SOCIAL LEARNING THEORY AND SIGNAL DETECTION THEORY
AS APPLIED TO AGGRESSION BY ADAMS

BY

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Boller's social learning theory and signal detection theory are discussed separately and then compared. Adams applied these theories and the concept of expectation to aggression. Adams conducted two studies in this area with the aid of a questionnaire which he devised. His results indicated that sensitivity to justified vs. unjustified aggression as indexed by d' is related to problem behavior or aggressive behavior as shown by institutionalization or by rating measures. In the present study with 76 eighth grade students, it was found that on two of the three scales least aggressive students were more sensitive to justified vs. unjustified aggression.
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One is always curious as to why an individual responds in a certain way to the various stimuli provided by the environment or why an individual responds similarly or differently to various stimuli. Obviously the consequence of the response or expected reinforcement plays a part in behavior also. There are a number of theories which attempt to answer these questions and others. One such theory is Rotter's social learning theory which is based on learning reinforcement patterns.

Rotter's social learning theory has been summarized by Jessar, Graves, Henson, and Jessar (1968) as follows:

The fundamental concepts in Rotter's social learning theory are the following: (1) expectation (E), which refers to the subjective probability held by an individual that a specific behavior will lead to the occurrence of certain events or reinforcements; (2) reinforcement value (RV), which refers to the degree of preference for the events or reinforcements which are contingently related to behavior; (3) behavior potential (BP), which refers to the likelihood of occurrence of a behavior, or the relative strength of the tendency to respond in a certain way; and (4) the psychological situation (?), which refers to the immediate context of action described in psychologically relevant terms, that is, in terms reflecting the actor's potential perception or interpretation of his confronting situation. These basic terms generate the following descriptive formula, which constitutes the foundation for prediction or explanation at the personality level:
The formula reads: The potentiality of any behavior occurring in a given situation is some function of (1) the expectation that it will, in that situation, lead to a particular goal and (2) the value of that goal in that situation. Note that the "e" term is implicit in that each of the other terms in the formula is variable or dependent upon the specific properties perceived in the psychological situation. Action, or actual behavior, then always involves a process of selection or choice, from a repertoire of behaviors, of that behavior with the highest potential for leading to gratification in a given context (pp. 85-86).

Another theory, which in some respects is quite similar to the social learning theory, is the signal detection theory. This theory sees men as a rational organism choosing between alternative responses on the basis of their expected payoff. Detection theory applies to perceptual discrimination which is divided into an informing process or observable physical stimuli and a decision process or the unobservable reactions of the subject to the stimuli. The subject's response to a class of stimuli will vary from one trial to the next yielding a "discriminal distribution". Also different stimulus classes will generally yield different distributions. The distributions are normal; and the distance between the means is the sensitivity parameter, d', which serves as an index of detectability or discriminability between the alternative stimulus classes. The larger the d' (the sensitivity parameter), the less the distributions will overlap, which indicates the degree of discriminability between the two stimuli. The larger the d', the more the subject can discriminate between two stimuli; and the smaller the d', the less the subject can discriminate. (Green and Swets, 1966)
The basic assumptions of both the social learning theory and the detection theory are quite similar. The social learning theory says that an individual's response depends on what he has learned will lead to the greatest satisfaction in a given situation. Likewise the signal detection theory assumes that the individual's choice of alternative responses depends on the expected payoff. Thus, both theories see behavior as a function of expectation and reinforcement.

Both theories offer a continuum of covert events available to the subject alone. However, the theories differ in the relations between overt and covert events that they have explicatied. The social learning theory emphasizes the relations between its genotypic covert terms (behavior potential, personal disjunction,...) and overt terms which are antecedent conditions (reinforcement history, socialization experience,...) or consequent events (global deviance, aggressive behavior,...). Signal detection theory emphasizes the relations between the stimulus variable, the events elicited by the stimulus presentations, and the overt responses, all of which occur more or less simultaneously. Because of this, the signal detection theory provides a testable theory. (Adams and Ulricha,2)

Adams (1969) developed the concepts of the social learning theory and detection theory when he applied them to aggression. Adams did two studies which concerned the relationship of aggression to sociocultural variables and to behavioral
variables. He developed a questionnaire, Expected Consequences of Aggression Test, which involved an act and a consequence to which the subject responded by marking on a scale ranging from "Sure it would not happen" to "Sure it would happen". The acts were either situational unjustified (Roughed up a little guy you didn't like) or situationally instigated-justified (Stood up to a guy who was trying to bully you). The eight consequences, which were the same for each act, represented four scales—self-outcome, peer outcome, institutional outcome, and physical outcome. (See Table 1 in Appendix)

In the first study the questionnaire was administered to six subject groups, each composed of thirty high school sophomores representing a specific combination of socioeconomic status and ethnic or racial group membership. The six groups were either Anglo, Hispanic, or Black and either lower class or lower-middle class. Each subject group was dichotomized 'most aggressive' or 'least aggressive' based on teacher and peer ratings. It was hypothesized that the 'most aggressive' subject groups would yield smaller d* values than the corresponding 'least aggressive' groups.

Based on the results, Adams concluded that the operational definition of socioeconomic status was not adequate for obtaining clear socioeconomic status differences within ethnic groups. In eighteen of the twenty-four comparisons,
the 'least aggressive' subject obtained higher \( d \) values as the theory predicted. However, four of the six exceptions occurred with the institutional scale indicating that the perceived dependence of the teacher's being impressed upon instigation or justification was not greater for the 'least aggressive'. Overall, the results suggest that \( d \) may relate to important sociocultural and behavioral variables.

In the second study Adams chose more extreme groups to represent differences in deviant aggression. The subjects were drawn from high schools and a correctional center for delinquent youth. Three groups of subjects were lower-middle class, upper-middle class, and institutionalized; these three groups were divided into 'most aggressive' and 'least aggressive', resulting in six groups. For the subjects from the correctional center, the questionnaire items were modified. (Instead of 'thrown rocks through a few store windows', 'Broke windows in the dorm' was substituted.

The primary hypothesis was that the 'most aggressive' subject groups would have smaller \( d \) values than the 'least aggressive'. It was also hypothesized that the upper-middle would have larger \( d \) values than the lower-middle.

The results support the primary hypothesis in all cases for the peer, self, and institutional outcomes. For the physical outcome the institutionalized 'most aggressive' group yielded a slightly higher \( d \) value than the institutionalized 'least aggressive' group. However, the other groups
confirmed the hypothesis in the case of the physical outcome. As to the secondary hypothesis, only the self-scale data was consistent with the hypothesis. Therefore, the data did not suggest a relationship between socioeconomic characteristics and sensitivity to the instigation-justification variable.

I attempted to replicate Adams' findings and give more validity to his theories. The subjects of this study were 81 eighth-grade students, both male and female. Because of the difference in subjects, the questionnaire was modified to make the questions more relevant. (See Appendix for sample questionnaire)

The subjects were grouped as 'most aggressive' or 'least aggressive' on the basis of teacher ratings. Both teachers needed to rate the student the same before the student would be placed in one of two subject groups. For convenience and uniformity all of the subjects were given the questionnaire at the same time.

**INSTRUMENT AND PROCEDURE:**

The questionnaire consisted of ten situations, with the odd numbered situations being justified aggressive acts and the even numbered, unjustified. The consequences, which remained the same for each situation, represented three scales—self (a, e), institutional (f, c) and peer (d, f). To score the questionnaire the rating scale was divided in the middle (low expectation or high expectation) and the
subject received a "1" or "0" depending on which side he made his mark. A mean was found for both groups on each scale for instigated and uninstigated aggressive acts. The difference between the means for instigated and uninstigated acts is the t'.

The hypothesis was that t' values for the 'most aggressive' group would be smaller than those for the 'least aggressive' group. This means that the 'most aggressive' group would be less sensitive to social cues for they would respond similarly to both justified and unjustified aggression.

RESULT:
The t' values obtained from the questionnaire are shown in TABLE 2. From this table it is easily seen that the 'most aggressive' subjects yielded smaller t' values on both the self and peer scales. On the third scale, the institutional scale, the 'most aggressive' scored slightly higher than the 'least aggressive' as had occurred in Adams' first study. This pattern seems reasonable for in general the student cares less about a teacher's attitude than about his own or his peer's.

DISCUSSION:
Signal detection theory appears useful in the area of aggression as shown by Adams' research as well as by my own. In most cases the 'most aggressive' yielded smaller "t' values than the 'least aggressive' indicating that the 'most aggressive' do not distinguish between justified and unjustified aggression. Adams also showed a relationship,
between $d'$ and ethnicity, with Anglo groups yielding higher $d'$ values than the ethnic minority groups. However, one must remember that the test was written with respect to the dominant group's norms.

It may be useful to lengthen the questionnaire and test an individual rather than groups as has been done. It would also be interesting to test age groups rather than social class or ethnic groups to examine the development of aggression. Also, signal detection theory may well prove useful in other behavior studies where social cues or environmental signals are present.
REFERENCES


Diagram to accompany Signal Detection Theory


**TABLE 1**  

The ECAT Consequence Scales

**Self-Outcomes**
You'd be pretty unhappy with yourself.
You'd feel pretty happy with yourself.

**Peer Outcomes**
Your friends would think you did the right thing.
Your friends would be pretty disappointed in you for it.

**Institutional Outcomes**
You'd get arrested or kicked out of school.
Your teachers would be impressed with you for it.

**Physical Outcomes**
You'd show that you're pretty tough physically.
You'd get physically hurt pretty badly for it.
### TABLE 2

**Data Obtained from 8th Grade Students**

<table>
<thead>
<tr>
<th></th>
<th>Self Scale</th>
<th>Institutional Scale</th>
<th>Peer Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{x}_i$</td>
<td>$\bar{x}_u$</td>
<td>$d'$</td>
</tr>
<tr>
<td>Least Aggressive</td>
<td>.798</td>
<td>.393</td>
<td>.403</td>
</tr>
<tr>
<td>Most Aggressive</td>
<td>.316</td>
<td>.463</td>
<td>.353</td>
</tr>
</tbody>
</table>

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$\bar{x}_i$ is the sample mean of the responses to instigated aggression.

$\bar{x}_u$ is the sample mean of the responses to uninstigated aggression.

$d' = |\bar{x}_i - \bar{x}_u|$

Note: These figures have not been normalized.