Contextual control over compound stimuli: an application to the teaching of numbers[1]

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Resumen

El propósito de esta investigación fue enseñar la discriminación entre "igual" y "diferente" para las cantidades y la forma escrita de varios números. En el procedimiento, se utilizó un control contextual mediante discriminaciones condicionales que incluían estímulos compuestos. Una niña de cinco años aprendió que la elección de uno de cuatro estímulos (número uno, número dos, cantidad uno, cantidad dos) dependía de la presentación de un estímulo contextual (igual o diferente) y un estímulo condicional compuesto de dos palabras (uno-cantidad, uno-número, dos-cantidad, dos-número). Una vez que se aprendieron las ocho combinaciones posibles de estímulos, se presentaron los estímulos contextuales para dos nuevos números. Los resultados mostraron la transferencia de aprendizaje sin enseñanza deliberada para dos nuevos números que incluían estímulos compuestos.

Palabras clave: *Control contextual, discriminaciones condicionales, estímulos compuestos, números*

Abstract

The purpose of this research was to teach the discrimination between "equal" and "different" for the quantities and written form of various numbers. In the procedure used, a contextual control for conditional discriminations that included compound stimuli was presented. A five year old girl learnt that the choice of one of four stimuli (number one, number two, quantity one, quantity two) depended on the presentation of a contextual stimulus (equal or different) and a conditional stimulus composed of two words (one-quantity, one-number, two-quantity, two-number). Once the eight possible combinations of stimuli were learnt, the contextual stimuli were presented for two new numbers. The results showed the transference of learning without deliberate teaching for two new numbers which included compound stimuli.

Key words: *Contextual control, conditional discriminations, compound stimuli, numbers*

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In the laboratory it is relatively easy to control, isolate and retrieve evidence of the stimuli that take part in the behavioural interaction. Nevertheless, these tasks are not that easy to perform when dealing with phenomena that occur in the applied context and therefore applied derivations on antecedent studies in the experimental field normally have certain delay. However, the knowledge generated through the experimental field is essential in order to design efficient and effective procedures for applied settings, such as the teaching process. A crucial contribution that has made a relevant impact on the experimental and applied behaviour analysis is the analysis and description of behavioural interactions or types of contingencies described by Sidman (1986). This author differentiated four types of contingencies: two-term (answer and consequence), three-term (discriminative stimulus, answer, consequence), four-term (stimuli, conditional and discriminative, answer, consequence) and five-term or contextual control (stimuli, contextual, conditional and discriminative, answer, consequence).

The phenomenon of contextual control of conditional discriminations in experimental research has been widely documented (Bush, Sidman & de Rose, 1989; Carpentier, Smeets & Barnes-Holmes, 2002a, 2002b, 2003; Dymond & Barnes, 1995; Gatch & Osborne, 1989; Kennedy & Laitinen, 1988; Lynch & Green, 1991; Markham & Dougher, 1993; Meehan & Fields, 1995; Pérez & García, 2008; Pérez-González, 1994; Pérez-González & Martínez, 2007; Pérez-González & Serna, 1993, 2003; Pérez-González, Spradlin & Saunders, 2000; Perkins, Dougher & Greenway, 2007; Serna & Pérez-González, 2003; Wulfert & Hayes, 1988). However, in applied research it is scarce (see Alós & Lora, 2007; O'Connor, Barnes-Holmes, & Barnes-Holmes, 2011; Falla & Alós, 2016).

The aforementioned research has focused on how the contextual stimulus affects the learning of new combinations of stimuli. One specific line of research has studied how the functions of contextual stimuli are transferred to new discriminations (Pérez-González, 1994; Pérez-González & Serna, 2003; Pérez-González & Martínez, 2007; Serna & Pérez-González, 2003). The procedure consisted of learning a conditional discrimination "A_{12}-B_{12}"; the teaching of a contextual discrimination "XA_{12}-B_{12}"; the learning of a new conditional discrimination "A_{34}-B_{34}" and evaluating how all this affected the transference of learning to a new contextual discrimination "XA_{34}-B_{34}". In contextual control tasks, stimuli (contextual and conditional) (XA) condition the choice between two discriminative stimuli (B). However, there are other types of discriminations that include two previous stimuli (compound stimuli) that condition the choice between four discriminative stimuli (see Alós, Guerrero, Falla & Amo, 2013).

The compound stimuli have been described for conditional discriminations (Alonso-Álvarez, 2010; Alonso-Álvarez & Pérez-González, 2006; Pérez-González & Alonso-Álvarez, 2008) and recently for simple discriminations (Alós, Moriana & Lora, 2011; Guerrero, Alós & Moriana, 2015). These authors showed that in certain discriminations, stimuli with a conditional or discriminative function may be formed by two stimuli. Alonso-Álvarez and other researchers used the following example to illustrate this. A person may be asked to select one of the following four names: Goya, Gauguin, Cervantes and Balzac. These names may be grouped by profession (writer or painter) and nationality (Spanish or French). The authors concluded that in order to select the correct name, the participant had to take into account both the profession and the nationality. The description of conditional discriminations that include compound stimuli is useful for understanding and studying certain phenomena that would have been excluded from Sidman's classification.

Alós and Lora (2007) used a contextual control procedure to teach numbers to a child with intellectual disability. The teaching programme included contextual and conditional discriminations. The conditional discriminations were formed by the name of a number and its written form, for the numbers: one and two, three and four. In the contextual control, the aforementioned stimuli were accompanied by a new stimulus with an "equal" or "different" contextual function. The participant correctly performed the test of transfer for the new numbers: three and four. However, with this procedure you cannot teach the participant a more complex task: choosing between the written form and the quantities of the numbers. So the analysis of the stimulus and the design of the procedure was still pending. This aspect could be related to both investigation approaches: contextual control and conditional discriminations which include compound stimuli.

This research studied the teaching of a contextual control task on compound stimuli. A girl had to learn that the selection of one of four stimuli (the number one, the number two, the quantity one, the quantity two) depended on the presentation of a contextual stimulus (equal or different) and a conditional stimulus formed by two words: one-quantity, one-number, two-quantity, two-number. Thus, if she was told something was "equal to one in number", she had to select the written form of that number; she also had to learn that when she received the instruction "equal to the quantity one", she had to indicate the quantity and not the written form of that number. Similarly, when given the instructions "different to the quantity one" or "different to the number one", in the first case the girl had to select the different quantity, and in the second case the written form different to that number. The same process was repeated for the number two. Once the eight possible combinations of stimuli had been taught, the contextual stimuli "equal and different" were presented for two new numbers (three and four) to determine whether learning had been transferred without explicit training.

Method

Participant

Azahara was 5 years and 8 months' old at the time of the study. The girl presented normal cognitive development and exhibited no behavioural disorders. She was attending infant school, and this study was carried out as an extra-curricular reinforcement programme.

Experimental design

An ABA unique design (Barlow & Hersen, 1984) was used for the evaluation and teaching of contextual control. Thus, the procedure included the evaluation of other behaviour prerequisites related to these (Phases from 1 to 10). Discriminations were measured in the baseline (A_{12}), (Phases 11, 12, 13), for a better understanding of the following alphanumerical codes; the reader can consult Figure 1. Finally, the training was applied (A_{12}) for X (A0)-B/C (Phases 15 to 21) and the same baseline (A) parameters were measured again (Phases 22 to 24).

Three types of discriminations applied in the procedure described in this investigation follow. Conditional discrimination formed by two stimuli (conditional and discriminative), a chosen answer and a consequence (Sidman, 1986). In this context, two types of discrimination may be differentiated: firstly, the conditional stimulus would be the name of a number, e.g. one or two, and the discriminative stimulus (the

written form, one or two); and secondly, the conditional stimulus would be a name (number or quantity) and the discriminative stimulus would be the written form or quantity. (See Figure 1)

A_1	A_2
B_1 B_2	B_1 B_2
+	+
One	Two
1 2	1 2
+	+

A_1	A_2
C_1 C_2	C_1 C_2
+	+
One	Two
* **	* **
+	+

0_B	0_C
B_1 C_1	B_1 C_1
+	+
Number	Quantity
1 *	1 *
+	+

0_B	0_C
B_2 C_2	B_2 C_2
+	+
Number	Quantity
2 **	2 **
+	+

Figure 1. First-order conditional discriminations: types of essays and examples of task.

Conditional discrimination including compound stimuli. This discrimination consisted of a conditional stimulus comprising two stimuli and a discriminative stimulus (Alonso-Álvarez, 2010; Alonso-Álvarez & Pérez-González, 2006; Pérez-González & Alonso-Álvarez, 2008). In this context, there were four configurations of stimuli: one-number, one-quantity, two-number, and two-quantity. To select the correct answer, the child would have to choose from four comparisons or discriminative stimuli, the written forms and the quantities of the numbers one or two. (See figure 2)

A_1	A_1	A_2	A_2
0_B	0_C	0_B	0_C
B1 B2 C1 C2	B1 B2 C1 C2	B1 B2 C1 C2	B1 B2 C1 C2
+	+	+	+
One	One	Two	Two
Number	Quantity	Number	Quantity
1 2 * **	1 2 * **	1 2 * **	1 2 * **
+	+	+	+

Figure 2. First-order conditional discrimination with compound stimuli: types of essays and examples of task.

Contextual control with compound stimuli. A contextual discrimination implied the establishment of an arbitrary relationship between a contextual stimulus, a conditional stimulus, a discriminative stimulus and a consequence (Sidman, 1986). In this research, the stimuli equal and different were added to conditional discrimination that included compound stimuli. Thus, in this context there were eight configurations of stimuli.

X_1 A_1 0_B B_1 B_2 C_1 C_2 +	X_1 A_1 0_C B_1 B_2 C_1 C_2 +	X_1 A_2 0_B B_1 B_2 C_1 C_2 +	X_1 A_2 0_C B_1 B_2 C_1 C_2 +
Equal One Number 1 2 * ** +	Equal One Quantity 1 2 * ** +	Equal Two Number 1 2 * ** +	Equal Two Quantity 1 2 * ** +

X_2 A_1 0_B B_1 B_2 C_1 C_2 +	X_2 A_1 0_C B_1 B_2 C_1 C_2 +	X_2 A_2 0_B B_1 B_2 C_1 C_2 +	X_2 A_2 0_C B_1 B_2 C_1 C_2 +
Different One Number 1 2 * ** +	Different One Quantity 1 2 * ** +	Different Two Number 1 2 * ** +	Different Two Quantity 1 2 * ** +

Figure 3. Second-order conditional discrimination of compound stimuli: types of essays and examples of task.

X_1 A_3 0_B B_3 B_4 C_3 C_4 ?	X_1 A_3 0_C B_3 B_4 C_3 C_4 ?	X_1 A_4 0_B B_3 B_4 C_3 C_4 ?	X_1 A_4 0_C B_3 B_4 C_3 C_4 ?
Equal Three Number 3 4 *** **** ?	Equal Three Quantity 3 4 *** **** ?	Equal Four Number 3 4 *** **** ?	Equal Four Quantity 3 4 *** **** ?

X_2 A_3 0_B B_3 B_4 C_3 C_4 ?	X_2 A_3 0_C B_3 B_4 C_3 C_4 ?	X_2 A_4 0_B B_3 B_4 C_3 C_4 ?	X_2 A_4 0_C B_3 B_4 C_3 C_4 ?
Different Three Number 3 4 *** **** ?	Different Three Quantity 3 4 *** **** ?	Different Four Number 3 4 *** **** ?	Different Four Quantity 3 4 *** **** ?

Figure 4. Test for new second-order conditional discrimination of compound stimuli: types of essays and examples of task. *Note*: the letters accompanied by numbers shown above are descriptive labels that the girl was never able to see. The plus sign that appears underneath of the comparisons indicates the choice that was reinforced in the stages of the learning process. On the other hand, the interrogative sign shown at the bottom of the comparisons indicates the stimulus that should have been selected on the tests to consider the choice as the correct one.

Material and context

The research was carried out in an individual class in which the girl and the researcher sat face to face opposite one another, separated by a table measuring 50 x 50 centimetres (19.68 inches.). The participants remained in the same position during the whole experiment. Two half-hour sessions were held on two consecutive days: first day (phases 1 to 13) and second day (phases 14 to 24).

Inter-observer agreements

54% of the trials presented in the experiment were recorded by an independent observer. In all the tests, the observer was present. For tests the agreements were calculated using the following formula: agreements divided by agreements plus disagreements multiplied by 100. Inter-observer agreements for all sessions were 100%.

Procedure

Presentation of stimuli and correct answers

The contextual and conditional stimuli were presented orally by the researcher. In contrast, the discriminative stimuli (numbers and quantities) were printed on a horizontal sheet of paper. The numbers were taught using the written forms of these numbers measuring 3 centimetres (cm) high by 2 cm (0.78 in) wide. The quantities were taught using asterisks measuring 3 x 3 cm (1.18 x 1.18 in). In the phases in which only two discriminative stimuli were presented (Phases: 1 to 8, and 11), the discriminative stimuli were located in the centre of the sheet and 20 cm (7.87 in) apart. In the phases in which four discriminative stimuli were presented (Phases: 9, 10, 12, 13), each stimulus was presented on one corner of the sheet. For each new test, the positions of the stimuli were changed at random (see Table 1).

Table 1. *Stimuli*

	A	B	C	X
0	--	Number	Quantity	--
1	One	1	*	Equal
2	Two	2	**	different
3	Three	3	***	--
4	Four	4	****	--

The correct answers were followed by positive expressions (excellent, perfect, etc) given by the researcher. In contrast, if the child gave an incorrect answer, the researcher would say "no". No consequences were programmed deliberately in the tests.

Phases

Phases 1 to 2. Tests. The numbers "one" (A1) and "two" (A2) were presented orally. For phase 1, the girl had to choose the correct written form and for phase 2, she had choose the correct quantities. The evaluation was carried out for 8 trials. No differential consequence was provided on the answers to the tests.

Phases 3 to 4. Tests. The evaluation was performed for two new numbers: three and four.

Phases 5 to 8. Tests. A conditional stimulus (0_B or 0_C) was presented and the girl had to choose between two stimuli of comparison: B1 and C1 (Phase 5), B2 and C2 (Phase 6), B3 and C3 (Phase 7), B4 and C4 (Phase 8).

Phase 9 to 10. Test. All the possible compound samples were presented and the girl had to choose the correct comparison. Thus, there were four possible combinations for the numbers: one and two (Phase 9), three and four (Phase 10).

Phase 11. Test XA_{12}-B_{12}. In this phase, one contextual stimulus "X_1" or "X_2" was presented with one of the two stimuli "A_1" or "A_2", and the girl had to choose one comparison: B_1 or B_2. The evaluation was carried out for 16 trials. Four possible combinations of stimuli were possible for the numbers, one and two.

Phase 12. Test $X(A_{12}0_{BC})$-B/C. The contextual stimuli were presented with one of the four compound stimuli, and the girl had to choose between four existing comparisons. A total of 16 trials were presented. Eight possible combinations of stimuli were possible: $X_1(A_10_B)$-B1, $X_1(A_20_B)$-B_2, $X_1(A_10_C)$-C_1, $X_1(A_20_C)$-C_2, $X_2(A_10_B)$-B_2, $X_2(A_20_B)$-B1, $X_2(A_10_C)$-C_2 and $X_2(A_20_C)$-C_1.

Phase 13. Test of transfer $X(A_{34}0_{BC})$-B/C. The evaluation is performed the same as in the previous test, now for the numbers: three and four.

Phase 14. Teaching $(A_{12}0)$-B/C. The four possible compound stimuli were presented (A_10_B, A_10_C, A_20_B, A_20_C) and the girl had to choose the correct comparison. In this phase, the probability of reinforcement was 0.5, meaning that consequences were applied randomly in only half of the trials.

Phase 15. Teaching $X_1(A_10_{BC})$-B_1/C_1. In this phase, the contextual stimulus (X_1) was presented with one of two compound stimuli (A_10_B or A_10_C) and the girl had to choose from four possible comparisons: B_1, B_2, C_1, C_2. The procedure required the girl to correctly complete 12 consecutive trials in order to continue to the following phase; in all the tests the abovementioned consequences were applied. Thus, two possible discriminations were presented: $X1(A_10_B)$-B_1 and X1(A_10c)-C_1.

Phase 16. Teaching $X_2(A_10_{BC})$-B_1/C_1. This phase was identical to the previous one, but in this case the other contextual stimulus (X2) was presented.

Phase 17. Teaching $X_2(A_10_{BC})$-B_1/C_1. In this phase, the girl was presented all four discriminations from the previous two phases. The criterion for completing this phase was the obtainment of 12 consecutive correct trials. Four combinations of the previous stimuli were possible.

Phase 18. Teaching $X_1(A_20_{BC})$-B_2/C_2. In this phase, the contextual stimulus (X_1) was presented with one of two compound stimuli (A_20_B or A_20_C) and the girl had to choose between four possible comparisons: B_1, B_2, C_1, C_2. Thus, two discriminations of stimuli were presented, all for the number two.

Phase 19. Teaching $X_2(A_20_{BC})$-B_1/C_1. This phase was identical to the previous one, the difference being that the other contextual stimulus (X_2) was presented. Thus, two possible discriminations were presented for the number two.

Phase 20. Teaching $X(A_20_{BC})$-B/C. The previous four discriminations were presented in this phase. Four possible combinations of stimuli were possible.

Phase 21. Teaching $X(A_{12}0_{BC})$-B/C. All eight possible combinations of stimuli were presented. The probability of reinforcement was 1.

Phase 22. Test $X(A_{12}0_{BC})$-B/C. The previous eight possible combinations of stimuli were evaluated. In this phase, no consequences were presented deliberately.

Phase 23. Teaching $(A_{34}0_{BC})$-B/C. Four new compound names were presented (A_30_B, A_30_C, A_40_B, A_40_C) and the girl had to choose the correct comparison between: B_3, B_4, C_3, C_4. In this phase, the probability of reinforcement was 0.5.

Phase 24. Test of transfer $X(A_{34}0_{BC})$-B/C. This consisted in the presentation of the contextual stimuli with all four possible compound stimuli (A_30_B, A_30_C, A_40_B, A_40_C). The student's performance was evaluated for 16 trials that included all eight combinations of possible stimuli for the numbers: three and four.

Results

In the initial tests for first-order conditional discriminations, Azahara completed all the tests correctly. It means that the following discriminations had been learnt before taking part in this investigation: A-B, A-C, 0-B/C. Also, she correctly completed the tests for conditional discriminations that included compound stimuli: (A0)-B/C. It proves that the girl was able to choose the correct spelling or amount when name and property were shown. At the baseline of the contextual discriminations (XA_{12}-B_{12}, X(A0)-B/C), she correctly answered 8 of 16 trials. It indicates that differentiation between equal vs different was not established for spellings and amounts. However, in the final evaluation for "X(A0)-B/C, she completed all the tests correctly. The girl learnt a contextual control task which involved compound stimuli for numbers one and two, showing transfer of functions of the contextual stimuli (two new numbers: three and four). In order to learn the contextual discrimination with compound stimuli (phases 15 to 21), she needed a total of 97 trials and of these only two were incorrect. Table 2 shows the results in each phase.

Table 2. *Phases, learning sequences and results.*

	Phases	Prompt	Reinforcement	Criterion	Trials
1	A_{12}-B_{12}	no	Test	8	8/8
2	A_{12}-C_{12}	no	Test	8	8/8
3	A_{34}-B_{34}	no	Test	8	8/8
4	A_{34}-C_{34}	no	Test	8	8/8
5	0_{BC}-B_1/C_1	no	Test	8	8/8
6	0_{BC} -B_2/C_2	no	Test	8	8/8
7	0_{BC} -B_3/C_3	no	Test	8	8/8
8	0_{BC}-B_4/C_4	no	Test	8	8/8
9	$(A_{12}0_{BC})$-B/C	no	Test	8	8/8
10	$(A_{34}0_{BC})$-B/C	no	Test	8	8/8
11	XA_{12}-B_{12}	no	Test	16	8/16
12	$X(A_{12}0_{BC})$-B/C	no	Test	16	8/16
13	$X(A_{34}0_{BC})$-B/C	no	Test	16	8/16
14	$(A_{12}0_{BC})$-B/C	no	.5	12	12
15	$X1(A_10_{BC})$-B/C	no	1	12	12
16	$X2(A_10_{BC})$-B/C	yes	1	12	20
17	$X(A_10_{BC})$-B/C	no	1	12	13
18	$X1(A_20_{BC})$-B/C	no	1	12	12
19	$X2(A_20_{BC})$-B/C	yes	1	12	12
20	$X(A_20_{BC})$-B/C	no	1	12	12
21	$X(A_{12}0_{BC})$-B/C	no	1	16	16
22	$X(A_{12}0_{BC})$-B/C	no	Test	12	16/16
23	$(A_{34}0_{BC})$-B/C	no	.5	8	8
24	$X(A_{34}0_{BC})$-B/C	no	Test	16	16/16
	Total				277

Note: The first two columns describe the number and kind of discrimination by stage. In each one, an alphanumeric code emerges for the stimuli; moreover, it includes a hyphen and a parenthesis or a slash could also be included. The hyphen indicates that the stimuli that work as comparisons are located on the right. The parenthesis indicates that there are compound stimuli and the slash means that this discrimination involves comparisons of the codes presented. The third column refers to the applied reinforcement, the word test means that deliberate consequences were not applied; on the other hand, 1 and 5 specify that there were consequences for each of the answers on the first study but just for half of them on the second study. The criterion column indicates the number of essays needed for the changing of stage. Finally, the number of essays appears by stage on the trials column; particularly, there is a fraction between correct trials and the total number of trials for the tests.

Discussion

The procedure used was effective for teaching a contextual control task for conditional discriminations. Specifically, the discriminations used in this research included compound stimuli. First, the girl learned to choose the written form or quantity of the numbers one and two before the words "equal" or "different". Then, her performance was evaluated for two new numbers: three and four. The girl performed correctly in behavioural interactions not taught explicitly; a phenomenon referred to in specialised literature as transfer of contextual functions (Alós & Lora, 2007; Pérez-González, 1994; Pérez-González & Martínez, 2007; Pérez-González & Serna, 2003; Serna & Pérez-González, 2003).

Alós and Lora (2007) used this procedure to teach numbers to a child with intellectual disability. The child had to choose one of two numbers "1" or "2" in response to the instructions: "equal to one", "different to one", equal to two", "different to two". Once these relationships had been learned, the child's performance was evaluated for the words "equal" or "different" and the new numbers: three and four. In this context, the selection of one of the two numbers depended on the presentation of two stimuli: contextual and conditional. However, it should be specified that in contextual control procedures there is only one possible relation between a conditional and discriminative stimuli (A_1-B_1, A_2-B_2) and four elements' combinations for contextual, conditional and discriminative stimuli. For this reason, Alós and Lora could not determine a possible transfer of contextual functions to new discriminative stimuli which could be related to conditional stimuli in their investigation. More precisely and just as an example, in an investigation using numbers, the student's performance should have been analyzed for the amount of numbers used. Investigations involving contextual stimuli and increasing to two the number of discriminative stimuli, which could be related to a conditional stimulus, remained pending. This procedure would include contextual and compound stimuli.

Compound stimuli have been described in conditional discriminations (Alonso-Álvarez, 2010; Alonso-Álvarez & Pérez-González, 2006; Pérez-González & Alonso-Álvarez, 2008) and also in simple discriminations (Alós et al., 2011; Guerrero et al., 2015). Essentially, it has been revealed that one answer out of four depends on the combined presentation of two stimuli: A0. The following example clarifies this information. The girl in this investigation had the following possible answers: one-number, two-number, one-quantity, two-quantity. To choose the proper answer, she was told to indicate: "one in number", "one in quantity", "two in number" and "two in quantity". However, the incorporation of the compound stimuli had several differential effects with respect to the programme described by Alós and Lora (2007). Firstly, the number of combinations of stimuli increased to eight compared with the four combinations in the previous study. Secondly, the number of comparisons or discriminative stimuli to choose from increased from two to four. Thirdly, the girl has to consider four stimuli (one contextual, two which create the conditional stimuli and one discriminative) to choose the correct answer while she had to consider just three stimuli in the previous investigation. Fourthly, the girl learnt to use the words "equal" or "different" for two properties (written form and quantity) of four numbers. Fifthly, this procedure contributed positively to the generalisation and transfer of learning involving two properties of the numbers.

Various aspects of this research may be highlighted. Firstly, from an applied standpoint, it describes a procedure for teaching a complex task. Secondly, from an experimental standpoint, it presents an initial study of the contextual control of conditional discriminations incorporating compound stimuli. Thirdly, it describes a systematic and detailed procedure that may also be used to teach these repertoires to

persons with learning difficulties, e.g. autism or intellectual disability. Future research must focus on describing and developing new learning programmes that include contextual stimuli and/or conditional compound stimuli. Two lines of work could be developed. The first being to use a pair of stimuli in relation as a second-order component in the discrimination and to expand the procedures for the acquirement of these discriminations (see Ribes et al. 2005). Second, procedures including answers different to those selected here must be developed. The inclusion of active answers (actions or verbal answers) for conditional discrimination procedures would allow researchers to study certain phenomena relating to instructional control or verbal behaviour.

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