Time delay in the acquisition of verbal correspondence in adults: An exploratory study

Atraso de tempo na aquisição de correspondência verbal em adultos: um estudo exploratório

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Abstract

Say-Do correspondence is typically defined as individuals' doing what they said they would do and accurately reporting what they did. The present study evaluated the effects of the delay between responses of verbal correspondence (Say, Do, Report) and the relation among responses (Say-Do, Do-Report, Say-Report, and Say-Do-Report) in a correspondence procedure. Eight adults were assigned to one of two groups that were differentiated by the delay among responses: Non-Delayed group (i.e., 0 hours among responses), Delayed group (i.e., 24 hours among responses). The correspondence task consisted of three phases: (1) Say (answering questions), (2) Do (performing different actions in relation to Say), and (3) Report (answering questions about Do). The Delayed group presented lower percentages of correspondence, but no statistically significant differences were found between groups. We discuss the increase in value of the delay variable and relevance of this delay to matching in clinical contexts.

Keywords: Verbal correspondence; Say-Do; Do-Report; temporal delay; adults.

Resumo

A correspondência Dizer-Fazer é normalmente definida como um indivíduo que faz o que disse que faria e relata com precisão o que fez. Este estudo avalia os efeitos do atraso entre as respostas de correspondência verbal (dizer, fazer, relatar). Foram avaliados os efeitos do atraso temporal entre as respostas de correspondência (Dizer, Fazer e Relatar) em um procedimento de correspondência típico. Oito adultos foram atribuídos a um de dois grupos que foram diferenciados por atraso: Grupo não atrasado (i.e., 0 horas entre as respostas), Grupo atrasado (i.e., 24 horas entre as respostas). A tarefa consistia em três condições: 1) Dizer (respondendo a perguntas), 2) Fazer (realizando ações diferentes em relação a Dizer), 3) Relatar (respondendo a perguntas sobre o Fazer). Diferenças foram encontradas entre os dois grupos, sendo que o Grupo Atrasado apresentou menores percentuais de correspondência. No entanto, nenhuma diferença significativa foi encontrada entre os grupos. A discussão é realizada em termos do aumento no valor da variável de atraso e da relevância do atraso no emparelhamento em contextos clínicos.

Palavras-Chaves: correspondência verbal; dizer-fazer; fazer-relatar; atraso temporal; adultos.

The phenomenon of verbal correspondence has been studied as coherence or coincidence between what subjects say they will do and what they subsequently do (Luciano et al., 1992). However, verbal correspondence is also the relation between (a) what a person says at one moment and later does or does not do (Say-Do), (b) what a person does and later reports (Do-Report), or (c) what a person says, does, and later reports (Say-Do-Report; Coelho et al., 2008).

The relationship between verbal and non-verbal behavior has been widely studied within the field of behavior analysis, but no procedure has yet been developed to answer how both behaviors are related (Beckert, 2005; Perez, 2017). Verbal correspondence can be generically defined as a label that describes the specific relationship between two kinds of responses that occur at different times (Lattal & Doepke, 2001), implying a verbal response in a context called Say or Report and a non-verbal response in a context called Do (de Faria Brino & de Rose, 2006; Rodríguez, 2000).

Since the first mention of the phenomenon of correspondence by Risley and Hart (1968), several studies have sought to determine the regularity of data that have been generated, but the diversity of explanations that have been offered for the phenomenon and different notions of verbal correspondence that have derived from these explanations are far from being resolved (Perez, 2017). This absence of resolution may be attributable to both (a) the multiplicity of theoretical conceptions (e.g., correspondence as following instructions, behavior governed by rules, self-instruction, and functional dominance) and (b) the variety of hypotheses and empirical procedures that have derived from these perspectives (e.g., da Silva & Lattal, 2010; de Freitas Ribeiro, 1989; Huffman et al., 2016; Lima & Abreu-Rodrigues, 2010).

Regardless of the theoretical dimension that is chosen to procedurally study verbal correspondence, shared aspects are regularly used in the area, namely (a) the use of two different contexts (Say and Do) to train the verbal correspondence response (e.g., Herruzo & Luciano, 1994, Rodríguez, 2002), (b) temporal proximity among the three responses (i.e., temporal delay between responses), and (c) vocal morphology of the requested behavior in Say and Report responses (e.g., Herruzo & Luciano, 1994; de Freitas Ribeiro, 1989).

The typical Say-Do-Report correspondence procedure usually consists of three responses. The Say response is vocalization about an action to be performed with regard to an objective. The Do response is usually a nonverbal behavior that is related to a set of different objectives, and the participant must interact with one of them. The Report response is vocalization about the Do response. The use of two physically differentiated contexts between the Say and Do responses has been maintained in most studies, with the exception of some experiments that were conducted using the matching-to-sample task, in which Say, Do, and Report responses are differentiated by stimuli that are presented on a computer screen for each response and not by spatial differences between responses (Rodríguez, 2002).

Israel (1978) suggested that an advantage of using correspondence training is the possibility of influencing behavioral changes remotely, without the experimenter's presence. This change can be understood in terms of context (i.e., the change is made in the Say context so that it occurs in the Do context) and temporal distance (i.e., a change occurs within a period of time). Thus, the temporal distance between correspondence responses would be relevant because of the implication that there is always a time difference between verbal correspondence. The value of this delay can be crucial for the establishment of correspondence.

One example is the relationship of verbal correspondence in therapeutic or daily situations where there is usually no immediate space-time contiguity among Say, Do, and Report responses. In the therapeutic setting, patients may say that they will do something in one session, with a time delay until the next session (e.g., 3 or 7 days). During this time delay, patients have the opportunity to do or not do what they said they would do. In the next therapeutic session, the patients report the actions that they did. Consequently, the Say-Do-Report correspondence episode has a time delay between each response, so there is no immediate space-time continuity. This promotes an increase in the probability of non-correspondence.

Medeiros and Medeiros (2018) suggested that the temporal relationship is a relevant variable in verbal correspondence in the therapeutic context because behavior that is being reported is followed or not followed by the behavior of reporting. Therefore, there are necessarily two separate responses in time: the behavior and the reported behavior that appears later.

The time distance or delay among responses of correspondence has usually maintained values close to zero (i.e., no delay between responses of correspondence), depending on the spatial distance between responses (Lloyd, 2002). Although some studies have explored the effect of delay on the correspondence relationship, manipulations of this variable have been related to the delay of reinforcement after the establishment of correspondence (e.g., Baer et al., 1983; Guevremont et al., 1986), although the delay could also be something inherent to the experimental task.

Despite the aforementioned relevance of the temporary delay between responses to the establishment of correspondence, few studies have investigated the effects of this variable in humans. Some studies (e.g., Guevremont et al., 1986; Weninger & Baer, 1990) have explored the effect of the delay in establishing correspondence, although the results have not allowed definitive conclusions about whether it affects correspondence because the delay variable was not studied as an

independent variable and instead studied tangentially to the main objective of the study.

In studies with nonhuman subjects, attempts have been made to describe experimental procedures that are homologous to Say-Do correspondence (e.g., da Silva & Lattal, 2010; Lattal & Doepke, 2001), in which the delay between responses was explicitly manipulated. Lattal and Doepke (2001) proposed an experiment with pigeons, in which correspondence was assessed as an example of conditional discrimination (Cumming & Berryman, 1965), based on the assumption that both correspondence and conditional discrimination procedures involve a relation between actions at two different times. In the correspondence procedure, during the first condition and following a brief delay, the subject has the opportunity to engage in one of several options. If the choice in the first condition matches the behavior in the second condition, then correspondence is said to have occurred (Lattal & Doepke, 2001).

The study by Lattal and Doepke (2001) consisted of the representation of a typical correspondence task that was adjusted to work with pigeons while maintaining essential characteristics that define this type of task, such as a first moment of choice between several alternatives (i.e., Say response in human studies) and a second choice (i.e., Do response time in human studies) and reinforcement of the response in the case of correspondence between the first and second choices. Lattal and Doepke (2001) used a simple operant response as homologous to the verbal response because, in both cases, the response functions as an indicator of the selection of one stimulus object or activity over other options. The two responses consisted of pigeons' selecting a color by pecking the key in a conditional discrimination procedure. For example, if the pigeon pecked the red key in the first condition and the red key in the second condition, then correspondence was assumed to have occurred. Conversely, if the pigeon pecked the red key in the first condition and the yellow key in the second condition, then no correspondence was assumed to have occurred.

In Experiment 2 of Lattal and Doepke (2001), the effects of a delay between the Say response and Do response were assessed using a conditional discrimination procedure with a delay interval between responses (i.e., 1, 2, 4, 8, 16, and 32 seconds). The results showed that longer delays resulted in less correspondence between moments (i.e., a lower percentage of Say-Do correspondence). These results suggest that the variable of delay between correspondence responses can affect the establishment of correspondence. This is considered relevant at the theoretical level, given that many authors conceive it as something inherent to the description or definition of correspondence itself. Although some studies compared Report responses at two different times (de Oliveira et al., 2016; Mazzoca and Cortez, 2020), the delay of time among Say, Do, and Report responses has not been systematically studied in humans. Studies in nonhuman animals have indicated that this delay can affect correspondence. At the level of ecological validity, the delay could be an interesting variable to consider in clinical contexts, where there is always a delay between Say, Do, and Report, and in studies of correspondence in therapeutic contexts.

The present study evaluated the effects of the delay between responses of correspondence (Say-Do-Report) on the acquisition of Say-Do, Do-Report, and Say-Report correspondence in adult human subjects.

Method

Participants

Eight experimentally naive students (five females, three males; mean age: 21 ± 3 years) from a university in Guadalajara, Mexico, voluntarily participated in the study. The participants were contacted by one of their teachers and received an extra point in their course for participation. Each participant signed an informed consent form before participation in the study.

Equipment

The experimental sessions were conducted in the Laboratory of Social Behavior, Center of Behavior Studies and Research, University of Guadalajara. The room (4.5 m   7 m) was free of distractions and had both natural and artificial light. The following objects and materials were in the room: Table 1 (120 cm   55 cm), with a desktop computer, keyboard, mouse, microphone, and chair. Next to Table 1 was Table 2 (230 cm   175 cm) that had (a) a set of 10 photographs (297 mm   210 mm, (b) a computer with a keyboard and mouse, (c) a photograph of a money box (297 mm   210 mm), (d) a set of fictional banknotes with a total sum of 2500 pesos, (e) three cardboard boxes (10 cm   10 cm each), and (f) a chair (Figure 1). Next to Table 2 was a commercial video camera that was mounted on a tripod. Both computers were programmed with Inquisit Lab 5 software.

Procedure

All participants were exposed to three different phases (i.e., Game, Trial with the Experimenter, and Correspondence) that differed with regard to the delay among Say, Do, and Report responses.

In the Game phase, the aim was to establish a situation that was closer to a natural context through a game

situation where the participants could win a reward (fictional money) that could be used throughout the experiment. A first-order matching-to-sample task (e.g., Cumming & Berryman, 1965) was implemented. Every trial presented on the computer screen a sample stimulus at the top and three comparison stimuli (an identical stimulus, a different stimulus, and a similar stimulus) at the bottom of the arrangement. Blue, red, and yellow squares, triangles, and circles were used as stimuli. The task consisted of matching one of the bottom stimuli (the similar stimulus) to the sample stimulus. A total of 16 trials were conducted. The participants received information about their performance at the end of the phase.

Figure 1
Representation of experimental room
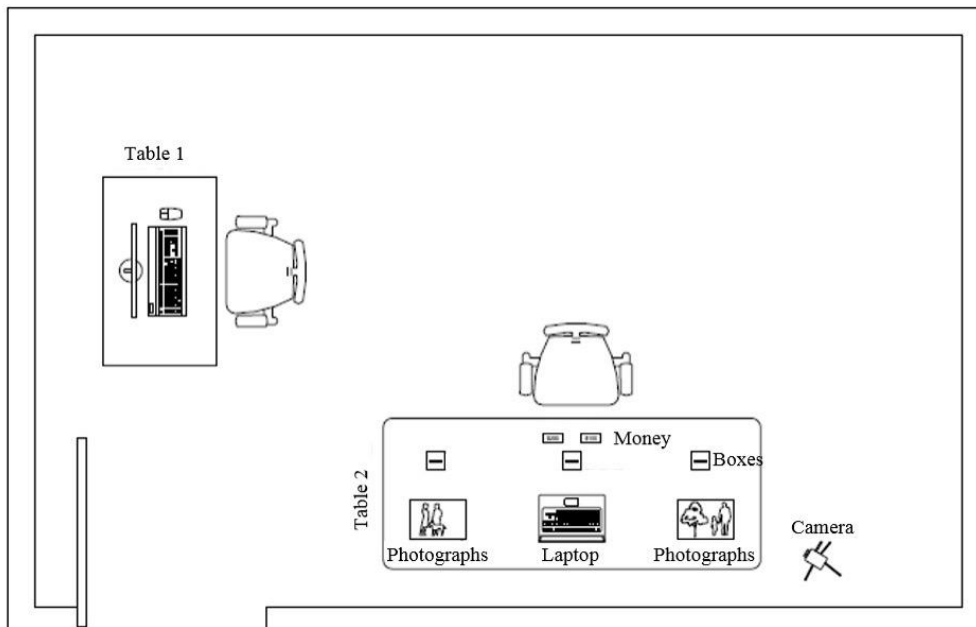
Independent of individual performance, each participant earned (in fictional money) a total of 2,500 Mexican pesos that they would use for the rest of the experiment. At the end of the game, the amount they had won appeared on the screen, which was then delivered by the experimenter as fictional paper bills.

The purpose of the Trial with the Experimenter phase was to familiarize the participant with the experimental sequence and avoid possible misunderstanding of the different parts of the phase. Thus, with the experimenter present, each participant performed a trial that consisted of three consecutive responses—(1) Say, (2) Do, and (3) Report—with or without a delay between them, depending of the experimental group. All of the participants were individually exposed to the Game and Trial with an Experimenter phases, followed by 10 trials in the Correspondence phase.

The participants were randomly assigned to one of two experimental groups ($n = 4$/group) that differed in the delay between responses (i.e., Say, Do, and Report) in the Correspondence phase. In the Non-Delayed group, there was no delay (in hours) between presentation of the three responses (i.e., Say, Do, and Report). The Delayed group had a delay of 24 hours between the presentation of each response, whereby the participants emitted Say responses (10 responses about 10 different hypothetical situations) and emitted Do responses 24 hours later (10 possibilities of making one of four movements about the previous hypothetical situations). After an additional 24 hours, they then emitted Report responses (10 responses regarding the movements that they had made at the Do response).

The Say response consisted of the participants' responding by answering the question that was presented on the computer on Table 1. The question was related to a hypothetical situation that referred to situations in everyday life (i.e., going to the supermarket, leaving a bar, and going to movies). In each situation, the possibility that the participant helped the protagonists of the situations with monetary resources was presented (i.e., using the fictional money that was earned in the Game phase). For example, "*Imagine that you are in class and a classmate asks you to lend money for lunch, but you only have 100 and 200 bills to lend. What would you do? Would you lend him the money? And if you had smaller bills?*"

The Do response consisted of making one of four movements on Table 2: (1) give money like in the situation that was presented in the Say response, represented by a photograph (i.e., the participant had to deposit his or her money inside the box that was positioned in front of the photograph of a hypothetical situation), (2) spend the money on watching a video at that moment of the experiment (i.e., the participant had to deposit his or her money inside the box that was positioned in front of the computer to watch the video), (3) save the money (i.e., the participant had to deposit his or her money inside the box that was positioned in front of the photograph of a money box), and (4) do not make any movement with the money (i.e., the participant kept the money with him or her and changed tables to emit the next response (Report response).

Finally, the Report response consisted of the participants' responding to the question that was presented on the computer on Table 1 regarding the movements they made in the Do response. For example: "*In the previous situation, what did you do? How did you spend the money? Why?*"

To have two different contexts, there were two different tables, one for Say and Report responses (Table 1) and one for Do responses (Table 2). Once the participants emitted a response, they had to change tables to emit the next response (i.e., Say, Do, Report). The Trial with the Experimenter phase ended when one trial was completed (i.e., when the participant gave the three responses: Say, Do, and Report).

At the end of the Trial with the Experimenter phase, the Correspondence phase began with the following instruction (translated from Spanish): "*Read the question that appears on the computer and respond as indicated.*" The aim of this phase was to assess the effects of the delay of Say and Report responses on the acquisition of correspondence. This phase consisted of 10 trials with the same logic as in the previous Trial with the Experimenter phase but without the presence of the experimenter. Each trial in the Correspondence phase had a different hypothetical situation and ended with the Report response. This phase ended when all 10 trials were completed. At the end of the phase, the experimenter thanked the participants and accompanied them to the exit.

Data analysis

The participants' performance was analyzed in terms of possible correspondence between Say, Do, and Report responses. The number of occurrences of Say-Do, Do-Report, and Say-Report correspondence was recorded. Say-Do correspondence was recorded as "Yes correspondence" when the participants said that they will do "X" activity and later did the activity they said they would do. In contrast, "No correspondence" was recorded when the participants did not do the activity that they said they would do. Do-Report correspondence was recorded as "Yes correspondence" when the participant performed "X" activity and later reported that they did "X" activity. "No correspondence" was recorded when they reported something different from what they did. Say-Report correspondence was recorded as "Yes correspondence" when what was described in the Say and Report responses was equal. "No correspondence" was recorded when the Say and Report responses differed. Comparisons between groups were analyzed using the nonparametric Mann-Whitney U test.

Results

Figure 2 shows the number of occurrences of Say-Do (S-D), Do-Report (D-R), Say- Report (S-R), and Say-Do-Report (S-D-R) "Yes correspondence" (upper panel of each graph) and "No correspondence" (lower panel of each graph) that was presented by the participants in the Non-Delayed and Delayed groups.

In the Non-Delayed group, three participants (P1, P2, and P3) did not present two types of correspondence in one trial, whereas P4 presented all four types of correspondence (i.e., S-D, D-R, S-R, and S-D-R) in all trials. All participants in the Delayed group presented at least two types of non-correspondence. P6 presented the most non-correspondence (10 non-correspondence responses in 40 trials total). P5 presented the most correspondence in the Delayed group but also presented three non-correspondence responses. Comparisons among groups showed that participants in the Delayed group had a greater number of non-correspondence (31 non-correspondence responses *vs.* 11 non-correspondence responses in the Non-Delayed group).

For S-D-R correspondence, the Delayed group had the highest number of non-correspondence responses (11). The Non-Delayed group had five non-correspondence responses for the S-D-R relation.
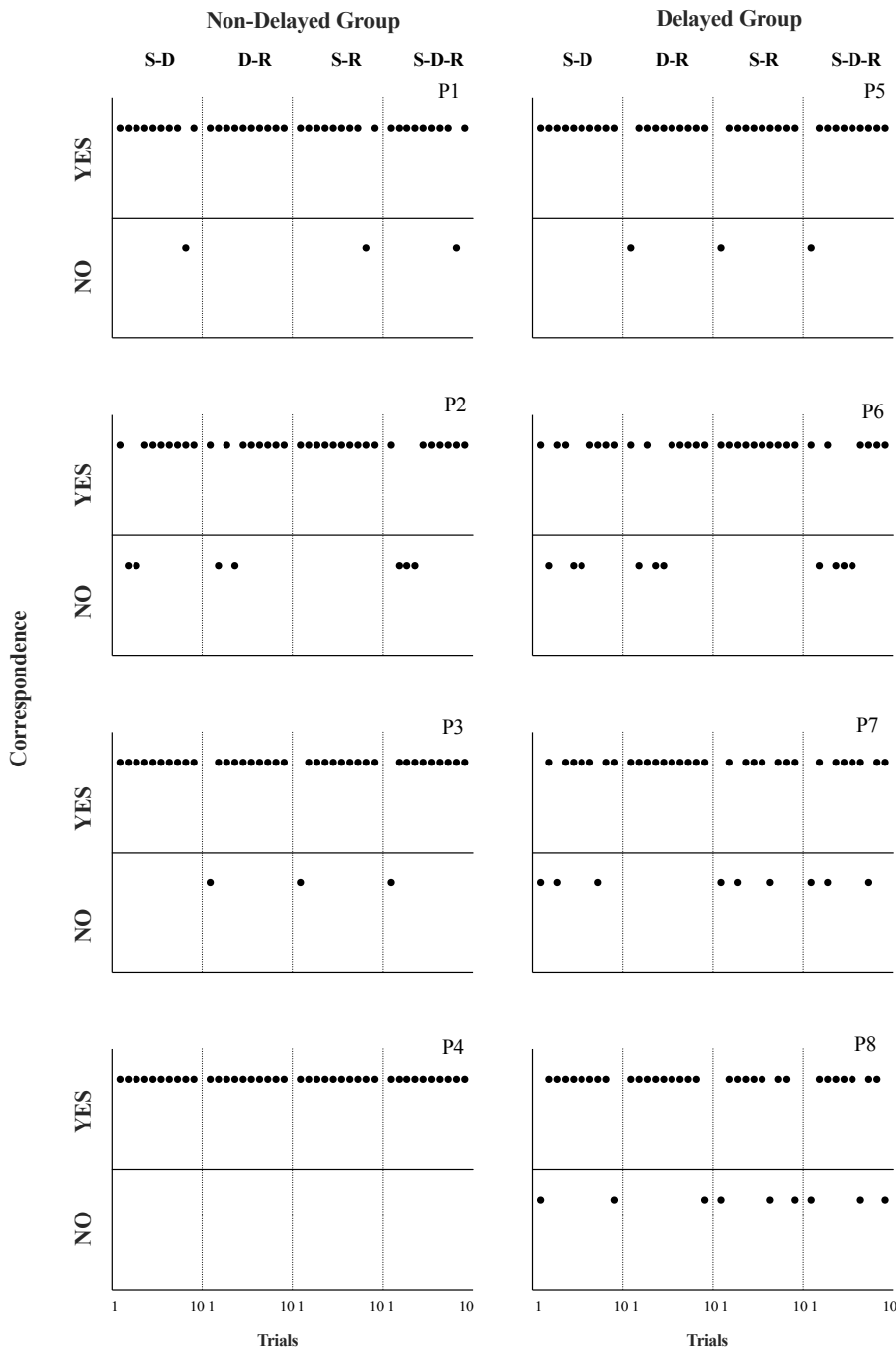
For the percentage of correspondence, the Non-Delayed group had the highest percentage of "Yes correspondence" for the four possible correspondence relations, with a lower percentage of "Yes correspondence" for S-D-R correspondence. In the Delayed group, the percentage of correspondence was lower than in the Non-Delayed group (80.6% *vs.* 91.8%), even for S-D-R correspondence, with 72.5% of "Yes correspondence" (Table 1).

Nonparametric statistical analysis was performed using the *Mann-Whitney U test*. The number of correspondence responses was compared between groups. No significant differences in the various types of correspondence were found between groups ($z = -1$, $p > 0.05$).

Discussion

The present study evaluated the effect of the delay between types of correspondence (Say-Do-Report) on the acquisition of Say-Do, Do-Report, Say-Report, and Say-Do-Report correspondence in human adults. The delays that were used were 0 and 24 hours between Say, Do, and Report responses in a correspondence task with two differentiated contexts (e.g., Say or Report context and Do context).

Figure 2

Number of correspondences for each participant

Note. S-D = Say-Do; D-R = Do-Report; S-R = Say-Report; S-D-R = Say-Do-Report.

The results suggest that the delay does not affect the establishment of correspondence because no significant differences were found between groups. However, a lower percentage of correspondence was found among participants in the Delayed group. This was also observed in the general group results. All participants in the Delayed group generally had worse correspondence (i.e., less "Yes correspondence" in all relations), but the difference between the Delayed and Non-Delayed groups was not large. Therefore, this variable, at least at the values and with the procedure used herein, does not appreciably influence the establishment of correspondence.

Previous studies used the typical Say-Do correspondence procedure to analyze Say-Do and Do-Report relations (e.g., Hernández et al., 2010; de Faria Brino & de Rose, 2006; Cortez et al., 2017), whereas others focused on training only one of these relations. The present study investigated different types of correspondence (S-D, D-R, and S-R) independently and the overall S-D-R relation. The latter type of relationship allowed us to analyze different types of relationships among the three types of correspondence responses as a unitary phenomenon.

Table 1
Percentage of YES correspondence in each correspondence relation

S-D-R correspondence is relevant to the clinical context but has scarcely been studied in experimental contexts. In the therapeutic context, the client says he will do "X" action, and later he either will or will not perform the previously verbalized behavior. After some days elapse, while again in front of the therapist, the client will then report his behavior (Ávila-Herrero, 2020; Froxán-Parga et al., 2019).

In the present study, the S-D-R relation was the most affected by the delay among correspondence responses, which also increased non-correspondence responses. This is consistent with therapeutic settings. Non-correspondence in a client's S-D-R behavior would be expected to be low at the start of therapy and improve toward the end of therapy (Froxán-Parga et al., 2019). In therapeutic sessions, the therapist works to modify the client's verbalizations (i.e., Say), which then exert control over the S-D relationship.

The S-D relationship was the next most affected relation in the present study. The Delayed group obtained the worst "Yes correspondence" results for this relationship. One hypothesis is related to the novelty of the task for participants. The participants were introduced to the S-D correspondence relationship for the first time, and then they learned that there was a relationship between what they do in the experimental task at a particular time and what they are going to do 24 hours later. The S-D and S-R relationships were mostly affected because Say was the first response, and the task was not learned until the Do response appeared.

For example, in the therapeutic setting, the client says that he is going to start leading a healthy lifestyle, and that is why he is going to start going to the gym. The Say-Do relationship is different if the client never faced the Do before (e.g., did not know how much the gym costs, how difficult it is to go to the gym after work because of traffic, or the response cost of going to exercise at the gym). The client who says that he is going to go to the gym faces a different Say-Do relationship than the client who has tried going to the gym previously and knows this relationship.

This also happens with the Do-Report relationship. For example, a person does the work he said he was going to do (S-D) because he knows his boss will later ask him for the report (D-R). This is different from a person who does not have knowledge that his Do will later be related to giving a report.

The differences we observed between groups, although not robust, are consistent with da Silva and Lattal (2010) and Lattal and Doepke (2001), who found that the loss of correspondence was greater as the temporal distance between Say and Do increased. Although these studies were performed with nonhuman animals, they can be viewed as a precedent in the area of Say-Do correspondence with regard to manipulating the delay between responses. The present study sought to provide information about the effects of manipulating the delay variable in human participants, mainly in the experimental context, that can be useful in applied contexts, such as the clinical-therapeutic setting (Ávila-Herrero, 2020; Froxán-Parga et al., 2019; Luciano et al., 1992).

One interesting question is why, in animal studies and therapeutical contexts, the delay produces greater decreases in correspondence than those observed in the present study. One reason may be related to the delay values. In Lattal and Doepke (2001), the delay values increased between responses. However, in the present study, only a single correspondence delay value (24 h) was implemented in the groups. Higher delay values may result in different outcomes (e.g., using delays between Say and Report that are ecologically closer to the therapeutic setting, such as 7 days).

All of the participants had high percentages of correspondence since the beginning of the experiment (i.e., a ceiling effect). Such results are usually found in studies with adults in correspondence tasks. Some authors mentioned that correspondence should be fully developed in adulthood because behavioral sincerity (D-R) is socially reinforced as we grow older (Delgado, 2013). However, in adult therapy, the behavior of non-correspondence continues to be found. It would be interesting to continue varying delay values to see if the ceiling effect is no longer observed.

The small number of participants in each group can be considered a limitation of the present training study that limited the robustness of the effects. The present experimental design should be replicated in future studies with larger sample sizes to reveal possible group affects.

Correspondence should continue to be studied using ecological procedures to allow a better understanding of the phenomenon beyond the laboratory setting. Controlled studies of relevant variables that may influence S-D correspondence should be conducted in natural contexts to benefit both the clinical and experimental contexts.

The present results generally suggest that the time that elapses between S-D-R responses is a variable that minimally affects the acquisition of correspondence but does not substantially interfere with it in situations where different moments are presented contiguously (i.e., without a delay).

Declaration of Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Contribution of each author

All the authors are equally responsible for the article contents.

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