

Absolute Inhibition Is Incompatible with Conscious Perception

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Van Selst and Merikle argued that the critical Preference \times Strategy interaction findings could be alternatively explained by positing individual differences as a function of preference and strategy. They further argued that ruling out conscious perception depends on making the exhaustiveness assumption. We argue that the inhibitory effects satisfy objective threshold criteria regardless of possible individual differences in thresholds. We further suggest that the inhibitory findings are inherently incompatible with the conscious perception explanation and that therefore we do not need to make the exhaustiveness assumption. We thus stand by our original conclusion that subliminal perception at the objective threshold has been demonstrated. © 1993 Academic Press, Inc.

We thank Van Selst and Merikle (1993) for their careful replication of our recent work (Snodgrass, Shevrin, and Kopka, 1993). In our reply, first we summarize the replicated findings and points of agreement. We then discuss Van Selst's and Merikle's interpretation of the findings (including the nonreplicated results), followed by our rejoinder. We close by discussing the issue of falsifiability in subliminal research.

Replicated Findings

Van Selst and Merikle reported that "overall discrimination performance did not deviate from chance" and that "analysis of the data in terms of . . . preference . . . revealed significant deviations from chance . . . using the pop strategy." In particular Van Selst and Merikle obtained a Preference \times Strategy interaction which conformed quite closely to ours (compare their Table 2 to our Table 6). In this interaction, look preference subjects performed significantly *below* chance, while pop preference subjects performed a bit above chance. Furthermore, parallel to our Experiment Three, they too found that this finding disappeared when blank cards were used. In this regard their control condition was superior to ours in that it was conducted contemporaneously with the real word condition. These findings support our contention that performance feedback was not artifactually responsible for the critical results. Finally, they also found that subjects were unable to *detect* the words (Experiment 3), similar to the detection threshold check results in our Experiment Three. Here again their findings may be even

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stronger in that they had subjects use the pop and look strategies while attempting to detect the words. Overall then, Van Selst and Merikle replicated our critical findings. Their interpretation of the critical findings differs considerably, however, from our own.

Van Selst and Merikle's Interpretation

In their discussion, Van Selst and Merikle conceded that they "were surprised" by their replication. They apparently expected a failure to replicate on an a priori basis. They thus acknowledged that the critical findings pose a challenge to the Cheesman and Merikle (1984, 1985, 1986) position that subliminal effects should not be observed when criteria for the objective threshold have been satisfied. In response to this challenge, Van Selst and Merikle made two post-hoc arguments, amounting to a significant retreat from the original Cheesman and Merikle position.

(A) They interpreted the critical findings as suggesting that there are *individual differences* in objective thresholds as a function of preference and strategy—and that seen this way, they (the findings) are "completely consistent" with the Cheesman and Merikle position, in which it was assumed that *overall* forced-choice discrimination was an adequate objective threshold criterion.

(B) Directly addressing the absolute subliminality question, they claimed that the answer "depends entirely upon whether one is willing to assume that forced-choice discrimination tasks are exhaustive measures of awareness." That is, perhaps the overall discrimination task does not completely tap any extant conscious perception. Because these lingering doubts persist, Van Selst and Merikle asserted that their failure to replicate the Word Meaning \times Strategy interaction and the motivation findings was important, as there is then no additional converging evidence of subliminality.

In our view, the Van Selst and Merikle revision of the Cheesman and Merikle position is not sufficient to explain the replicated findings.

OUR REPLY

The Individual Differences Argument

First, although we agree that there are almost certainly differences in objective thresholds as a function of individual differences, this fact simply cannot explain the critical findings—especially the *below* chance performance of look preference subjects in the pop condition. Consider:

(1) Obviously, Van Selst and Merikle must hold that the subjects responsible for the critical findings were above the objective threshold. If they concede that these subjects were at the objective threshold, then absolute subliminality is demonstrated and they must abandon the Cheesman and Merikle position.

(2) The criterion for deciding if subjects are above the objective threshold is above chance performance. However—

(3) The look preference subjects in the pop condition performed *below* chance, not above chance. This fulfills the above criteria for objective threshold status.

Moreover, these subjects showed the clearest and most fully replicated effects. How then can Van Selst and Merikle maintain that these subjects were *above* the objective threshold?

(4) Further, these same look preference subjects performed *at* chance, not above, in the look condition. Thus, regardless of whatever individual differences may have obtained in the objective threshold as a function of preference and strategy, *these subjects performed only at or below chance, never above*. They therefore seem to fulfill the objective threshold criterion no matter how one looks at it, yet they still show an effect—namely the inhibitory (below chance) effect in the pop condition.

(5) If Van Selst and Merikle maintain (as they must) that the look preference subjects were somehow above the objective threshold, they would have to explain why these subjects performed below chance, exactly the opposite of what one would expect. We think that such a view would have to: (a) involve substantially altering the basic definition of the objective threshold, and (b) explain why subjects who were presumably consciously perceiving something would actually deliberately avoid (not just ignore) using this consciously perceived information when making their responses. If subjects simply ignored such information, they should have responded randomly and produced chance-level performance, not below chance.

Because point 5 is crucial it bears a bit more explanation. First, psychophysics itself rests on the assumption that subjects will generally use consciously perceived information to *increase* their response accuracy, not decrease it. Indeed, the very definition of the objective threshold and the inherent structure of threshold-setting procedures embodies this assumption. To substantively abandon this principle, then, is to seriously undermine the very basis of psychophysics. There are situations, of course, in which a kind of inhibition can be explained by conscious perception. In priming paradigms, for example, subjects' reaction times are longer to targets preceded by unrelated primes than by related primes, producing a kind of relative inhibition. Crucially, however, these kinds of situations do not produce absolute inhibition, that is, significantly *below* chance performance. In the priming situation subjects still respond correctly to the targets even when they are preceded by unrelated primes. They are just slower. Similarly, one might try to argue along the lines of the criticisms voiced against the 1950s New Look "taboo word" studies—that higher thresholds for taboo words (vs neutral words) were artifactually due to subjects' reluctance to say them (cf. Erdelyi, 1974). Here again, however, the analogy does not apply—our stimuli could hardly be considered taboo. Moreover, such an explanation would necessitate a response bias and there is none in our (or Van Selst and Merikle's) findings. Thus, a conscious perception explanation of absolute inhibition would seem to require some sort of "perverse subject" hypothesis in which they refused to use the information which they consciously perceived to guide their response in a positive direction. Indeed, these perverse subjects would seem to be deliberately giving the wrong answers, a position we find highly implausible.

Further, in our paper we conducted other tests of the conscious perception hypothesis: Checking for the presence of partial cues and seeing if the critical

findings obtained only for above chance subjects. Results were negative. Curiously, Van Selst and Merikle did not address these findings nor the above arguments concerning the implications of absolute inhibition, despite our discussion of these points at some length in our paper.

On the other hand, we can see how Van Selst and Merikle's individual differences argument could apply to the pop preference subjects because they performed a little above chance in the pop condition. Presumably they would argue that these subjects' true objective thresholds were below (briefer than) the exposure conditions used during the experiments. Thus, these subjects could have conceivably been above the objective threshold, accounting for the above chance effect they exhibit. We do not agree, but even if we were to concede this point it does not apply to the look preference subjects because they performed below chance.

Instead, we explain the critical findings by interpreting preference as an individual difference regarding how subjects are disposed to allow unconsciously perceived information to affect their direct (i.e., conscious) responses. In this way we believe we have a consistent rationale that explains both the inhibition (for subjects who do not like to pop) and the facilitation (for subjects who do like to pop). Further, the critical findings obtained for both above and below chance subjects. This fact conforms to Cheesman and Merikle's (1984) suggestion that true subliminal effects should be uncorrelated with d' , thus supporting our contention that the pop preference subjects performed above chance due to unconscious, not conscious, perception.

Further support that our exposure conditions are subliminal occurs from recent work by Wong, Shevrin, and Williams (in press). Wong et al. obtained objective thresholds for each subject, thus taking into account any individual differences in objective thresholds. Wong et al. found that subjects exhibited an SCR response and an ERP expectancy wave when subliminally exposed to stimuli that had been previously paired with an aversive shock.

The Exhaustiveness Assumption Argument

Van Selst and Merikle's point seems to be that we cannot rule out the possible influence of consciously perceived information unless we assume that our forced-choice discrimination measures exhaustively tap all conscious perception. Our response here is similar to the above remarks concerning inhibition. Namely, Van Selst and Merikle would have to postulate that the critical findings were due to this consciously perceived information and would then have to explain how subjects would end up giving reliably wrong answers despite having some accurate consciously perceived information. In this way we do *not* need to assume that the discrimination task is an exhaustive measure of conscious perception in order to maintain our conclusions. This is a further strength of the inhibition findings; because they are incompatible with a conscious perception explanation in principle, the exhaustiveness assumption is not necessary. Further, Merikle and Reingold (1990) reported converging evidence suggesting that the detection threshold is an adequate measure of consciously available information.

In the light of these considerations, positing differences in individual thresholds does not explain our main results. Our original interpretation stands: Unconscious influences on intentional judgments at the objective threshold have been demonstrated.

Van Selst and Merikle then claimed that obtaining converging evidence is all the more important because of the difficulty in showing that discrimination measures are really exhaustive. As just stated, we do not believe that we need to make the exhaustiveness assumption. Thus, this argument loses some force. Nonetheless, we are disappointed that Van Selst and Merikle did not replicate our word meaning and motivation findings and agree that this makes our overall case less strong than it could otherwise be. At the same time, however, we agree with Van Selst and Merikle that the critical finding is the Preference \times Strategy interaction. Our replication of it, as well as theirs, suggests that it is well established. Further, Van Selst and Merikle's experiments also differed from ours in an important respect: They included females as subjects, whereas we used only males. In ongoing work (Snodgrass & Shevrin, in preparation), we have found sex differences using this paradigm. In particular, our experiments indicate that females exhibit preference effects in both the pop and the look conditions and do not show word meaning differences in the pop condition. Interestingly, in Van Selst and Merikle's Experiment 1, their subjects were predominantly female and the results showed some tendency for preference effects in both strategy conditions. They do not provide information regarding the male/female breakdown in the real word condition of Experiment 2, but our results suggest that the presence of females would tend to attenuate the Word Meaning \times Strategy interaction. It is thus possible that their failure to replicate the word meaning effect may be due in part to their inclusion of female subjects. In our work with females, we also found no effect of motivation, again suggesting some sex differences in this regard. Nonetheless, we were unable to explain Van Selst and Merikle's findings of a trend for a positive effect for motivation. It may be that this finding just does not hold up. Even if the Word Meaning \times Strategy interaction and motivation effects ultimately wash out, however, we feel our position is firmly supported by the critical findings alone.

Falsifiability in Subliminal Research

There is potential difficulty in the post-hoc interpretation offered by Van Selst and Merikle. What independent criterion would acceptably establish that individual differences in the objective threshold had been sufficiently taken into account? For example, in the Wong, Shevrin and Williams (1993) study, could it not be maintained that although individual objective thresholds had been established at Time 1, that at Time 2, when the indirect response was obtained, the objective thresholds for the positive subjects were lower? Clearly, a positive finding in itself cannot be used as a sufficient basis for inferring that objective thresholds are lower for subjects showing an indirect or subliminal perceptual effect. Inherently, this approach is unfalsifiable. The only way that the individual difference hypothesis can be saved from unfalsifiability is by citing *in advance* independent

criteria for such individual differences in objective thresholds. In fact, this was exactly what was done in the Wong et al. study. It would seem to be incumbent on Van Selst and Merikle to offer such independent criteria, as they had so usefully earlier for establishing overall objective thresholds.

It has been the difficulty, so tellingly pointed out by Merikle, in separating conscious from unconscious factors in efforts at establishing subliminal *perception* that led him and others to shift to an implicit memory paradigm and thus avoid the entire issue of subliminal perception. For example, Merikle and Reingold (1991) exposed subjects in an initial phase to pairs of words, one of which was cued. In the second phase, subjects were presented with words that were either new words or old uncued words from the first phase. When subjects were asked directly to say whether words were old or new, they performed at chance levels. On the other hand, when they were asked to estimate whether the contrast was low or high between the words and the background, they more often chose the old uncued words as having higher contrast. However, could not one argue that the contrast (indirect) findings were in fact due to spontaneous (direct) recall of the words? Moreover, perhaps these experiences of guessing or recall are fleeting and seldom easily remembered, reminiscent of the James argument against unconscious processes—a conscious fleeting thought that is immediately forgotten. Obviously these arguments are unfalsifiable until we are able to devise independent criteria for guessing, recall, and consciousness itself.

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