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"Verbal Responses and Children's Shift in Judgment"

Suzanne Salzinger
Biometrics Research
New York State Dept. of Mental Hygiene
The following problems were studied within the context of the grant:

1) Under what conditions of stimulus and response is children's acquisition of physical judgment enhanced;

2) Under what conditions of stimulus and response do children display constancy of judgment and under what conditions do they display shift in judgment when they are subjected to the imposition of various kinds of anchor stimuli;

3) The extent to which stimulus control over perceptual judgment responses in children is influenced by changes in the observing response produced by the child's verbal response, i.e., Does the child's use of nominal and relational response classes cause that child to attend to particular aspects of the stimulus;

4) The extent to which stimulus control over perceptual judgment responses in children is influenced by changes in the conditions of stimulus presentation, i.e., Does a multiple stimulus array make the child attend to different aspects of the stimulus than a single stimulus array;

5) Do children display constancy of judgment under the effect of an anchor equally well under conditions where the stimulus display is manipulated or where the child's response is modified? Is there a trade-off in the effect of these two procedures, or do they enhance each other;
6) Do different anchors, namely physical anchor stimuli and social anchor stimuli, have different effects on constancy of judgment and shift in judgment;

7) Do the different anchors interact with the child's use of different verbal response classes in the effect they produce on judgment;

8) Do the above mentioned effects vary with modality of judgment, i.e., specifically length judgment and weight judgment;

9) Do the above mentioned effects change with age.

During the course of the grant two studies were run on length judgment and two on weight judgment. The first two are combined and reported in a monograph entitled "Children's Judgment of Length and Shift in the Presence of an Anchor Stimulus as a Function of Stimulus Presentation and Verbal Response" (in press) in Genetic Psychology Monographs. The studies on weight judgment are completed and are currently being written for publication.

Study I - Length Judgment

The first study examined the effect of the child's use of nominal vs. ordinal verbal responses and single vs. multiple stimulus presentation on acquisition of length judgments and the stability of the judgments under the condition of an extremely lengthy anchor stimulus.

The scaled stimuli were slides of 4 lengths: 4, 6, 8, and 10 cms. respectively and the anchor stimulus was 20 cms. They were presented singly for the single stimulus condition and embedded in a configuration of the other scaled stimuli for the multiple stimulus condition.
The responses were nonsense syllables used as labels in the nominal response condition and nonsense syllables which were associated with terms for relative length in the ordinal response condition.

Results

<table>
<thead>
<tr>
<th>Ordinal Responses</th>
<th>Shift</th>
<th>Learning</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Stimulus</td>
<td>11.03</td>
<td>.399</td>
<td>26</td>
</tr>
<tr>
<td>Multiple Stimulus</td>
<td>14.00</td>
<td>.318</td>
<td>27</td>
</tr>
<tr>
<td>Nominal Response</td>
<td>13.58</td>
<td>.374</td>
<td>24</td>
</tr>
<tr>
<td>Ordinal Response</td>
<td>11.72</td>
<td>.344</td>
<td>29</td>
</tr>
</tbody>
</table>

A significant difference was found between acquisition in the single and multiple stimulus conditions ($F = 5.77, p < .025$), showing that the children had more difficulty learning to label the stimulus lengths when they were presented singly. Although the shift scores were not significantly different, covarying out the effect of learning showed a trend toward more resistance to shift when the children had learned to make their judgments in the single stimulus condition.

In summary, the direction of differences indicated a trend showing that shift was greater when learning occurred under conditions of multiple stimulus presentation than single stimulus presentation and greater for the nominal response than for the ordinal response. For learning it appeared to be harder to learn in both the single stimulus
condition and in the nominal response condition.

Correlations with age showed that children tended, as they got older, to make fewer errors in learning to label the stimuli and in showing more resistance to shift under the influence of an anchor stimulus. There was no differential relationship found among the four conditions and age.

Study II: Length Judgment

We felt that the use of nonsense syllable material, although it controlled for past response history of the children, might have been too difficult for the children to manage, so we therefore reran the study using real words as response classes, in which color names (green, blue, red, and yellow) were used to establish a nominal response scale and numbers (1, 2, 3, and 4) were used to establish a relational response scale.

Results -

Table 2

Means of Shift Scores and Proportion Incorrect during Acquisition (Learning) for Stimulus Conditions, Response Conditions, and Age

<table>
<thead>
<tr>
<th></th>
<th>Shift</th>
<th>Learning</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young</td>
<td>15.10</td>
<td>.312</td>
<td>40</td>
</tr>
<tr>
<td>Old</td>
<td>13.80</td>
<td>.241</td>
<td>40</td>
</tr>
<tr>
<td>Single Stimulus</td>
<td>12.50</td>
<td>.319</td>
<td>40</td>
</tr>
<tr>
<td>Multiple Stimulus</td>
<td>16.40</td>
<td>.234</td>
<td>40</td>
</tr>
<tr>
<td>Nominal Response</td>
<td>16.15</td>
<td>.302</td>
<td>40</td>
</tr>
<tr>
<td>Relational Response</td>
<td>12.75</td>
<td>.251</td>
<td>40</td>
</tr>
</tbody>
</table>
An analysis of learning results showed that the younger children had more difficulty in learning \((F = 4.95, p < .05)\); the multiple stimulus condition was learned more easily than the single stimulus condition \((F = 6.93, p < .025)\), and there was a trend for the nominal response to be harder to learn than the relational response \((F = 2.48, .10 < p < .25)\).

An analysis of shift results showed a strong trend to shift more having been trained under the multiple stimulus condition \((F = 3.96, .05 < p < .10)\) and a strong trend to resist shifting when using a relational rather than a nominal response \((F = 3.01, .05 < p < .10)\).

An analysis of covariance on shift, covarying out the effect of learning, strengthened the difference between the stimulus conditions, i.e., the multiple stimulus condition produced more shift than the single stimulus condition \((F = 6.339, p < .025)\), and diminished the difference between response conditions, i.e., there was still, however, a slight trend showing the relational response to produce more resistance to shift \((F = 1.944, .10 < p < .25)\).

In summary, the two studies appear to corroborate each other despite their differences of procedure.

The evidence on shift behavior shows that children tend to shift more having been trained under multiple stimulus presentation (in other words, seeing the whole scale presented all at once). A less strong finding on shift is that using a relational response enables the child to resist the influence of the anchor and thereby keep from shifting. If one considers both the single stimulus condition and the use of a nominal response to provide cues for categorical
perceptual processes, and the multiple stimulus condition and the use of an ordinal response to provide cues for relational perceptual processes, then there is some indication that the stimulus and response shift effects may contrast with each other and that there may indeed be a trade-off between the two effects in how they stabilize judgment responses under anchor conditions for length judgment.

Both studies show the same results on learning to make judgments, namely that the multiple stimulus condition and the relational response condition facilitate acquisition.

In general too, younger children have more difficulty in acquisition although there is not as much of a difference in shift with age. Their difficulty seems to occur mainly with the single stimulus and nominal response conditions.

Study III - Weight Judgment

The weight judgment studies explore the verbal response effect on shift using each child as his/her own control in a modified single stimulus presentation format. The procedure involves an ABX paradigm where the child is presented first with one stimulus weight along with B's label for it, a second stimulus weight along with a label for it, and finally one of the first two stimuli accompanied by a request to judge which of the first two stimuli it is.

The scaled weight stimuli were 100 gms., 200 gms., 300 gms., and 400 gms., as well as an anchor stimulus of 800 gms.

The nominal responses were the color names "green," "blue," "red," "yellow," and the relational terms were "heavier" or "lighter."
Each child was given a nominal response condition and a relational response condition separated by a month and counterbalanced for the children.

Results -

A comparison of the number of correct judgments each child made in the unanchored condition under the nominal as opposed to the relational condition showed that the children's use of relational terms significantly improved accuracy (sign test: \( p < .001 \) for 4 yr. olds and \( p < .006 \) for 5 year olds).

Under conditions of a heavy anchor the children shifted significantly more when they used relational rather than nominal response terms (Wilcoxon matched pairs: \( .01 < p < .025 \) for 4 year olds and \( p < .005 \) for 5 year olds).

It seems that this occurs because no significant shift occurs for the nominal condition whereas both 4 yr. olds (sign test: \( p < .001 \) and 5 yr. olds (sign test: \( p < .006 \)) shifted significantly under the relational condition.

In further accounting for the difference in shift it seems that when children use the relational response the number of incorrect "heavier" judgments decreases significantly from the unanchored to the anchored condition (sign test: \( p = .022 \)) and the number of incorrect "lighter" judgments increases (sign test: \( p < .001 \)), whereas the distribution of "heavier" and "lighter" incorrect judgments remains essentially evenly distributed from the unanchored to the anchored condition when children use a nominal response.
Discussion of weight vs. length judgment findings

The procedure of using each child twice, once under the maximal and once under the relational response condition resulted in a clear difference between the effect of the two conditions on shift behavior. The difference in response effect on shift was not clearly apparent in the prior studies on length judgment involving visual stimuli where independent groups of children were used for each condition. In those studies, a difference in amount of shift was found to be primarily related to the conditions of stimulus presentation (i.e., more shift was found when the children had learned to make judgments during a multiple, rather than a single, stimulus condition).

Considering both the stimulus presentation effect on shift in the length judgment studies, along with the response condition effect on shift in the weight judgment studies, it appears that when children are subjected to either stimulus conditions in which they make judgments of a stimulus embedded in a multiple stimulus array or response conditions in which they make judgments using relational responses, that observing responses are produced in the child which tend to induce a regular shift in the scale of judgment when an anchor is present. The trade-off effect which seemed to be indicated in the length judgment studies is not corroborated by the weight judgment study where the relational cues provided by the response condition strongly induces shift. The nominal response and single stimulus conditions do not produce an observing response which leads to regular shift under anchor conditions, but rather produces a variable disruption in judgment.
Study IV - Weight Judgment

Using the same AX procedure and each child his/her own control as in the prior weight judgment study, two stimulus variables were manipulated for their effect on dichotomous judgments: One was a social anchor in which an influential "person" makes misleading judgments which the children must discount in order to judge the weights accurately themselves; and the other was a physical anchor where an extra weight, either extremely heavy or extremely light was presented to the children prior to their judging the scaled pair of weights.

One response variable was also manipulated to test its effect on both unanchored judgment as well as on judgments made in the social and physical anchor conditions. The variable chosen was, as in the prior studies, the verbal response the children were to use in making their judgments. For one set of conditions they used a nominal response, i.e., either "Lion" or "Bear," for judging the two weights, and for the other set, a relational response, i.e., either "Heavier" or "Lighter."

It was hypothesized that judgment would be influenced by both anchor conditions. In addition it was hypothesized that the relational verbal response terms would aid the children in resisting the social anchor effect more effectively than the nominal response terms, since they would produce appropriate observing responses for making the children compare the weights to each other (when there was no sensory distortion due to a physical anchor stimulus). And finally, based on our prior results it was hypothesized that the use of
relational terms would make the children more susceptible to the effect of the physical anchor than would the nominal terms.

Results -

Two types of analyses were done: one based on traditional psychophysical measurement using the number of correct responses and the other based on sensory decision theory which utilizes both a measure of discriminability and response bias.

Analysis of the number of correct judgments indicates the following: that the children's judgment is significantly affected by the social anchor when they use a nominal response class (sign test: p < .022) but that it is resistant to the effect of the social anchor when they use a relational response class (sign test: p = .339); and that their judgment is affected by the physical anchor when they use either the nominal response class (sign test: p = .004) or the relational response class (sign test: p < .001); the latter effect being much stronger, as predicted.

Results based on the discriminability scores tend to corroborate the above findings. Further analyses are being carried out on the response bias factor although no changes have yet been found as a function of the experimental conditions. It appears so far that it is discriminability itself, rather than response bias which is influenced by both the anchor conditions and the verbal response variables in the study.
References


Salzinger, S., & Sanders, R. The influence of social and physical anchors and type of verbal response on preschoolers' judgment of weight. (Paper in preparation).