Affective blindsight

de Gelder, Bea; Pourtois, G.R.C.; Vroomen, Jean; Weiskrantz, L.

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The recent findings that facial expression can be recognized in the absence of awareness by blindsight patients suggest that, as the saying goes, we might indeed be blindly led by emotions. Although we are entirely in agreement with the comments made by Heywood and Kentridge (Heywood, C.A. and Kentridge, K.W. (2000) Affective blindsight? Trends Cognit. Sci. 4, 125–126), we would like to take this opportunity to discuss some of the questions that they raised and to describe our most recent data that may clarify some of the important issues.

Heywood and Kentridge remark, the finding of covert discrimination by a blindsight subject of facial expressions presented to his blind field (‘affective blindsight’) raises the question of how this performance is achieved. An MRI approach should provide new evidence with respect to the activation patterns subserving affective blindsight, but it is worth noting that behavioral experiments can also help to clarify the neural basis of this phenomenon; for example, by determining which stimulus categories and attributes can be processed in the absence of striate cortex. Indeed, our most recent results indicate that blindsight is found only for facial expression and that covert discrimination of other facial attributes as such a key press, which is less likely than verbalization to invoke reflexive conscious processes. The genuine guess of an uninformed conscious system might potentially interfere with the stimulus-driven responses of the putative cellular circuit. We will have to wait for further experiments to answer this question.

**References**


13. Heywood, C.A. et al (1999) Dissociable neural factors in explaining the findings. This suggestion was based upon our earlier finding that, although moving images supported affective blindsight, stationary images did not. This is consistent with findings that demonstrate that discriminating between two patterns of biological movement can be done on the basis of very limited or very impoverished input. But if movement is important, why does facial speech not support blindsight? In facial speech, one has a stimulus that is socially and biologically significant and for which discrimination can be done on the basis of the same kind of impoverished information consisting of a small number of moving dots.

Whatever the outcome of that particular debate we do now have some preliminary evidence suggesting that stationary images of facial expressions can support affective blindsight (de Gelder et al., unpublished data). In our recent experiments we measured the importance of a face presented to the blind field on the response to a facial stimulus presented to the intact, seeing field. The results showed that incongruity between the expressions presented to the two hemifields significantly delayed judgement of the facial expression in the seeing field.

This is an illustrative example that covert processing can often only be found with an indirect rather than a direct method, in which subjects are required to ‘guess’ the identity of stimuli they patronly deny seeing. As Heywood and Kentridge suggest—in line with some recent findings about qualitative differences between overt and covert processes—the superior sensitivity of indirect methods for uncovering covert processing or residual processing abilities might be due to an absence of conflict between overt, reflexive answering and covert responding. We addressed

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**Affective blindsight: are we blindly led by emotions?**


**Beatrice de Gelder, Jean Vroomen, Gilles Pourtois and Larry Weiskrantz**

The rapidity with which the responses discriminating facial expression. How important are these factors in explaining the findings? This suggestion was based upon our earlier finding that, although moving images supported affective blindsight, stationary images did not. This is consistent with findings that demonstrate that discriminating between two patterns of biological movement can be done on the basis of very limited or very impoverished input. But if movement is important, why does facial speech not support blindsight? In facial speech, one has a stimulus that is socially and biologically significant and for which discrimination can be done on the basis of the same kind of impoverished information consisting of a small number of moving dots.

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identify the kind of trap that animal observ-ers(!) might be less than willing to accept that there is any point in continuing with forced-choice guessing. Indirect methods completely remove this counterintuitive element.

Further research is needed to discover whether affective blindness is restricted to emotions for which the amygdala is at present known to play a special role. But even if the amygdala’s role is specific only to particular emotional stimuli or states, and other emotional states depend critically on other targets, our results suggest that these too can be assumed to be well-provided for in terms of visual projections via the sub-cortical, collicular-pulvinar route (among others) that bypass the primary visual cortex.

References

Homologies for numerical memory span?
Marc D. Hauser

For some, the case of Clever Hans represents the kind of trap that animal references often fall into when searching for human capacities in other creatures. Hans was certainly clever with respect to picking up on human cues, but was unquestionably clueless when it came to solving mathematical problems. Ever since the debunking of Clever Hans, however, an extraordinary amount of evidence has accumulated[1], showing beyond a shadow of doubt, that we share many of the core building blocks of our number capacity with other animals. We know, for example, that several avian (pigeon, African gray parrot) and mammalian (rat, rhesus monkey, chimpanzee) species can be trained to recognize the ordinal relationships between four numbers, with inter-integer differences of either one or more, she would touch each number from lowest to highest, and with remarkable speed and accuracy. Taking advantage of this ability, Kawai and Matsuzawa set up a memory span task. A set of numbers was displayed on a monitor, such as 1, 3, 4, 8.

As soon as Ai pressed the first number in the sequence (i.e., 1), all of the remaining numbers were shown in a white box within the square. Ai’s task was to press the remaining numbers (now masked) in order. For set sizes of two to four numbers, her performance was above 90% correct. Although her performance dropped to 65% for set sizes of five, this was nonetheless significantly above chance (i.e., 4%; note that in the original manuscript this was incorrectly calculated as 6%). Of considerable interest was her reaction time to respond. Independent of set size, Ai was slowest on the first press, with reaction time remaining relatively constant for all subsequent responses. Thus, for example, mean reaction time for the first response to a set size of four was 717 ms, and then 390, 432, and 457 respectively for the last three, masked, responses. This strongly suggests that Ai first explored the number space, calculating the ordinal relationships and spatial locations of each number, and then used this stored information to guide her subsequent responses.

As in all well-designed research with interesting results, many questions remain. To understand better whether Ai’s capacity for calculating ordinal relations among numerical values is unique to her or some, the case of Clever Hans...

The above considerations suggest that the issue of the relative sensitivity of various testing methods is more than a quantitative matter, and in fact involves a qualitative capacity for stimulus identification. Heywood and Kentridge raise a very interesting issue when asking whether key press responses could have strengthened the data further (in fact, what is what we did use). They speculate that with reflexive verbal responses, the response generated in the blind field via dedicated routes could be inhibited by mechanisms of awareness. The finding that non-verbal response alternatives have a negative effect on the results of guessing suggests, paradoxically, that awareness plays a role in covert recognition. For example, the underlying mechanism might be one of conscious processes monitoring autonomous reactions, as indeed Heywood and Kentridge suggest. But there might be other reasons why indirect paradigms are more sensitive than direct paradigms and why different response modalities yield different results. Neuropsychological subjects are, by definition, unaware of the capacities that can be revealed by experiments on their implicit processes. Direct methods require them to engage in discrimination that they do not believe they can make. In such a counterev-idence situation, subjects (and some experimenters) might be less than willing to accept that there is any point in continuing with forced-choice guessing. Indirect methods completely remove this counterintuitive element.

Further research is needed to discover whether affective blindness is restricted to emotions for which the amygdala is at present known to play a special role. But even if the amygdala's role is specific only to particular emotional stimuli or states, and other emotional states depend critically on other targets, our results suggest that these too can be assumed to be well-provided for in terms of visual projections via the sub-cortical, collicular-pulvinar route (among others) that bypass the primary visual cortex.

References