateral exposures. For one group of participants, both primes and subsequent targets were exposed in the same visual field; this was the ipsilateral exposure condition. For the other group, targets were exposed in the opposite visual field than the primes which preceded them; this was the contralateral exposure condition.

The results obtained in the central exposure (control) condition replicated Murphy's and Zajonc's experiment (1993, Study 1). The results in the lateral-exposure conditions were as follows. First, an assimilation effect was obtained in all contralateral exposure conditions. Compared to the evaluation of ideographs primed neutrally, those primed negatively were evaluated more negatively and those primed positively more positively when exposure of prime and target were in different visual fields. In the ipsilateral exposure condition results were not symmetrical. For exposures of primes and targets in the LVF an assimilation effect was obtained. However for exposures of primes and targets in the RVF a contrast effect was obtained. Compared to the evaluation of ideographs primed neutrally, those primed negatively were evaluated more positively and those primed positively more negatively.

Stefański (unpublished PhD thesis) claimed that such a shift of evaluation of ideographs in the direction that is opposite to the valence of emotion expressed in the photograph used as prime indicates the involvement of different processes that have their neural correlates in the left cerebral hemisphere. According to this hypothesis objects detected by the left hemisphere are located on two-dimensional verbalized dimensions, whereas detection by the right hemisphere is related to holistic coding of sensations coming from all senses taking part in detecting the object. As argued by Stefanski (1987, unpublished PhD thesis) obtaining a contrast effect is only possible when verbalized dimensions are activated. The conclusion from these last two points is that a contrast effect is possible when the left cerebral hemisphere is activated, which is consistent with Stefanski's results obtained for ipsilateral exposures in the RVF.

Stefanski's research not only showed differences in evaluation resulting from the visual field in which affective primes were exposed, but also from the consistency of this field with the visual field in which targets were exposed (contrlateral or ipsilateral exposures). Therefore, it was not clear how implicit affect influences evaluation depending on the cerebral hemisphere to which affective stimulation is addressed. Moreover, these studies did not show whether negative and positive implicit affect is related to the function of separate cerebral hemispheres.

We decided to slightly change the procedure designed by Stefanski and to conduct several experiments to examine the relation of both negative and positive implicit affect to cerebral hemisphere functions.

First we wanted to replicate results showing the influence of implicit affective stimuli on explicitly formed evaluative judgments. Second, we wanted to examine whether directing affective stimulation to either the left or right cerebral hemisphere (lateral exposures) would produce effects different from those produced when directing the stimulation to both hemispheres (central exposures), as shown in previous studies (e.g. Stefanski, unpublished PhD thesis). Stefanski obtained a contrast effect with this procedure, and it seemed to be produced by left hemisphere activation. However, this study did not investigate whether it is sufficient to present the affective stimulation to the left hemisphere alone to get a contrast effect. Due to the fact that the contrast effect is described as a consequence of correction processes, it is important to know when it is obtained in order to find where the control of nonconscious affect starts. This is the first step to answering a more general question: what are the minimal conditions for reducing the nonconscious affect influence which leads to biased judgments? Is the activation of the left hemisphere enough to reduce that influence? This is a new question in the area of implicit affect research. Most research is aimed at showing that implicit processes exist and can influence us without conscious awareness. The present question is the consequence of our interest in the conditions of reducing the influence of such processes on human functioning.

We predicted that: (1) as in previous studies (see Karwowska 2001, Kobylinska 2001b), the influence of suboptimal affective primes exposed for a duration of 16 milliseconds on the evaluation of neutral target stimuli would produce a contrast effect; (2) the influence of implicit affective primes on the evaluation of neutral target stimuli would be different depending on the visual field in which primes were exposed. Specifically, we predicted that the evaluation of target stimuli would be: (i) more positive when primed by exposures in the RVF than in LVF based on the hypothesis that connects positive emotion with the left hemisphere and negative emotions with the right; (ii) least differentiated when primed by exposures in the RVF based on the hypothesis of control functions of left hemisphere suggesting that the influence of affective stimuli, either in the direction of a contrast effect or an assimilation effect, should be inhibited.

METHODS

We present below results based on combined data from four experiments in which four independent groups of participants took part. The identical affective priming paradigm (Murphy and Zajonc 1993) was used in four experiments. The method was modified in accordance with the lateral priming procedure proposed by Stefanski (unpublished PhD thesis).

Subjects

One hundred and forty one students (68 men and 73 women) from Warsaw University and other Warsaw academies participated in four studies. All of these participants stated that they were right-handed. Only the results from those participants who were not aware of the priming procedure were included in the analysis. Data from 3 participants were excluded, as they saw "something" flashing before the ideographs. Ages ranged from 18 to 26 (mean 21.4). All participants volunteered to take part in an experiment that was introduced as "A study on intuition processes". Before the experiment participants were informed that they would be evaluating ideographs. They were not informed about the priming procedure until they completed the task.

Materials and apparatus

A 3-field Gebrands G1130/S tachistoscope was used to expose the stimuli. The tachistoscope was controlled by a PC computer under Tachistoscope Controller 3.1. software.

Two black and white photographs of the same male face, one expressing joy and the other disgust, served as affective primes. The emotions expressed in the photographs were distinct and easily recognizable and were chosen from a large set of photographs of emotional expressions on the basis of former studies (Ohme et al. 1999). The exposure duration of the affective primes was 16 milliseconds. Primes were exposed either in the LVF, RVF or CVF depending on the condition. The size of the photographs was 5 cm × 5 cm. They were attached to white tachistoscope cards measuring 15.1 cm × 10.1 cm. In the central exposure condition the photographs were attached in the middle of the cards. In the lateral exposure condition the photographs were attached on either the left or right side of the cards. The midpoint of the photographs was 3.7 cm to the left or right (2.8°) from the midpoint of the card. A white tachistoscope card was exposed in the no priming condition.

Chinese ideographs were used as target stimuli. These were black printed on white paper. Twenty eight were selected from a larger set as they were evaluated as most affectively neutral (selection procedure described in Kobylinska 2001b). Target stimuli were always exposed in the CVF. The exposure duration of target stimuli was 2 000 ms. The ideographs were printed in squares of 5 cm × 5 cm that were attached to white tachistoscope cards.

The affective evaluation of the ideographs was the dependent variable. Participants were requested to say "how negative/positive the character trait represented by a given ideograph is". Each ideograph was evaluated on a separate 130-mm long scale whose endpoints were strongly negative – strongly positive character trait. The mean distance in millimeters, from the beginning of the scale to the point marked on it by participants, constituted the dependant variable. Higher values denote more positive evaluations.

Procedure

Each person participated in the experiment individually. Participants were asked to sit in front of the tachistoscope screen and were given written instructions. There were 28 ideographs presented. One was used on a training trial and 27 on experimental trials. Of these 27: (1) 9 were primed negatively – 3 exposed in the LVF, 3 in the CVF, 3 in the RVF; (2) 9 were primed positively – 3 exposed in the LVF, 3 in the CVF, 3 in the RVF; (3) 9 were not primed (a blank tachistoscope card was exposed).

The control condition of "no prime" and not a neutral prime was introduced because previous studies have shown that targets primed neutrally (a neutral face) were evaluated the same as those which were not primed at all (Blaszczak 2001) and it is difficult to find photographs of completely neutral faces. Thus in our opinion having no prime was easier and still satisfactory as a control conditions. After the exposure of each ideograph, the participants had 12 seconds to evaluate this on the 130 mm scale described above. Each ideograph was evaluated on the separate piece of paper.

A single trial consisted of: (1) a sound informing the participant that a stimulus would be exposed; (2) exposure of a fixation point – a black point in the middle of a white tachistoscope card, exposure duration 200 ms; (3) exposure of a prime, exposure duration 16 ms; (4) exposure of an ideograph, exposure duration 2000 ms; (5) evaluation of the ideograph on a scale, duration 12 s.

After the exposure of the last ideograph, participants were asked whether they had seen anything strange or unusual. The order of primes was randomly selected and was the same for each participant. The order of targets was counterbalanced. Each ideograph was used in each priming condition. That is, each was primed negatively for one-third of participants, positively for one third and not primed for one third. At the end of their session, each participant was informed about the aims of experiment.

RESULTS

Repeated-measures analysis of variance was used for the analysis, with mean evaluation of the ideographs as the dependent variable and priming valence and visual field as factors.

Main effects

The results revealed a significant main effect of priming valence ($F_{2,280}$=4.594, P<0.01). Figure 1 shows the mean evaluations of ideographs primed negatively, not primed and primed positively independent of visual field of prime exposures.

Contrasts were employed to check the significance of mean differences. Evaluations of ideographs primed negatively were significantly higher than evaluations of ideographs primed positively ($F_{1,140}$=7.875, P<0.006) and of those not primed affectively

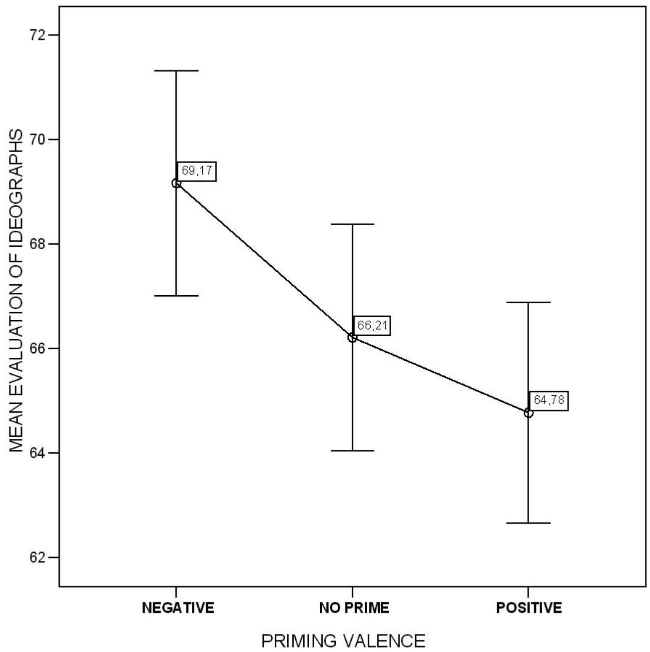

Fig. 1. Mean evaluations of ideographs primed negatively, not primed affectively and primed positively

($F_{1,140}$=4.120, P<0.044). No difference was found between the evaluations of ideographs primed positively and those not primed affectively ($F_{1,140}$ =1.044, P<0.309).

A main effect of the visual field in which primes were exposed was obtained ($F_{2,280}$=9.423, P<0.0001). Figure 2 shows the mean evaluations of ideographs primed by exposures in the RVF, CVF and LVF.

The evaluation of the ideographs was significantly more positive when they were primed by exposures of affective stimuli in the RVF than in the CVF (*t*-test for dependent samples: t_{140}=4.09, P<0.001) or in the LVF (t_{140}=2.66, P<0.01). Ideographs exposed in the LVF were judged marginally more positive than those exposed in the CVF (t_{140}=–1.85, P<0.07).

Interaction effect

The interaction effect of priming valence and visual field was marginally significant ($F_{4,560}$=2.133, P<0.075). Figure 3 shows the mean evaluations of ideographs primed negatively, not primed and primed positively in LVF, CVF and RVF.

The results demonstrated a contrast effect in the central visual field condition. The evaluation of negatively primed ideographs was significantly higher than those which were positively primed and than those

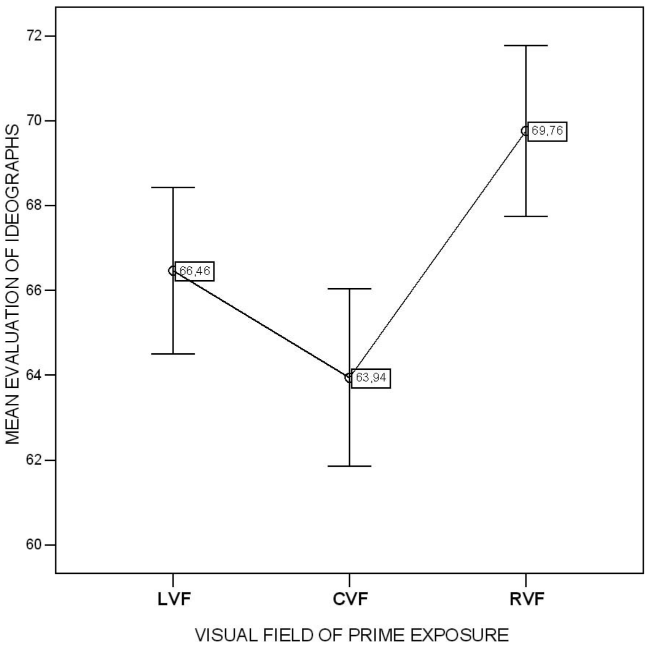

Fig. 2. Mean evaluations of ideographs primed by exposure of stimuli in the left, central, and right visual fields

which were not affectively primed (contrasts: $F_{1,140}$=11.065, P<0.001 and $F_{1,140}$=4.191, P<0.043). In RVF and LVF exposure, an effect of priming valence was not detected. The most similar were the evaluations of ideographs primed by exposures of affective stimuli in the right visual field exposure condition. Separate analyses for positive and negative priming valence conditions showed a significant effect of visual field only in the positive priming condition. Ideographs primed positively were rated significantly lower when the primes were exposed in the CVF and LVF than in the RVF (*t*-tests for dependent samples: t_{140}=4.834, P<0.001 and t_{140}=2.195, P<0.030). Moreover ideographs primed positively were rated slightly higher when the primes were exposed in LVF than when they were exposed in CVF (t_{140}=2.671, P<0.072).

DISCUSSION

We obtained support for our hypotheses. An influence of implicit affect on explicit judgments was observed. Differences in the evaluation of neutral stimuli were caused by: (1) affective priming valence (this contrast effect supported hypothesis 1); (2) visual field of exposure (this valence asymmetry effect supported hypothesis 2); (3) a weak, but suggestive, interaction of valence and exposure field.

As in previous research, implicit affect influenced the evaluation of ideographs. The contrast effect which was obtained was characterized by the evaluation of ideographs incompatible with priming valence. The evaluation of ideographs primed negatively was higher than the evaluation of those primed positively. This effect appeared only when affective priming stimuli were exposed in the central visual field. The result is a repli-

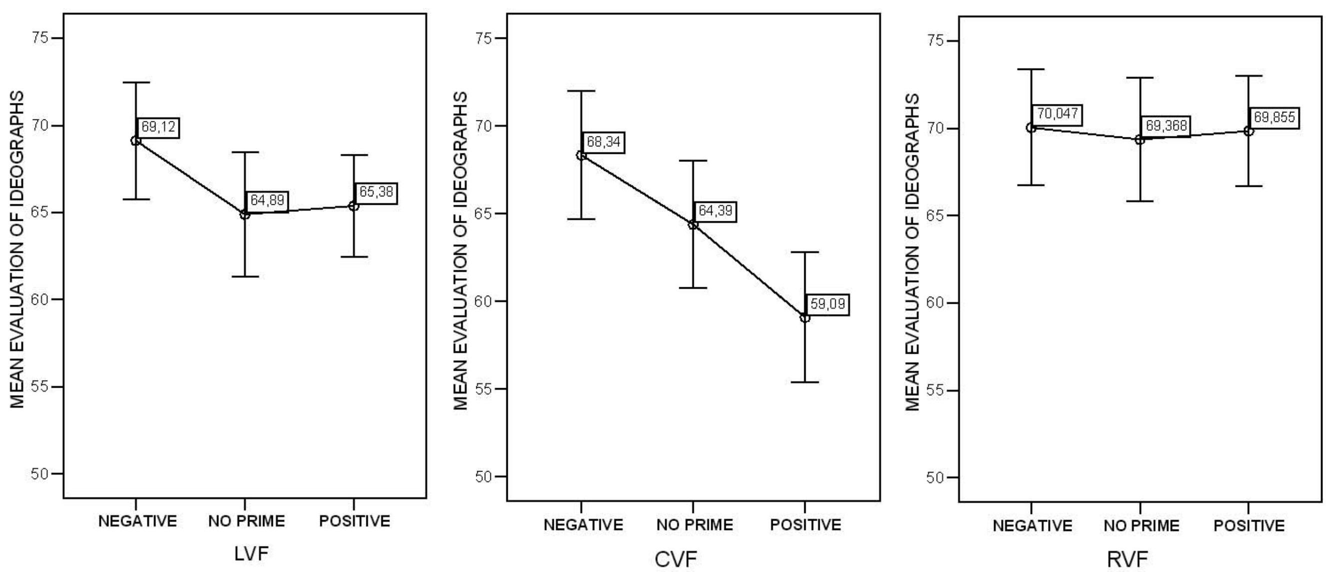

Fig. 3. Mean evaluation of ideographs primed by negative, neutral and positive primes exposed in the left, central and right visual fields (the interaction of priming valence and visual field)

cation of previous research which demonstrated a contrast effect when the exposure duration of primes was 16 ms (Kobylinska 2001b). It should be mentioned that this was the only experimental condition in which the prime and target appeared in the same location. This may be an alternative explanation for obtaining the strongest contrast effect for CVF exposures (Jaśkowski and Przekoracka-Krawczyk 2005). As Jaśkowski claims (2006) on the basis of experiments on cognitive priming, when both prime and target are congruent the response for the target may be different than when prime and targets are incongruent. One may think that in our study exposure of both prime and target in CVF may be treated as congruent trial and exposure of prime in a different visual field than that of target's exposure may be treated as incongruent trial. Thus for congruent and incongruent trials we may observe different effects.

Furthermore, the evaluation of ideographs differed depending on the visual field in which primes were exposed. Exposure of affective primes in the right visual field resulted in more positive evaluation of ideographs than did exposing primes in left visual field regardless of priming valence. These results support the valence asymmetry hypothesis: the left cerebral hemisphere is thought to be responsible for positive emotions, and the right for negative emotions. In addition, the evaluation of ideographs preceded by affective primes exposed in the central visual field differed only from the evaluation of ideographs preceded by primes exposed in the right visual field. Of course, this effect requires further research and more detailed examination, but at least one possible interpretation can be formed: some data show that the right cerebral hemisphere detects sensory stimuli sooner than does the left hemisphere (Davidson and Fox 1989, Grabowska and Nowicka 1996). This refers to the situation in which stimuli are presented to the central visual field only, and both the right and left hemispheres are activated. It may be assumed that processing in the right hemisphere begins sooner than does processing in the left, and thus the later activation of the left hemisphere may be affected by the processing in the right one. As a consequence, the final effect of processing may be dominated by the left hemisphere. Some neurobiological research also shows that activation of the left hemisphere may inhibit activation of the right (Davidson et al. 2000a).

This interpretation is supported by the fact that the influence of visual field was the strongest in the positive priming condition, and positive emotions are probably related to activity in the left cerebral hemisphere. Thus the consistency of the valence of the prime (in this case positive prime) with the hypothetical functions of the hemisphere to which it is addressed (in this case the left hemisphere) should indeed result in the strongest effect. Assuming such an interpretation accurately explains brain processing, in the case of activation of both cerebral hemispheres, the left cerebral hemisphere may dominate evaluation processes (for example by inhibition of more primary evaluation). This would be compatible with data showing that more complex cognitive activity and emotional control processes have their neural correlates in the left hemisphere (Buck 1999, Davidson et al. 2000a). This is partially due to the connection of left hemisphere function with verbalization. Many psychological theories of emotional control stress the importance or even necessity of verbalization for emotional control (see: Ekman and Davidson 1994, Larsen and Prizmic 2004, Manstead et al. 2004). However there are also data that argue against such an interpretation. For example, Demaree and others (2005) claims that "left-frontal brain regions have been implicated in Brain Activation System strength as well as the experience of positive-approach affect (such as happiness). Conversely, Brain Inhibition System strength and negative-avoidance affect (such as fear) appear to be modulated by right-frontal brain regions" (p. 1579). It seems that further research on the topic of neural correlates of emotions, which would control for emotion complexity and degree of cognitive engagement, is needed.

The present data also indicate that cerebral asymmetry not only refers to conscious processes and higher mental functions which have neural correlates in cortex, but to more basic functions which are correlated with activation of subcortical (i.e., the amygdala) regions (Bass et al. 2004, Noesselt et al. 2005).

Our results may lead to the following question: is the lack of awareness of priming stimuli crucial for observing the effects obtained? The present study does not answer to this specific question, because only suboptimal primes were used. However previous research, starting with Murphy and Zajonc (1993) (see also: Winkielman et al. 2005) and continuing with experiments conducted by our Polish research team (see Kolańczyk et al. 2004, Ohme et al. 1999) has shown that affective priming stimuli influenced the evaluation of targets only in conditions of suboptimal exposure of primes (when participants were not aware of presentation of primes) and not with optimal exposures of 1 second (when participants were aware of the presentation of primes).

CONCLUSIONS

In the present article the relations between the valence of suboptimal affective primes and the hemisphere to which the primes were addressed were examined. It appeared that both priming valence and the visual field of prime exposure influenced evaluation of neutral targets. Following exposure of primes in the center of the visual field, targets primed negatively were evaluated more positively than targets primed positively (the contrast effect). In conditions of RVF and LVF exposure, no effect of priming valence was detected. However targets primed by exposures of both positive and negative primes in RVF were evaluated more positively than those primed by exposures in the CVF or LVF.

In summary, the initial and exploratory character of this research should be clearly noted. The paradigm we applied allowed us to register only the very specific consequences of eliciting implicit affect. However, the results of our research provoke further questions regarding the possibility of modifying and controlling the implicit affective processes which influence human behavior.

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