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The Use of Verbal Instructions in Investigations with Young Children

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Abstract

Three to 5 year old children have not fully acquired the skills of language. For example, their ability to understand how to speak intelligibly, and to understand what is said to them is still in the process of developing toward the abilities of older children and adults. This often makes their verbal responses to investigating questions hard to evaluate. The reason is that children of this age group may not understand or fully understand a verbal instruction. Moreover, their nervous systems are not fully developed. In this paper, one investigation where conclusions were based on the responses of 3-5 year old children to a verbal instruction will be compared with experimental evidence of the stages that children 1-6 years old are observed to pass through as they begin to comprehend and respond to certain kinds of verbal instructions. Thus, the practice of using similar experimental methods in investigations with both children and adults will be evaluated.

How can we be sure that children as young as 3-5 years of age fully understand questions put to them? The fact that they make responses in answer to questions is no guarantee that they understand the questions in the same way that adults or even older children would understand them. We cannot rely on their answers if we look at them solely in terms of how adults respond because their language skills are not yet fully developed. In other words, verbal instructions that are understood in a uniform way and produce stable responses in older children will often evoke inconsistent and varied responses among younger children who are still in the early stages of acquiring

language and basic knowledge about the world (Luria, 1961).

In order to be sure that we understand a child's verbal and non-verbal responses to questions it is necessary to be aware of the different ways in which their responses can be interpreted. What appears to be the case from an adult standpoint need not, and often does not match the intention of the child. It can even happen that children make nonspecific responses after merely understanding that something is being asked of them that necessitates an answer. Thus, they may respond in the same way to a variety of questions that are posed to them.

This is something that is often not fully taken into account by investigators designing experiments with toddlers. However, it is fortunate that we do not have to merely surmise or infer what a child of 3-5 years of age understands: more specifically, what they are capable of understanding and what they are incapable of understanding. We are able to accurately predict children's responses under certain conditions and have an understanding of those responses because of the experimental evidence reported by the Russian neuropsychologist, A. R. Luria. This evidence is the result of hundreds of investigations with children of various ages at different stages of acquiring language that he and his colleagues undertook over the course of several decades.

An investigation of children's taste preferences

In the summer of 2007 an article appeared in the American journal, *Archives of Pediatrics and Adolescent Medicine* (Robinson, Borzekowski, et al.; "Tots Judge Food") in which the results were reported of an investigation that attempted to link the amount of marketing children had been exposed to and the foods they preferred to eat. In this investigation, five different kinds of food and drink were given to 63 children to taste. The children's ages ranged from 3.4 to 5.4 years old. The samples of the five different food items—hamburger, chicken nuggets, French fries, milk, and baby carrots—were presented to each child one at a time. When each food item or drink appeared, two identical samples of the same item were set in front of the child on a tray. The authors describe the two items as identical because the two samples of the item for each trial were taken from one hamburger (a different hamburger for each child), the same carton of chicken nuggets, French fries, or milk, and package of carrots, respectively. The only difference was that one of the pair was presented in a

plain white wrapper or cup and the other was wrapped in packaging from McDonald's, the fast food restaurant which was chosen for use in this investigation. The brand-marked items featured that restaurant's colorful logo.

There were two research assistants in the room. The one who was conducting the experiment sat in front of the child, but was hidden behind an opaque screen. The other was in charge of placing the samples in front of the children and always stood behind them while they tasted the items. When the second assistant had placed each pair of items on the tray in front of the child, she asked the child, "Can you tell me which of these foods comes from McDonald's?" If the child indicated the brand-marked item, the assistant said nothing more. If the child did not answer or indicated the plain-wrapped item, the assistant pointed to the food or drink wrapped in restaurant packaging and said in a neutral voice, "This food [drink] is from McDonald's." This procedure was repeated before the taste test for each of the five pairs of food items (Robinson, Borzekowski, et al., 2007, p. 793).

The assistant behind the opaque screen next told the child, "Now take a bite [sip] of *this* food [drink]," while reaching around one side of the screen and pointing to the item on that side. Then she put her opposite hand around the other side of the screen and said, "Now, take a bite [sip] of *this* food [drink]. Finally she said, "Tell me if they taste the same, or point to the food [drink] that tastes *best* to you." There were three cases in which the child was considered to have no preference, a) if they responded that the two samples tasted the same, b) if they did not respond at all, and c) if they did not know. No preference was scored as 0, preference for the plain-wrapped food was scored as –1, and preference for the brand-marked food was scored as +1 (Robinson, Borzekowski, et al., 2007, p. 793).

The results of this taste test were then compared with information derived from a questionnaire the children's parents filled out containing questions such as the number of television sets in their homes, the estimated average amount of time a TV is turned on in their houses, and how many times their child in the past week had asked them for any foods they had seen on television. Other questions had to do with eating habits, for example the number of times on average the child is taken to dine in a month at the particular fast food restaurant whose logo appeared on the packaging of items in the taste test.

Those who designed the experiment followed standard psychological proce-

dures that are used when samples of subjects are tested for their preferences. The authors took care to eliminate every possible bias in the taste test. For example, as explained above, there were two research assistants in the room. The one who was conducting the experiment sat in front of the child, but was hidden behind an opaque screen. The other, who was in charge of placing the samples in front of the child always stood behind the child. In this way, their facial expressions or other movements could not provide any unintentional signs of approval or disapproval of the child's responses. Furthermore, a random sequence was devised for placing either the plain-wrapped sample or the brand-marked sample to the right or left of the subject. The same was done for the order in which the first research assistant asked the child to take bites from and pointed to either of the two samples in front of them.

The instructions were spoken in English. If the child didn't understand, Spanish was then used. The same instructions were used, word for word, with each child and not repeated. The data was then put through several kinds of analyses including a nonparametric Wilcoxon signed rank test, a nonparametric McNemar test, the nonparametric Spearman rank correlation for scaled variables, the nonparametric Wilcoxon Mann-Whitney U test for dichotomous variables, and the nonparametric Kruskal-Wallis test for categorical variables.

The results were that the children indicated they preferred the brand-wrapped items significantly more than the plain-wrapped items. According to the authors, the results demonstrated that, "...children preferred the tastes of foods and drinks if they thought they were from McDonald's." The investigators went on to explain further that, "brand identity can influence young children's taste perceptions (Robinson, Borzekowski, et al., 2007, p. 794)." This information was seen as strong evidence of a link between advertising and the child's food preferences.

But does the evidence from this particular investigation actually demonstrate that this link exists? Might there not be many other, more plausible reasons why young children under similar conditions would indicate the brand-marked item instead of the plain-wrapped one that have nothing at all to do with their taste preferences, actual eating habits or knowledge of the fast food restaurant in question? The experimental evidence in the next section suggests that this is feasible.

Characteristic behavior of different-aged children in response to verbal instructions

It may appear that children as young as 1 year old can understand language spoken to them because of their immediate responses. For example, a child may have a toy in their hand, be asked by an adult to hand it over, and the child does so. Indeed, toddlers do understand language to some degree, but their ability to understand is still in the process of being formed. It would be wrong to assume such a firm connection between words and actions as we would find in older children has been established in younger children. Some of the most comprehensive evidence that describes the stages that children go through as they begin to associate specific actions with verbal instructions comes from a series of elegant experiments carried out by the Russian neuropsychologist, A. R. Luria and his colleagues. These are described most fully in English in his book *The Role of Speech in the Regulation of Normal and Abnormal Behavior* (1961) and also in the articles *Speech Development and the Formation of Mental Processes* (1969) and *The Directive Function of Speech in Development and Dissolution* (1965).

As stated above, it would appear that language spoken to children around even 1 year of age can have a direct influence upon their actions, but this relationship is still very tenuous and is easily disrupted. In one series of experiments, Luria (1965) and his colleagues attempted to discover more precisely the ways in which the directive function of language could be characteristically disturbed in different-aged children. In other words, they tried to determine the conditions under which the child does not respond or responds differently to a verbal instruction.

With the youngest children in the investigation, those of 1.0 to 1.2 years of age, it took very little to disrupt an association made between a verbal instruction and the child's action. For example, if an object such as a toy fish is placed in front of the child and they are asked to hand it to the investigator, the child can do so without any difficulty. The child is able to do the same for other common objects such as a cup, a toy cat, or a toy horse. However, if the investigators complicate the situation even slightly very different results are observed. Luria (1965, p. 351) describes such a case:

Let us place before the child two objects: a toy *fish* and at some distance from

it, and half way toward the fish a bright colored toy *cat*. If in this situation we ask a child of 1.0-1.2 to hand us the *fish*, his behavior will be different. The uttered word will evoke in him an orienting response[1], and his glance will be fixed on the fish; but his hand, stretched out toward the fish, will stop half way, turn toward the cat, and instead of giving us the fish that was requested, the child will grasp the *cat* and offer it to the experimenter. The directive function of the word will be maintained only up to the moment when it comes into conflict with the conditions of the external situation.

In other words, we can observe that the child does hear and understand the word "fish" by initially looking at the fish, not the cat. But the child is distracted by what is closest at hand and more colorful, the cat, and picks it up instead. In fact, Luria provides us with much evidence that the younger a child is, the more chance there is that bright objects, new sounds, or the unexpected actions of others in the immediate external situation will attract their attention and have more influence over their actions than instructions spoken to them (Luria, 1965).

Another key point from Luria's findings is that things in the immediate environment that an adult indicates and names for the child cause these objects and features to be ones that are more likely to have special significance for the child in the future (Luria, 1961). The adult may cause the child to notice certain details in their surroundings that they might not have naturally noticed for themselves. For example, if a parent and child are looking at a flower together, the parent may point out its different parts and name them. They may count the number of petals together with the child.

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[1] In the original text (Luria, 1965, p. 351), the term *orientational reaction* is used instead of the more commonly used terms, *orienting response* or *orienting reflex*. The orienting response is an exploratory response evoked by novel stimuli. The outwardly observable elements of the response can include eye movement toward the stimulus. Other inner changes that ready the subject to take in information more easily such as changes in brain activity and dilation of blood vessels can also be detected when an orienting response is evoked (see Luria, 1973, 1981).

They may point to, name, and use the golden, dusty pollen to make yellow markings on their arms. These activities modify the child's perception, and in the future the child will not see the flower as they did before as a whole, but instead as an object of a certain color, with a certain amount of petals, and other such features.

Luria demonstrated in many investigations the influential role that adults can have in directing children's attention to specific items in their visual field. One example is a series of experiments where the investigators demonstrated an ability to modify the child's attention from focusing on the naturally occurring more dominant feature in the child's visual field to focusing on the weaker element. To do this, children aged 3 to 5 were presented with complex visual stimuli—pictures such as a solid red circle on a solid gray background and a solid green circle on a solid yellow ground, one at a time. They were then asked to squeeze a balloon with either their left or right hand depending on which picture appeared. After a while all the children formed a habit of completing the task perfectly. The next step was to confirm which feature—the color of the circle or the color of the background—was determining their choice. To do this, the children were presented with a red circle in a yellow (instead of gray) background and a green circle in a gray (instead of yellow) background). Luria writes:

> Observations demonstrate that in such cases the stronger element in the compound, that is the circle, is always decisive; the child will still squeeze with his right hand for the red circle and his left for the green, regardless of their backgrounds. (1961, p. 5)

The next part of the investigation was to determine if the weaker element, the color of the background could be made the determining factor by verbal instructions from an adult. The children were then told to squeeze the balloon with the right hand for the gray ground and with the left for the yellow. The results were that children aged 3 to 4 showed no stable response pattern. Those aged 4 to 5 were still relatively unstable in responding if their results were compared with those from the initial experiment. It is only, "children aged 5 to 7 who begin reacting to the background color which a verbal command has made the stronger element in the compound (Luria, 1961, p. 6)."

However, the results were quite different if other, more meaningful instructions were given. The same investigation was carried out in which the colored circles were

replaced with solid-colored airplanes on the same gray and yellow backgrounds. The children were told to press the balloon with their right hand for a red airplane on a *yellow* ground because the plane can fly when the sun is shining and the sky is yellow, and press with their left hand for a green airplane on a *gray* ground because when it is rainy the plane cannot fly and has to be stopped. With these more meaningful verbal instructions children as young as 3 or 4 began reacting consistently to the backgrounds instead of the figures of the airplanes.

In sum, children between 3-5 years of age naturally attend to a figure more than the background when presented with a complex visual stimulus. However, verbal instructions from adults can influence children from around the age of 5 and above to attend to the weaker element, such as the color of the background. But even children as young as the age of 3 will be influenced by an adult's verbal instruction if it creates meaningful associations for them.

There is yet a third series of Luria's investigations that has relevance in this article. These were conducted with children from age 2.5 to 6, and from these investigations we can see evidence of the immerging stages of the interrelationship between the adult's verbal instructions and children's actions. In these experiments, children of different ages were told to squeeze a rubber bulb that was in their hand when a colored light appeared. When pressing the bulb, the frequency, force, and duration of their squeezing could be recorded. From this data, distinct patterns emerged for specific age groups, results that Luria once jokingly said had taken researchers 7-8 years to compile, but could be adequately explained in three minutes.

In such an experiment with the youngest children the verbal directions were: "When the red light appears, squeeze." Two to 2.5 year old children responded in a characteristic way. Interestingly, they reacted immediately to *the verbal instruction itself*, not waiting for the light. Luria (1979) explains further:

> The second part of the verbal instruction—"squeeze"—evoked an immediate motor reaction, and the child pressed the bulb. The intended stimulus, the red light, actually became a distracting factor, and children who had already begun to press the bulb at the mention of the word "squeeze" often stopped responding altogether when the light came on. In addition, each verbal command "squeeze" evoked, not a unitary bulb-squeeze, but a whole series of involuntary

> motor reactions which only gradually exhausted themselves. Even the direct negative instruction "stop," frequently led to excitation and to stronger, less controlled motor responses. (p. 107)

It would appear from these and other similar studies (Luria, 1965, 1969) that a verbal command given to a child of that age caused them to immediately initiate a movement. In addition, they did so with whatever was most readily available (i.e. the rubber bulb in hand) regardless of the actual words of the instructions. This occurred in these and other experiments in which more familiar objects from everyday life were immediately accessible. It is notable that the children actually *increased* their activity upon hearing the words "stop" or "that's enough." Tone of voice or "pulse" of the spoken words also appeared to have more influence at first than the various words used by the investigators in initiating such motor responses in these younger children. In other words, according to Luria, the verbal command evokes a motor action in the young child, who incorporates whatever is immediately accessible into their movements or continues their current movement with more vigor.

This can be seen in everyday life as well, something that is often frustrating to parents. If a 2-year old child is reaching for an open can of paint and the parent shouts, "No! Don't touch that paint!" The child is very likely to immediately grab the paint and maybe even stick a hand in it. The parent's command only further draws the child's attention to the paint. This is because the 'logic' of the child is different from that of the adult. At this stage it makes no sense to the child for an adult to point something out and then say not to touch it.

For children around 3 years of age, the pattern was slightly different. They were able to wait until they saw the light go on before pressing. However, once having started they *continued* squeezing regardless of whether the light was on or off. The repeated instruction to, "Press only when the light flashes," was powerless to stop the motor excitation that had already begun. As with the younger children, an inhibitory instruction such as, "Don't press when there is no light," reinforced actions that had already begun—strengthening, not stopping them (Luria, 1961, 1965).

Children between 3 and 4 behaved in a markedly different manner. They learned to listen to the instructions and were able to wait to respond until the light appeared. But this does not mean they were able to follow all kinds of instructions. For

example, when the task was changed and instructions given that forced them to make a choice (i.e. “When you see a blue light do nothing. When you see a yellow light squeeze.”), the results were interesting. If the yellow light appeared followed by a blue light, many children continued to press the bulb even after the blue light appeared. Likewise, when the blue light appeared followed by the yellow light, the children often failed to respond to the yellow light. According to Luria, it was as if their initial choice for either starting or inhibiting their motor response, not the spoken instructions had the most control over their behavior. What is even more interesting is that all the children could repeat the verbal instructions adequately and demonstrate they knew their meaning, but were not *physically* able to coordinate their own motor behavior yet to follow them.

As Luria (1965, p. 358) writes, “The experiment shows that this practical correspondence between the semantic meaning of the sentence and its directive role does not appear for a long time.” Following directions is no simple matter for the young child. The excitation evoked by the signal of the yellow light was stronger than the signal of the verbal instruction to stop pressing, and stronger than the signal of the blue light to do nothing. In these experiments, the adult’s speech always had an initiating effect on motor behavior in all ages of children tested, and only gradually came to have an inhibiting effect as children became older and the child’s own speech system had developed further (Luria, 1961). It was not until around the age of 6 when children had no problem with any of these tasks and only made mistakes if asked to react as quickly as possible or when fatigued.

An evaluation of the investigation of children’s taste preferences from a Lurian standpoint

In the study of children’s taste preferences the investigators, despite meticulously following standard psychological procedures and performing multiple analyses of the data, hinged their whole argument solely on spoken and pointing responses of 3-5 year old children to one verbal instruction (“Tell me if they taste the same, or point to the food [drink] that tastes *best* to you”). Furthermore, they interpreted this evidence only in one way: the children’s preferences had been influenced by the amount of their exposure to advertising. However, what the authors of this study call children’s tastes preferences, are at best actually only children’s *apparent* taste preferences. In

other words, the authors have only given us a surface view and not a depth view of the most likely reasons why the children indicated the brand-marked items more often than the plain-wrapped ones in the taste trials. Moreover, we must point out that the authors' interpretation of the children's responses is not even a likely one when the evidence is examined from a Lurian viewpoint.

First of all, as explained in the previous section, Luria's investigations demonstrated that in young children the visual sense dominates. This gradually changes as children's language skills develop and the words that they hear others use come to have more influence over their actions. The first Lurian example of the 1-year old child who understands the instruction and starts to reach for the toy fish but on the way is visually attracted by the bright-colored toy cat and picks it up instead, is a clear illustration of this in very young children. The second example of the child focusing on the dominant figure of the solid-colored circle and not the solid-colored background when presented with a complex visual stimulus, demonstrates how children even from the age of 3-5 continue to be primarily influenced visually, and especially by the dominant element in their visual field. Therefore, just from the fact that one of each pair of the food items was wrapped in a plain white wrapper and the other in a wrapper with a colorful logo, we can predict that the child will indicate the item with the colorful logo more often than the plain-wrapped one. Furthermore, they would do so for any item in more colorful packaging regardless of brand. This difference in packaging itself would cause us to predict the results the investigators found.

Secondly, in the taste preference investigation the first thing the children were asked by the second adult assistant was, "Can you tell me which of these foods comes from McDonald's?" If the child indicated the brand-marked item, the assistant said nothing more. If the child did not answer or answered "incorrectly,"[2] the assistant pointed to the food or drink wrapped in restaurant packaging and said in a neutral voice, "This food [drink] is from McDonald's." This procedure was repeated before the taste test for each of the five pairs of items. According to the authors, 48% of the children needed to be told by the adult in at least one and sometimes more than one of the five different trials which item was from McDonald's (Robinson, Borzekowski, et

[2] Baby carrots were not sold by McDonald's restaurants at the time of this investigation.

al., 2007, p. 794).

Even if the paired items had equally attracted the attention of the children visually, the children were nevertheless continuously asked to point out the brand-marked item of the two. If they could not do it, an adult told and indicated by the pointing to them which one it was. From a Lurian standpoint, this part of the investigation would have drawn the child's special attention to that particular item. Thus, this would further influence the children to choose the brand-marked item regardless of how they thought it tasted.

Thirdly, we will examine the key instruction. The children's responses to this instruction provided the principle evidence from which the authors drew their conclusions. The instruction given was, "Tell me if they taste the same, or point to the food [drink] that tastes *best* to you (Robinson, Borzekowski, et al., 2007, p. 793)," There are some inherent assumptions in this instruction made by the authors regarding the language abilities of children aged 3-5. One assumption is that it is equally easy for a child of this age to respond by speaking as it is to respond by pointing. According to Luria, this is not the case. Even though children may understand the instruction, the younger they are, the more likely it is that the verbal instruction will instantly evoke a movement rather than a verbal response from the child. Even though the children had the option of either saying or indicating a preference by pointing, if they wished to indicate the two items were *the same*, their only option was to *say* it. This would make the author's null hypothesis—that the correct choice is for the children to respond that the taste of the two items is the same—significantly less likely for the children to indicate, even though they might have thought the two items did indeed taste the same.

Another presumption regarding children's language abilities is that children have an adult understanding of the meaning of "tastes best" and "tastes the same," which are both rather abstract for such young children to understand. These are concepts with which they may have had no prior experience and the investigators made no provision to find out in what way the young children understood them. Furthermore, they counted children who did not respond at all or said they did not know as having *no preference*. This is wrong. When children do not respond, there can be many reasons for this behavior. These reasons might be related to their physical condition (i.e. tired or hungry), their emotional condition (i.e. sad or anxious),

or because they are engaged in mental activity such as planning. It is impossible to determine which is the case without further investigation. Therefore, the children's "no response" responses should not have been included in the data, but instead disregarded.

Furthermore, the "tastes the same" response may also be less likely for a child than an adult to indicate for other reasons. For example, the fact was that the two items were packaged differently and that itself might create not only in a child, but also in an adult, an expectation that there would be a difference in taste. However, the child may feel more obligated than the adult to answer the question "which tastes best" because according to the young child's reasoning there *must* be a difference since the two items look distinctly different. Expectation and the effect it can have on perception (often mistakenly understood as a purely sensory effect), has been a much-investigated topic, one well known to psychologists since the 1950s and 1960s (K. Wigglesworth, personal communication, December 30th, 2007).

Conclusion

In sum, a comprehensive evaluation of the methodology used in this investigation that incorporates the experimental evidence available to us of a young child's ability to understand and react to verbal instructions is needed. Let us review the facts. In this investigation the children were presented with an array of sensory stimuli, 1) the visual presentation of the two samples, 2) the auditory question asking for their preference if any, and 3) the gustatory comparison they are asked to make. So the children were obliged (or felt obliged) to answer the question in relation to what they saw, what they were asked, and what they tasted.

This is requesting a lot of young children. With so many demands on the child, it is doubtful that they would have been able to discriminate a difference in taste between the two samples even if there had been one. Furthermore, it is clear from Luria's evidence that not only are brightly colored objects attractive to the young child, but also more importantly, that the visual world continues to dominate or take priority over the other senses. So, given the obvious complexities of this task for a young child in this investigation, it is by no means clear or certain that the responses themselves of the children could reveal the actual reasons for their responses.

To say that it was the subjects' exposure to advertising that significantly influ-

enced them to choose the brand-marked items more frequently is not at all a likely reason. The evidence from Luria vastly outweighs the possibility that advertising influenced the children's choices. The presumption of the investigators is that previous experience of the McDonald's products took precedence over the children's responses in the experiment. That is, past events influenced their current reactions. This is most improbable on the Lurian evidence. The temporal gap is too long. In sum, the claimed influence of advertising is the least probable reason for the results found in the experiment.

In conclusion, despite the investigators' careful precautions and the obvious time and effort that went into conducting this study, little definite information was gained from it that could enlighten us. This was because the designers of the investigation failed to take into consideration all that we do know and have evidence of in regard to the developing relationship between language and the young child's own actions.

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幼児に対する調査における言語使用の問題点

ミリアム　T. ブラック

要　旨

３歳～５歳の幼児は、未だ母語の習得段階にある。このことは、質問に対する幼児の言語による答えを的確に評価することを、概して難しくする。それゆえ、幼児に関する多くの研究は、研究者が出した言語的指示に対する幼児の言語的・非言語的反応の両方を分析対象としている。しかし、幼児はその言語的指示を、より年長の児童と同じようには理解出来なかったり、あるいは、生理学的未熟さから、同じ指示に同じようには従えなかったりすることがあり得るため、この方法にも別の問題が生じる。よって、本稿ではまず、１歳～６歳の幼児が、ある種の言語的指示を理解し、反応し始める時期に通るとされている段階を検証する。さらに、３歳～５歳の幼児の言語的指示に対する反応を分析したある研究についても論評する。