On Diversity in the Terminology Concerning Inhibitory Stimulus Control: Implications for Practitioners of Applied Behavior Analysis

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The multiplicity of terms employed in the literature of behavior analysis to tact stimuli associated with inhibition effects is considered. It is submitted that whereas there is diversity in the conditioning histories associated with inhibitory stimulus control, there is commonality in the controlling properties invested in contiguous stimuli by those various histories. The author contends that there is heuristic value in organizing the scientific language of behavior analysts on this topic around inhibition as a process. It is further suggested that the many tacts for inhibition-related stimuli, divided as they are along what might be called procedural lines, distract from what is argued here to be the core operation, *viz.*, stimulus mediated inhibition.

Stimulus control issues have long been of interest to experimental analysts of behavior. It is only recently however that the antecedent side of the three-term paradigm has been given the attention it merits in the instructional and behavior management endeavors undertaken by behavioral practitioners in the field (see, for example, Billingsley & Romer, 1983; Falvey, Brown, Lyon, Baumgart & Schroeder, 1980; Woods, 1980, 1983a, 1984, 1987). Unfortunately, when practitioners in the field turn to experimental sources to enhance their understanding of inhibitory stimulus control, they are likely to encounter some contradictions. Even a cursory reading of the relevant literature reveals a problem which is endemic to our field—a multiplicity of terms, all of which are apparently intended to tact the same phenomenon. With respect to specific antecedent/ambient stimuli which have an inhibiting function, we find that Ferster and Appel (1961) use the term preferred here, “S-delta,” in a paper exploring timeout duration as a factor in error consequence during match-to-sample training. Rilling (1977) on the other hand uses the term “negative stimulus (S⁻).” Hearst (1969) and Hearst, Besley and Farthing (1970) prefer “inhibitory stimulus” as contrasted with “excitatory stimulus” which is their term for S⁰. Azrin

and Holz (1966) have chosen to describe stimuli with inhibitory control properties as “warning stimuli” (p. 415). Presumably a more thorough reading would reveal even more terms purporting to tact the same phenomenon. Given the calibre of the work done by the users of these differing terms, there is no clear direction in terms of whose example to follow. It is difficult on the basis of stature within the field, to choose between, say, Ferster and Rilling as to the usage one ought to adopt. A simple quoting of the authority of one does not override the credibility of the other. Still, as Skinner (1974) has said, it is important that we employ a consistent and precise language within the field of behavior analysis. He has argued that

when it is important to be clear about an issue, nothing but a technical vocabulary will suffice . . . education, politics, psychotherapy, penology and many other fields of human affairs are suffering from the eclectic use of a lay vocabulary. The theoretical consequences are hard to demonstrate, but . . . important . . . (p. 22-23).

Similar views have been advanced convincingly by Heline (1980).

EXTINCTION VS. PUNISHMENT MEDIATED INHIBITORY CONTROL

Inhibitory stimulus control, as a phenomenon, is recognized to be a decline in response strength in association with contextual stimuli. Sulzer and Mayer (1972) restricted the definition of S-delta to stimuli in the presence of which “a given response is not reinforced” (p. 290). Miller (1980) has done likewise in defining S-delta as “a

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stimulus associated with extinction for a particular response" (p. 219). Yet, this confinement of the use of the term S-delta to extinction-induced inhibitory control is not universal. Ferster and Appel (1961), for example, in the matching to sample study mentioned above, state that "... in matching to sample, for example, nonmatching responses are followed by brief timeout. The timeout as an aversive stimulus presumably suppresses S-delta responding . . ." (p. 45).

WHY NOT SUBSUME ALL INHIBITORY STIMULUS CONTROL UNDER THE S-DELTA RUBRIC?

It is submitted that the process of inhibition itself, as opposed to the means by which responding is inhibited, is most useful as an organizing principle. The author has been led to adopt that view by considering the notion of inhibition-as-an-active-process propounded by several significant contributors to the literature. Viewing the stimuli tied to inhibition that way makes them symmetrical opposite-numbers to S^ps: S-deltas occasion response reduction and S^ps occasion response strengthening. In each case the stimuli in question derive their controlling properties from a stimulus-linked conditioning history. In support of this position a number of quotations are offered, the first of which comes from Catania. In his 1979 text *Learning*, he notes "... inhibitory stimulus control gradients seem to imply that extinction represents some kind of active suppression of responding rather than simply the passive outcome of discontinuing reinforcement . . ." (p. 153). This resembles the view taken by Hearst, Besley and Farthing (1970) who state that "... an 'inhibitory stimulus' is a stimulus that develops during conditioning the capacity to decrease response strength below the level occurring when that stimulus is absent . . ." (p. 376). Compare this, in turn, to Mackintosh (1977): "... it seems reasonable. . . to expect that many of the principles derivable from studies of excitatory stimulus control will apply equally to the case of inhibitory control . . ." (p. 482).

With regard to actual symbolic representation of inhibitory stimulus control, there is, again, no clear direction to follow within the literature, as the multiplicity of terms and usages reviewed above shows. The stimulus

that is here tacted as "S-delta" has gone under several different names (including, of course, "S-delta"), and there are precedents for discussing it in relation to extinction and punishment, both separately and together. It seems however that the common thread running through all of the foregoing is inhibitory impact upon response strength, and following from Catania, Mackintosh, Hearst et al., etc. a view of inhibitory control which emphasizes function is arguably to be preferred. The notion of subsuming under one term all stimuli which come, by way of a contiguous conditioning history, to exert inhibitory control has practical and logical appeal insofar as it may enhance the precision and economy of our scientific language. Given the choice of terms currently available in the literature to tact the stimuli which have inhibitory function, "S-delta" is specifically advocated because:

1. it employs the "S" prefix which is widely accepted as representing the stimulus components within classical conditioning schematics, and within the three-term paradigm of operant conditioning;
2. by excluding + and - superscripts, it is less likely to be confused with the symbolic representation of the onset/offset status of consequating stimulus events (located on the other side of the paradigm);
3. it employs the "delta" character, universally recognized in scientific notation as being associated with change (here, a downgrading in response strength);
4. as the Greek equivalent of "D" (as in S^p), it invites reader recognition as a qualification of a stimulus operation that is related to but different from "D"; and
5. it leaves the terms "positive" and "negative" out of the designation (their inglorious history with regard to the abounding punishment/negative reinforcement confusion serving as sufficient reason, surely).

One might ask, Is this just an exercise of theoretical hair-splitting with no implications for practitioners of applied behavior analysis who serve in the field? (The author has asked this question before in another context—see Woods, 1983b.) Clearly it is not.

Practitioners have a stake in the integrity of behavior analysis at the basic science level. Theoretical questions are neither over the heads of, nor irrelevant to the needs of, professionals who work in the field. Practitioners who understand basic principles will not merely proliferate what Baer, Wolf & Risley (1968) called a "collection of tricks"—they may be expected to contribute meaningfully to the growth of a conceptually integrated technology.

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