

Consciousness Requires Global Activation: Commentary on Baars on Contrastive Analysis

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Abstract. Baars' *contrastive analysis* approach offers an essential framework for differentiating conscious processing from the myriad unconscious functions carried out by the mind/brain. In applying this approach it is important to understand that consciousness is not something other than, but something *in addition to* the unconscious processes that precede and follow the momentary focus of awareness. We have argued elsewhere that neurologically this something is *activation* via a *global attentional matrix* which both: 1) controls access to consciousness by competing unconscious processors; and 2) integrates the multimodal representations of those processors which gain momentary access into unified, conscious percepts.

1.1 I think Baars ([1994](#)) does a credible job of outlining an empirically based set of criteria for the study of conscious phenomena. Indeed, one wonders at the timidity of psychology during the middle decades of this century (see Baars' initial quotation from Crick and Koch, 1990) given that consciousness was the central concern of experimental psychologists during William James' time.

1.2 Perhaps the greatest stumbling block for this earlier *consciousness psychology* was its *a priori* rejection of the existence of unconscious thought processes (Baars, 1986). It is this basic flaw in approaching consciousness which Baars' contrastive analysis serves to

rectify. Indeed contrastive analysis, in my view, is more than an approach: it should be a *fundamental constraint* in consciousness research. Conceptually this constraint appears dichotomous: yes/no, either/or, but this can be misleading when we turn to *functional and biological* considerations.

1.3 This brings me to my first point: Consciousness is not something other than unconscious thought processes, it is something in addition to unconscious perception and representation. This fact is implicit in every example Baars gives of contrasting conscious and unconscious phenomena. We have developed a *neural attentional model* (Newman & Baars, 1993) which instantiates a number of the distinctions Baars makes. Based upon the model, I would offer a list of criteria for what consciousness entails in addition to the unconscious processes which provide its necessary context.

2 Conscious Processing Requires Global Activation

2.1 For a percept or image to become conscious requires an activation process beyond that generated by the stimulus itself. The traditional metaphors for this criterion has been consciousness as a threshold or searchlight providing the necessary luminance for a percept or idea to enter into awareness. Crick (1984) suggested the existence of a *thalamic searchlight* mediating such processes. Baars (1983; 1988) and Newman & Baars (1993) have extended this metaphor of a thalamically mediated searchlight to include cortical and midbrain areas contributing to the global activation of wide areas of the cortex. This *extended reticular-thalamic activating system* (Baars, 1988) is postulated to provide the supplementary activation required to represent the activities of modular processors as integrated, conscious contents.

2.2 This activation system is regulated by a global attentional matrix which controls access to a cortical *global workspace*. Various coalitions of unconscious processors compete for access to this global workspace (Newman & Baars, 1993). A basic criterion of this model is that *consciousness is a limited-access system*. Its primary adaptive advantage is that it allows the organism to focus the processing resources of the central nervous system upon the particular stimulus most relevant to it in the moment. Viewed in isolation, this limited processing capacity of consciousness (and its concomitant slowness) would seem maladaptive. However, when the existence of myriad unconscious processes -- working outside of, and competing for access to consciousness -- is taken into account, the entire system can be seen to support the highly adaptive allocation of processing resources. Creating a single "stream of consciousness" is nature's solution to the problem of prioritizing experience, so that what is most dangerous or attractive or advantageous or interesting at that moment gains our undivided attention.

2.3 Based upon the above criteria we would predict that global activation is transient, yet continuous. By this I mean that conscious percepts and images are the tip of a highly fluid iceberg of supporting and competing unconscious processes. Global activation, then, involves multiple levels of activation and inhibition preceding (e.g. sentence parsing) and following upon (e.g. long-term memory) the momentary content to which these processes relate.

2.4 Conscious representations and processes are multimodal and unitive. This may seem paradoxical, yet it is quite consistent with the data Baars presents (e.g. Necker Cube imaging). By unitive I mean that consciousness naturally tends towards the integration into a single, unified percept of the outputs of those unconscious processors predominant in the global workspace at any one time. Attended percepts are normally multimodal. Mental images tend to integrate several stimuli (e.g. chunking). Brain research has shown that even stimuli presented in a single modality, like vision, are built up out of the activities of multiple processing areas specialized for edge detection, contrast, color, movement, etc. The CNS, then, requires some mechanism for binding the diverse representations generated by multiple unconscious processors into a coherent stream of consciousness. It is our contention that global activation, as described briefly above, provides the necessary basis for such binding. Global activation is not some vague metaphor, rather it is a widely studied property of neural activity (grossly represented by the EEG). Moreover, the *neural global workspace model* (Newman and Baars, 1993) delineates the anatomical and physiological substrates for this activation process with considerable specificity.

3 Conclusion

3.1 As these criteria and examples illustrate, any approach that hopes to define the nature of consciousness must develop contrasting perspectives for elucidating conscious and unconscious processes. These perspectives should be understood as complimentary rather than mutually exclusive, however.

References

Baars, B. J. (1983). Conscious contents provide the nervous system with coherent global information. In R. Davidson, G. Schwartz and D. Shapiro (Eds.) *Consciousness and self-regulation* (pp. 45-76). New York: Plenum Press.

Baars, B. J. (1986). *The cognitive revolution in psychology*. New York: Guilford Press.

Baars, B. J. (1988). *A cognitive theory of consciousness*. Cambridge, MA: Cambridge University Press.

[Baars, B. J. \(1994\) A thoroughly empirical approach to consciousness. PSYCHE 1\(6\) \[80 paragraphs\]](#) Filename: psyche-94-1-6-contrastive-1-baars

Crick, F. (1984). Function of the thalamic reticular complex: The searchlight hypothesis. *Proceedings of the National Academy of Science, USA*, 81, 4586-4590.

Crick, F. and Koch, C. (1990). Towards a neurobiological theory of consciousness. *Seminars in Neuroscience*, 2, 263-275.

Newman, J. & Baars, B.J. (1993). A neural attentional model for access to consciousness: A global workspace perspective. *Concepts in Neuroscience*, 4(2), 255-290.