Psicothema

Cognitive Defusion as a Verbal Exercise: An Experimental Approach

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Abstract

Background: As one of the founding principles of Acceptance and Commitment Therapy (ACT), cognitive defusion is a contextual control of language, but it is not clear which behavioural process would allow such defusion. Two experiments are presented which analyse that process using a word repetition exercise. **Method:** Experiment 1 was performed with 30 randomised participants, using a factorial between-groups (4×2) with repeated measures design: Group 1 = milk-milk-milk exercise; 2 = emotional word repetition; 3 = milk-to-emotional word shaping; and 4 = control without intervention. Questionnaires were applied on thoughts, emotional regulation, and experiential avoidance, in addition to the evaluation of 20 images suggesting emotions. In Experiment 2, 78 participants were randomised using the same 4×2 design, and also 60 images with a proven emotional reactivity were used. **Results:** Experiment 1 did not show changes in any of the variables, nor a decrease in emotional assessment, which should occur according to the theory behind ACT. In Experiment 2, no significant changes between the groups and no pre-post changes appeared, except in latency time. **Conclusions:** The lack of replication of the defusion process is discussed, along with the mixed results of other studies.

Keywords: Cognitive defusion, milk-milk-milk exercise, behavioural process, ACT.

Resumen

Defusión Cognitiva como Ejercicio Verbal: un Enfoque Experimental. **Antecedentes:** desde la Terapia de Aceptación y Compromiso (ACT), la defusión cognitiva es un proceso de control contextual del lenguaje, aunque no está claro cuál sería el proceso conductual de esa defusión. Se presentan dos experimentos analizando ese proceso mediante un ejercicio de repetición de palabras. **Método:** el primer experimento se realizó con 30 participantes aleatorizados, con un diseño factorial entre-grupos con medidas repetidas (4×2): Grupo 1 = ejercicio leche-leche; 2 = repetición de palabra emocional; 3 = moldeamiento leche-palabra emocional; y 4 = control. Se han utilizado cuestionarios sobre pensamientos, regulación emocional y evitación experiencial, junto con la valoración de 20 imágenes que sugerían emociones. En el segundo experimento se aleatorizaron 78 participantes con el mismo diseño 4×2, y se utilizaron 60 imágenes con una reactividad emocional ya comprobada. **Resultados:** en el primer experimento no hubo cambios en ninguna de las variables, ni la disminución de la valoración emocional que debería producirse según la teoría de ACT. Tampoco en el segundo experimento aparecieron cambios significativos entre los grupos, ni pre-post, excepto en el tiempo de latencia. **Conclusiones:** se discute la falta de replicación del proceso de defusión que defiende ACT, siguiendo también los resultados dispares de otros estudios.

Palabras clave: defusión cognitiva, ejercicio leche-leche, proceso conductual, ACT.

Acceptance and Commitment Therapy (ACT) (Hayes & Strosahl, 2004) has been an innovation in the field of psychotherapy, with relational learning, rule-following, and functional analysis of *experiential avoidance*. ACT has also incorporated "medium-level" terms such as *cognitive fusion* (Assaz et al., 2018; Hayes et al., 2012), according to which the individual responds as equally to words as they would to the objects, people, or events that the words represent. ACT proposes *cognitive defusion* as a therapeutic process to change the context of language, thus separating the emotional functions from the referents of that language. The idea is that the individual would respond to the words themselves, rather than to the objects that the words represent. Instead of changing the content of verbalisations (thoughts) as cognitive behavioural therapy does, it is about changing the function of verbalisations.

Several strategies have been developed through ACT to achieve this *cognitive defusion* (Blackledge, 2015). The best known strategy is the repetition of the word "milk-milk-milk", where it is proposed to the individual that they repeat this word several times until the connections with other concepts, memories, flavours, smells, etc. are diminished. Later, the exercise would be repeated with other emotional words that the individual has an aversion to (for example, "coward", "useless", "anxious", etc.). This exercise is inspired by the classic exercises involving the repetition of words in the work of Titchener (1916), which was later revised and updated (Tian & Huber, 2010). Several studies have reported on the positive effects of Titchener's Repetition on various clinical samples (Campbell-Sills et al., 2006; Liverant et al., 2008, Masuda et al., 2004; McMullen et al., 2008). However, it is not clear what the behavioural mechanism would be that would make this verbal exercise have the effect of lowering emotional evaluations.

The explanation and hypothesis from ACT is that it would involve relational learning or a "symbolic" learning experience, by which we relate multiple words and concepts (or thoughts). Thus, by changing the function of a word (for example, repeating "milk-milk-milk"), the probabilities and functions of all the other responses that are associated with them would be changed, including the aversive or emotional value of those words (Assaz et al., 2018; Hayes et al., 2002; Healy et al., 2008; Keogh, 2008).

Secondly, the most classic explanatory hypothesis, based on the original exercise, would be that would occur by extinction, and that the therapeutic effect that is obtained would be a decrease in the associations that are conditioned with respect to words (Assaz et al., 2018; Tryon, 2005).

A third possible hypothesis would involve the influence of the therapist in the clinical context of the treatment. Various authors defend the fact that shaping would be the process of change during psychotherapy (Follette et al., 1996; Salzinger, 2011), and even more so when these types of verbal exercises are continuously repeated throughout the ACT therapy (Assaz et al., 2018).

In the literature, there are numerous experiments on the repetition of words and their effects, but the results are disparate. Masuda et al., (2004) was the first to show the usefulness of word repetition in reducing the functions of self-reported negative thoughts, and they stated that it reduced the anxiety and credibility of negative self-referential thoughts (although not significantly). In a following study, Masuda et al. (2009) showed a slight effect at higher repetition, and they provided a guide to the participants plus reasons for its success. Both studies had quite a few methodological limitations. However, later studies with larger samples did find significant differences with self-applied words (Masuda et al., 2010a; Masuda et al., 2010b; Mandavia et al., 2015), whereby this exercise decreased the discomfort and increased the credibility regarding this phrase versus distraction or the control group. In the study by Watson (2007), regarding obsessive thoughts related to pollution, this exercise reduced discomfort more than for the imaginary exposure group and the control. De Young et al., (2010) have also shown this effect, with negative emotional words, but they provided reasons for the success of the technique, and also better results were obtained.

Other studies on the defusion process have used different verbal protocols, which involve longer dialogues, instructions, or experiential exercises, for example, regarding the reduction of avoidance (Luciano et al., 2014), a decrease in discomfort concerning self-applied phrases (Healy et al., 2008) and viewing video scenes (Pilecki & McKay, 2012), or a decrease in self-negative thoughts (Marasigan, 2019). Other researchers have shown pre-post effects, but not when they were comparing with control groups, or comparing with cognitive-behavioural techniques (Barrera et al., 2016; Fernández & Calero, 2015; Jenkins & Tapper, 2013; Keogh, 2008).

Therefore, taking into account the variety of studies and disparate results on defusion, the fundamental objective of the present study was to *find the possible behavioural explanation of cognitive defusion*, using an experimental analogue where the effects of the exercise involving the repetition of words were tested. In this regard, we consider that the use of images with different types of emotional values would be more parsimonious in an experimental analysis, since images also provoke emotions due to previous associations (Broome et al., 2012; Mathews et al., 2013).

Thus, based on these previous explanatory hypotheses, the first experiment was designed, where the individual could assess visual

stimuli and their emotional impact, and observe their changes after performing the verbal exercises. To overcome the methodological problems of those other studies, a between-group design was used, including a control group and pre-post measures that controlled for any extraneous variables. Computer also gave specific instructions to each group, to eliminate the effect of subjectivity of the researcher, and diverse measures that were also taken of possible emotional changes.

The second experiment was aimed at giving greater experimental certainty concerning the results. The experiment consisted of a replication whereby the same design was used between groups, but there was an increase in the number of randomised participants, using images with a proven emotional value, and adding latency time as another measurement parameter of the possible emotional effect.

Experiment 1

This first experiment was aimed at replicating the effect of cognitive defusion through the typical ACT "milk-milk-milk" repetition exercise, and then analysing its possible mechanism of action. Three experimental groups and one control group have been used, with the following hypotheses:

1) If the defusion mechanism were a learning of verbal relationships, then the verbal exercise "milk-milk-milk" would decrease the emotional evaluations of the participants in Group 1.
2) If the defusion mechanism were only about extinction, then the emotional values would decrease more in Group 2 with the repetition of solely the emotional word.
3) If the defusion mechanism is a process of shaping by the therapist, it is assumed that the emotional values would decrease more in Group 3, where the therapist instructs the participants to repeat "milk-milk-milk" in relation to the participant's own emotional word.

Method for Experiment 1

Participants

The sample consisted of 33 participants who had no prior knowledge of ACT, and no prior knowledge of the verbal exercises in the experiment. The final sample consisted of 30 participants (aged between 22 and 59 years; mean age = 27 years), as there were problems in registering three participants. Of the 30 participants, 24 were women and 6 were men, with proportions similarly distributed among the four groups, while 63% were students, 20% were workers, and 17% were unemployed.

A combined between-groups (4×2) with repeated measures factorial design was used. The experiment was carried out with 30 participants, who were completely randomised between the 4 conditions, (with 8, 7, 7, and 8 participants, respectively), and the pre-post measurement of 5 dependent variables (questionnaires and computer measurements of the participants' evaluations).

Instruments

To assess the possible influence of exercises on frequent thoughts, self-concept, or cognitive strategies related to aversive events, several instruments were used:

Automatic Thoughts Questionnaire Revised (ATQ-R; Kendall & Hollon, 1989). The ATQ-R evaluates the frequency of automatic thoughts (negative, positive, dissatisfaction, self-concept, coping) that are associated with a depressed mood. In the Spanish validation, Cronbach's *alpha* reliability coefficients were between .79 and .90, and up to .94 for the full scale.

Emotional Regulation Questionnaire (ERQ; Gross & John, 2003; adapted by Rodríguez-Carvajal et al., 2006). The ERQ is designed to assess individual differences in emotional regulation strategies, such as "cognitive reevaluation" and "expressive repression". The original studies show an *alpha* value between .68 and .82, and .63 for the Spanish adaptation.

Acceptance and Action Questionnaire (AAQ; Hayes et al., 2000; Spanish adaptation by Barraca, 2004). The original authors of the AAQ created this questionnaire to assess experiential avoidance and psychological acceptance within ACT. It has an internal consistency of .70, and the Spanish adaptation has an *alpha* of .74, and a test-retest reliability of .71.

Visual stimuli were extracted from the *Thematic Apperception Test* (TAT) of Murray (1958). The TAT presents black and white images to the participant, that are suggestive of some emotional states, in order that that they can interpret them and describe what his/her emotions or thoughts associated with those images would be. In this case, the TAT was used as a diffuse stimulation that could provoke different emotions in each participant.

Likewise, two computer programmes were developed for the automatic evaluation of these images (*Tact.exe* and *Emotions.exe*) (Valero-Aguayo, 2010), and they were applied by using a laptop computer. In the first (*Tact.exe* - for naming emotions), 20 images appeared and the participant had to choose between 6 emotions on a *Likert scale* from 0 to 5: none, melancholy, sadness, anguish, dejection, despairs. In the second, these same 20 images were presented and the participant had to assess the degree of intensity of the emotion produced when viewing them, on a *Likert scale* from 0 (no emotion) to 10 (maximum intensity or discomfort).

Procedure

The same researcher performed this experiment in all sessions and for all participants. The participant and the researcher were the only individuals in the room, and some sessions were recorded for testing. Previously, the participant had been informed of the task and had also been asked for his/her written informed consent to apply the questionnaires, collect data, and make recordings. The intervention in each of the four groups was as follows:

Group 1 - The "milk-milk-milk" exercise. The exercise involving the repetition of the word "milk-milk-milk" was carried out for each participant, in accordance with the explanation of Masuda et al. (2004, 2010a).

Group 2 - Extinction. In this condition, an exercise was performed based on the same ACT defusion technique, but exclusively with the "emotion word" that was chosen by each participant (for example, "sadness" or "pain").

Group 3 - Shaping of "milk-word". The experimenter first carried out the repetition exercise of the word "milk-milk-milk", and then carried out the repetition exercise for the own emotional word for each participant. Here, it was intended to place both words in the same context, explicitly establishing a verbally stimulating

relationship between them (for example, "milk and sadness are just words", "they are just sounds").

Group 4 - Control. No intervention was received, only the passage of time of one week between the pre- and post evaluations. This is the control condition of possible learning effects, repetition of the test, attention of the experimenter, or other effects that could affect the evaluations of the participants.

In the first session, the participants completed the questionnaires (AAQ, ERQ, and ATQ), and then the evaluation with the images on the computer with both of the aforementioned programmes. Subsequently, the corresponding verbal exercise was applied according to the experimental condition. A maximum of 3 sets of repetitions of 30 seconds duration for each were performed, and in the shaping group the participants continued until they obtained the verbal rule of the relationship between the word and the emotion.

In the second session, the following week, the experimental exercises were performed again in each group as a reminder. The participants subsequently completed the evaluation of the TAT images again, as descriptions and as emotional evaluations. Finally, the participants completed all of the questionnaires again.

Data analysis

An ANOVA with repeated measures has been performed and, in those cases where significant differences could appear, a *post hoc* analysis was performed using the Scheffe and DMS tests. Previously, the homogeneity of variances and homoscedasticity tests were performed, which allowed the application of these standardised tests in all cases.

Results for Experiment 1

Regarding the AAQ, ERQ, and ATQ questionnaires, no significant differences appeared between the groups, either in the pre-post case, or in any of the cases. Table 1 shows the data that were obtained in the four groups, and in each of the measures, both from the questionnaires and from the image evaluations.

In this first experiment, we found that the expected differences do not appear, since in the AAQ questionnaire the scores should have decreased due to more distancing and less "experiential avoidance". Something similar ought to have happened with the ERQ questionnaire, which should have lowered the scores for "emotional suppression". Therefore, the significant differences of the initial hypotheses on defusion have not been found, and all of the groups are similar.

In relation to the evaluations that were carried out by computer, the same type of statistical analysis has also been carried out. Table 1 and Figure 1 show the mean scores of each group before and after performing the exercises. It can be seen visually that there are hardly any differences between them, and there are no statistical differences.

Contrary to the concept of defusion and what the theory in ACT says of it, the emotional assessments of these images by the participants have not changed. At least in Group 1, Group 2, or Group 3, subjective evaluations of the degree of discomfort or anxiety should have decreased. Following the theory it should have been more evident in Group 1 than in the other groups. However, the data show no significant pre-post changes, and no differences with respect to the control group. If there were to be any response

	Group 1 "milk-milk" N = 8		Group 2 "emotion" N = 7		Group 3 Shaping N = 7		Group 4 Control N = 8		Group Effect		Pre-Post Effect	
	M	SD	M	SD	M	SD	M	SD	F	p	F	p
AAQ Pre	40.11	7.75	39.71	9.08	37.00	9.45	35.67	7.89				
AAQ Post	37.67	6.04	38.71	5.21	37.63	7.92	36.89	6.47	.458	.714	.099	.750
ERQ Pre	31.33	8.86	34.43	2.4	33.00	4.78	32.89	5.20				
ERQ Post	34.00	8.29	35.43	9.53	34.75	5.92	34.44	5.98	.012	.950	2.948	.097
ATQ + Pre	110.67	17.25	102.50	37.90	110.33	10.21	111.60	10.90				
ATQ + Post	108.17	15.01	109.00	30.69	121.67	57.14	104.20	17.83	.085	.732	.100	.757
ATQ - Pre	59.50	20.77	47.75	9.14	47.67	24.94	45.60	8.26				
ATQ - Post	57.33	23.82	59.25	17.25	54.67	41.88	45.80	24.33	.159	.473	.092	.253
Images Description												
Pre	2.32	.30	2.42	.48	2.73	.32	2.30	.47				
Post	2.58	.59	2.18	.61	2.70	.28	2.17	.61	1.298	.296	.148	.703
Images Emotion												
Pre	4.51	1.43	5.03	1.36	5.82	.56	5.45	1.08				
Post	5.05	1.82	4.49	1.51	5.30	.76	5.34	1.16	1.041	.391	.432	.517

Table 1
Scores from the 4 groups, in the pre-post assessment of Experiment 1
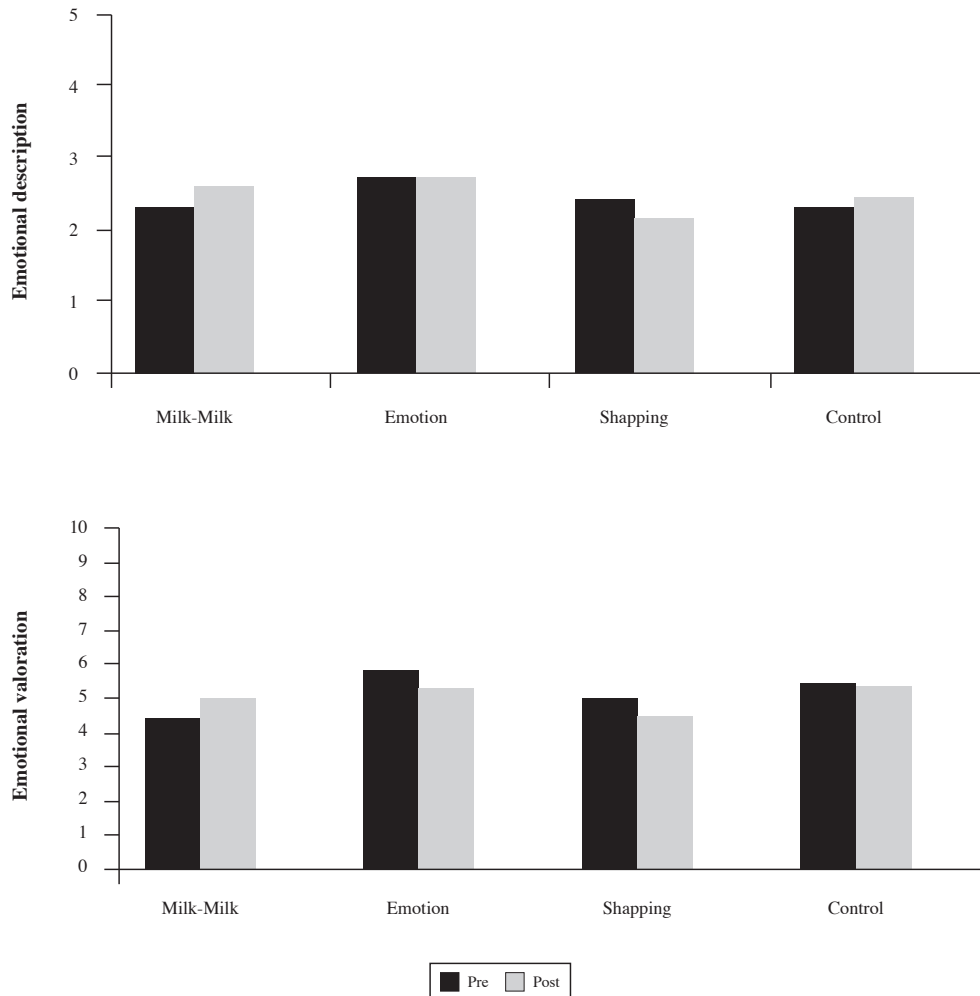

Figure 1. Scores in the description and emotional valoration for each group in Experiment 1

trends, it would be a certain decrease in Group 2 (repetition of emotion) and Group 3 (shaping), but there were no statistically significant differences.

Conclusions for Experiment 1

In summary, the variables that we have manipulated in this first experiment on the defusion process did not in any way affect the measurements that were obtained, and this was true of the four groups. We can affirm that the differences that were hypothesised for defusion according to ACT and according to the experiments of Masuda et al. (2004, 2009) have not appeared.

Due to these negative results, it could be argued that although there is randomisation and the data are homogeneous, the number of participants in each group was small. But, studies by other authors have used an even smaller number of participants (and some used only 4), with unique assessments of one or two questions, and measurements that were performed only once; and certainly not with the variety of parameters that have been applied in the present study. On the other hand, it could also be argued that TAT images are emotionally low, although general and non-self-applied words have been used in other studies. Therefore, a second experiment was proposed to overcome these difficulties.

Experiment 2

This new study was proposed, with the aim of clarifying experimentally the behavioural mechanisms of defusion, and accentuating the experimental rigour in order to obtain greater security regarding the results that were obtained. In this way, the number of participants was increased, the emotional intensity of the images was also increased, and the positive, negative, or neutral valences of those images were compared which, theoretically, should reflect the differential changes by the participants after performing the verbal exercises.

This second experiment maintained the same hypotheses as the first experiment, that is, finding out which behavioural process (relational, extinction, or shaping) is producing the decrease in emotional evaluations after the verbal exercises. But, in addition, it is hypothesised that if the images cause enough discomfort, the participants will appear to differentiate significantly between the different images. Therefore, if the action mechanism is the one proposed by ACT, then the decrease will be greater for negative images, and a greater decrease will also appear in Group 1 than in the other groups and in the Control Group.

Method of Experiment 2

Participants

The sample was made up of 78 participants, but 2 of them did not complete the second assessment, and one had computer problems. The final sample of 75 participants was randomly distributed in the four groups (20, 21, 17, and 17 participants, respectively). All participants had no prior knowledge of ACT, and no prior knowledge of experiential exercises. The mean age was 24 years (SD = 5.17). The participants were mostly women, and mostly at the university level. There were no significant differences between the groups in the distribution by sex, nor in any of the other variables such as educational level, type of residence, occupation, or marital status.

The same experimental design as Experiment 1 was used: combined between-groups (4×2) with repeated measures factorial design, three experimental conditions ("milk-milk-milk" repetition, emotional word repetition, and shaping), and a control condition. All of them had measurements before and after the application of the exercises.

Instruments

The same questionnaires on thoughts and emotions (AAQ, ERQ, and ATQ) from Experiment 1 have been used, but also: (1) the evaluation of the image description, using a nominal scale for 20 positive, 20 negative, and 20 neutral images; (2) evaluation with a *Likert scale* 0-10 of the degree of discomfort produced by each of these images; (3) the latency time in seconds when evaluating descriptions; and (4) the latency time in seconds during the emotional evaluation.

Emotional images were selected from the *International Affective Picture System* (IAPS; Lang et al., 2008). This system provides a scale for measuring emotions that are created by images, which can be located in a wide range of semantic categories. For the evaluation and application, two specific computer programmes were used for this investigation (Autor, 2010). In the former programme, after the initial screen with instructions, 60 images appeared randomly, which were previously selected and ranked from positive to negative emotions, with the following scale: 0 = None, 1 = Happiness, 2 = Love, 3 = Joy, 4 = Tenderness, 5 = Tranquillity, 6 = Disgust, 7 = Anguish, 8 = Grief, 9 = Pain, 10 = Fear. The categories that were chosen by the participant and their latency time before each were recorded. In the latter programme the same 60 randomised images were also presented, but the participants had to respond on a *Likert scale* from 0 (no emotion) to 10 (maximum intensity or discomfort), and their latency was also recorded.

Procedure

As in Experiment 1, participants were informed about the tasks and they were asked for their informed consent regarding their collaboration. The entire procedure followed the same order as Experiment 1: initial evaluation, two training sessions with each verbal task according to the group, and the final evaluation. The only difference was regarding the IAPS images and the software programme that was used to present and record the data.

Data analysis

An analysis of variance (ANOVA) with repeated measures was also carried out in this experiment, followed by a *post hoc* analysis using Scheffe and DMS tests. The tests of homogeneity of variance and homoscedasticity in all cases allowed the application of these standardised tests. Also, in order to ensure the emotional differences between images of IAPS system, a *t*-Student between positive, negative and neutral images was done.

Results of Experiment 2

Regarding the AAQ, ERQ, and ATQ questionnaires there were no significant differences between the groups, and this was also true for the pre-post effects, in all of the cases. The means of the

different groups are very similar in all cases, that is, the expected differences did not appear, according to the concept of defusion in the ACT, since in the AAQ the scores should have decreased, in the same way that the ERQ should have lowered the scores in "emotional suppression".

In relation to the direct measures of evaluation using a computer, an ANOVA analysis has also been carried out in the same way as before, but specifically with a separate analysis of the positive, negative, and neutral images. The results show that there are no significant differences between the groups in any of the variables, in the description, the emotional assessment, or in their latencies. In no case does the emotional assessment that was given by the participants in the different groups decrease (see Table 2). Differences appear in some cases in the pre-post comparison, which indicates that there is a learning or repetition effect of the test since, when evaluating the images a second time, all of the participants responded more quickly. However, in none of the cases was there an effect due to the type of exercises between the four groups, as can be seen in Figure 2.

There are differences in the pre-post latency of the description for positive images ($F (3, 74) = 11.836, p < .001$), negative images ($F (3, 74) = 25.752, p < .001$), and neutral images ($F (3, 74) = 83.641, p <. 001$). Similarly, there are differences in the pre-post latency of emotional assessment regarding positive images ($F (3, 74) = 8.798, p <. 005$) and neutral images ($F (3, 74) = 5.178, p < .05$) (see Table 3). This effect of a decrease in latency occurs for all images, and there is no group effect. Curiously, in all of the groups there is a decrease in the latency for negative images (see Figure 2), but with these images there should have been more differences in Group 1 and not in all of the groups, as is the case.

However, to verify that the selected images were well classified, the image evaluations by groups have been compared with each other. In this case, there are significant differences in the groups

between positive and neutral images ($t (74) = 20.29, p < .001$), positive and negative images ($t (74) = -11.66, p < .001$), and neutral and negative images ($t (74) = -29.41, p < .001$). This indicates that the images, which were selected from the IAPS system, were well classified, in correspondence with the published scores on this test.

Conclusions for Experiment 2

Against the initial hypotheses, the differences between the groups do not appear in any of the variables. More specifically, differences do not appear in the questionnaires, with respect to the descriptions, or with respect to the emotional effect caused by the different images, whether the effects were positive, negative, or neutral. Hence, we can affirm that none of the verbal exercises have produced the expected effect of reducing subjective discomfort.

What did appear are pre-post differences in some of the variables, and especially in pre-post latencies concerning the different images. But this decrease in latency is the same for all of the groups. This could be explained as a learning effect, since all of the participants took a few seconds less to respond, with no differences between the groups. Therefore, the possible *defusion effect* is not replicated experimentally with these conditions and these results.

Discussion

In both experiments, the emotional changes that are hypothesised by the theory of defusion in the ACT have not appeared. The experiential exercises of repeating the words, which were carried out in one way or another, do not produce changes in the evaluations of the participants. Both experiments have been replicated using an experimental design, with various measurements in questionnaires,

	Group 1 "milk-milk" N = 20		Group 2 "emotion" N = 21		Group 3 Shaping N = 17		Group 4 Control N = 17		Group Effect		Pre-Post Effect	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	F	p	F	p
Valoration Description												
Positives	3.26	3.21	3.22	3.17	3.11	3.22	3.35	3.51	.940	.426	.613	.436
Negatives	7.57	7.49	7.69	7.49	7.79	7.78	7.18	7.61	1.413	.246	.106	.745
Neutrals	1.85	1.44	1.44	0.98	2.06	1.39	1.47	1.13	.915	.548	1.887	.174
Valoration Emotion												
Positives	5.59	5.65	6.25	5.55	6.26	6.36	6.04	5.88	.915	.548	1.887	.174
Negatives	8.52	8.43	8.19	7.83	8.20	8.28	8.62	8.48	.754	.524	1.392	.242
Neutrals	1.64	1.78	1.56	1.33	2.53	2.32	1.86	2.02	.563	.641	.056	.813
Latency Description												
Positives	7.63	4.79	7.52	6.92	8.59	6.29	7.62	6.16	.931	.430	**11.836**	.001
Negatives	8.64	5.53	8.50	6.29	9.01	4.94	6.84	4.29	.464	.709	**25.722**	.001
Neutrals	9.48	4.41	8.11	4.46	9.44	4.78	10.5	5.82	.402	.752	**83.641**	.001
Latency Emotion												
Positives	5.90	4.24	4.72	4.71	5.25	4.64	6.34	3.59	1.998	.122	**8.798**	.004
Negatives	3.45	3.03	4.79	3.57	4.69	4.99	4.10	3.77	.669	.574	1.183	.281
Neutrals	5.06	3.93	4.16	3.01	4.92	3.85	3.72	3.58	.380	.768	**5.178**	.026

Table 2
Measures from the 4 groups in the description, valoration and latency of images in the Experiment 2
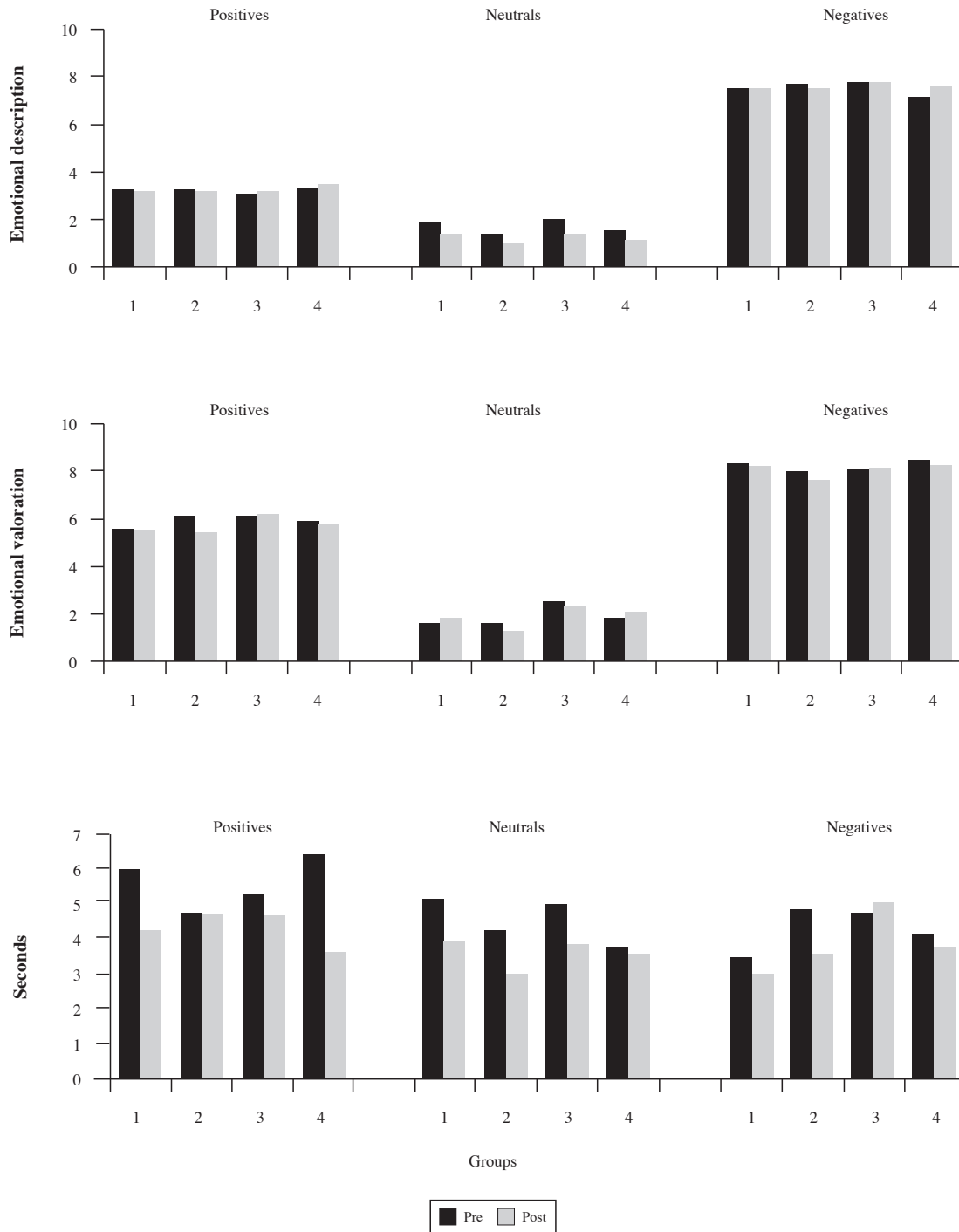
Figure 2. Scores in the description, emotional valoration and latencies for each group of Experiment 2.
Note: Group 1 = milk-milk-milk, Group 2 = emotional word, Group 3 = shaping, Group 4 = control

emotional evaluations, and response latency. It can be stated that the only changes would be due to the effect of repeating the test or learning the task.

We argue that a robust design was used in this study, which included a control group, which had no type of verbal exercise. In our study, if we had undertaken a comparison with only a couple of these groups, only measuring the post-exercise effects, without using a control group, etc., in accordance with different previous studies in the body of literature, perhaps we would have found significant differences. In fact, as a test, we performed a subsequent statistical analysis with these same data, *taking only the milk-milk-milk repetition groups in isolation*, and statistically significant pre-post changes appeared (for example, pre-post AAQ, pre-post ERQ, and pre-post positive and neutral images). This would denote the

lower methodological rigour of those other studies, since when comparing only pre-post, without a control group and without other internally valid controls, it is easy to obtain significant changes. Mere repetition of the test or the researcher's own attention could produce "effects" independently, but they would not have internal validity that eliminate these threats to stability without other comparisons.

These results are consistent with some studies that also did not found these differences. This is the case of Barrera et al. (2016) who compared real-time exposure alone, real-time exposure combined with defusion, and with cognitive restructuring in social anxiety problems, but all of these decreased anxiety discomfort and negative pre-post thoughts, with no differences between the groups. The study by Keogh (2008) using positive and negative phrases that were repeated by the study participants themselves found a slight decrease in the negative ratings, but there was no change in global ratings, and there were no differences between groups. Other studies have shown disparate results, with decreases in discomfort, but with no differences compared to other intervention groups and controls (López & Luciano, 2017; Pilecki & McKay, 2012).

We conclude that, although there are studies with positive results (Campbell-Sills et al., 2006; Liverant et al., 2008, Masuda et al., 2004, 2010a, 2010b; McMullen et al., 2008), in the present study defusion effects have not been produced due to methodological characteristics. It is possible that the effects could be in the use of images as referents of participant emotions, when the usual methodology uses one or more self-applied phrases (Healy et al., 2008), or phrases that are verbalised by the individual (Marasigan, 2019), or figures and shapes that are associated via classical conditioning to other stimuli by way of equivalence (Luciano et al., 2014). However, the study by Donati et al. (2019) also used the same IAPS images to generate an aversive situation of general avoidance, although they did not use a control group to compare that effect. We can affirm that our results were not due to the visual stimulation that was used, since the images do produce those emotional evaluations (positive, negative, and neutral) that correspond to studies in the previous body of literature on the IAPS (Lang et al., 2008; Moltó et al., 2013; Vila et al., 2001).

It is also be possible for us to provide other explanations of these differences, because the ACT exercises have generally only been performed using self-applied or self-reported phrases and words. Since ACT assumes a close link between defusion and personal values, an individual would respond more in a more emotional way to something that affects that individual directly (Blackledge, 2015; Blackledge & Hayes, 2001). In this case, perhaps the IAPS visual stimuli, although strongly emotional in nature, may be more general and not self-applicable.

Another influencing factor could be the exact methodology for performing the defusion and repetition exercises. In several of the studies that show efficacy (De Young, 2010; Lee et al., 2018; Masuda et al., 2009), an explanation or reasoning is also given to the individual. In the present study, no prior explanation or reasoning was given to the participants.

Furthermore, when performing an experimental analogue in a therapeutic application, the influence of the researcher or therapist can be a fundamental variable (Follete et al., 1996; Hayes & Wilson, 1994; Pierson & Hayes, 2007; Vilardaga & Hayes, 2010). In contrast, using a computer programme or recording the instructions in an audio device improves control in clinical analogues (McMullen et al., 2008). In the present study, the procedure has been precisely carried out using a computer, following on-screen instructions, and with minimal intervention by the researcher.

In summary, despite the abundance of literature on the phenomenon of defusion, its effects have not been replicated in the two experiments of the present work. Our study may have limitations, therefore the replication has not been identical to other studies, but it is clear that more research is still needed to ensure the phenomenon and to explain the mechanisms that produce it. Studies in the literature demonstrate that the phenomenon of defusion occurs in the clinical context, but when it comes to finding the causes or mechanisms of its operation in an experimental context, the phenomenon of defusion is no longer so evident. In future studies, the variables should be investigated in analogues that distinguish between the stimulative, evocative, or relational functions of words (Assaz et al., 2018), and also the therapeutic relationship itself should be investigated, when these types of verbal exercises are carried out.

References

Assaz, D., Roche, B., Kanter, J.W., & Oshiro, C.K. (2018). Cognitive defusion in Acceptance and Commitment Therapy: What are the basic processes of change? *Psychological Record, 68*, 405-418. https://doi.org/10.1007/s40732-017-0254-z

Barraca, J. (2004) Spanish adaptation of the Acceptance and Action Questionnaire (AAQ). *International Journal of Psychology and Psychological Therapy, 4*(3), 505-515.

Barrera, T.L., Szfranski, D.D., Ratcliff, C.G., Garnaat, S.L., & Norton, P.J. (2016). A experimental comparison of techniques: Cognitive defusion, cognitive restructuring, and in-vivo exposure for social anxiety. *Behavioural and Cognitive Psychotherapy, 44*, 249-254. https://doi.org/10.1017/S1352465814000630

Blackledge, J. T., & Hayes, S. C. (2001). Emotion regulation in Acceptance and Commitment Therapy. *JCLP/In Session: Psychotherapy in Practice, 57*(2), 243-255. https://doi.or/10.1002/1097-4679(200102)57-2

Blackledge, J.T. (2015). *Cognitive defusion in practice: A clinician's guide to assessing, observing, and supporting change in your client*. Context Press.

Broome, R., Gard, D.E., & Mikels, J.A. (2012). Test-retest reliability of an emotion maintenance task. *Cognition and Emotion, 26*(4), 737-747. https://doi.org/10.1080/02699931.2011.613916

Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006). Effects of suppression and acceptance on emotional responses on individuals with anxiety and mood disorders. *Behavior Research and Therapy, 44*, 1251-1263. https://doi.org/10.1016/j.brat.2005.10.001

De Young, K.D., Lavender, J.M., Washington, L.A., Looby, A., & Anderson, D.A. (2010). A controlled comparison of the word repeating technique with a word association task. *Journal of Behavior Therapy and Experimental Psychiatry, 41*, 426-432. https://dolor.org/10.1016/j.jbtep.2010.04.006

Donati, M.R., Masuda, A., Schaefer, L.W., Cohen, L.L., Tone, E.B., & Parrott, D.J. (2019). Laboratory analogue investigation of defusion and reappraisal strategies in the context of symbolically generalized avoidance. *Journal of the Experimental Analysis of Behavior, 112*, 225-241. https://doi.org/10.1002/jeab.550

Fernández, T., & Calero, A. (2015). Efectos de la detención del pensamiento y la defusión cognitiva sobre el malestar y el manejo de los pensamientos negativos [Effects of though stopping and the cognitive defusion on the discomfort and management of negative thoughts]. *Behavioral Psychology, 23*(1), 107-126.

Follete, W.C., Naugle, A.E., & Callaghan, G.M. (1996). A radical behavioral understanding of the therapeutic relationship in effecting change. *Behavior Therapy*, *27*(4), 623-641. https://doi.org/10.1016/S005-7894(96)80047-S

Gross, J.J., & John, O.P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*, 348-362. https://doi.org/10.1037/0022-3514.85.2.348

Hayes, S. C., & Wilson, K. G. (1994). Acceptance and Commitment Therapy: Altering the verbal support for experiential avoidance. *The Behavior Analyst, 17*, 289-303. https://doi.org/10.1007/BF03392677

Hayes, S.C., & Strosahl, K.D. (2004). *A practical guide to Acceptance and Commitment Therapy*. Springer.

Hayes, S.C., Barnes-Holmes, D., & Roche, B. (2002). *Relational Frame Theory: A post-skinnerian account of human language and cognition*. Kluwer Academic Publ.

Hayes, S.C., Barnes-Holmes, D., & Wilson, K.G. (2012) Contextual behavioral science: Creating a science of more adequate to the challenge of the human condition. *Journal of Contextual Behavioral Science, 1*, 1-16. https://doi.org/10.1016/j-jcbs.2012.09.004

Hayes, S.C., Bissett, R.T., Strosahl, K.D., Wilson, K.D., Pistorello, J., Dykstra, T.A., et al. (2000). *Psychometric properties of the Acceptance and Action Questionnaire (AAQ)*. Unpublished manuscript.

Healy, H.A., Barnes-Holmes, Y., Barnes-Holmes, D., Keogh, C., Luciano, C., & Wilson, K. (2008). An experimental test of a cognitive defusion exercise: Coping with negative and positive self-statements. *The Psychological Record, 58*, 623-640. https://doi.org/10.1007/BF03395641

Jenkins, K., & Tapper, K. (2013). Effects of a brief cognitive defusion task on chocolate craving. *Appetite, 71*, 479. https://doi.org/10.1016/j.appet.2013.06.038

Kendall, P. C., & Hollon, S. D. (1989). Anxious self-talk: Development of the Anxious Self-Statements Questionnaire (ASSQ). *Cognitive Therapy and Research*, *13*(1), 81-93. https://doi.org/10.1007/BF01178491

Keogh, C. (2008). *Cognitive and emotional defusion: Investigations of the underlying psychological processes using explicit and implicit measures* [Unpublished doctoral dissertation]. University of Maynooth. http://mural.maynoothuniversity.ie/1830/1/CKthesis.pdf

Lang, P.J., Bradley, M.M., & Cuthbert, B.N. (2008). *International Affective Picture System (IAPS): Affective ratings of pictures and instruction manual* (Report A-8). The Center for Research in Psychophysiology. University of Florida.

Lee, I., Kim, C., & Duys, D.K. (2018). Effects of cognitive defusion compared to thought distraction on Korean college students with social anxiety. *Journal of Asia Pacific Counseling, 8*(2), 7594. https://doi.org/l10.18401.2018.8.2.3

Liverant, G. I., Brown, T. A., Barlow, D. H., & Roemer, L. (2008). Emotion regulation in unipolar depression: The effects of acceptance and suppression of subjective emotional experience on the intensity and duration of sadness and negative affect. *Behaviour Research and Therapy, 46*, 1201-1209. https://doi.org/10.1016/j.brat.2008.08.001

López, J.C., & Luciano, C. (2017). An experimental analysis of defusion on deictic and hierarchical framing on cognitive performance. *Psychological Record, 67*, 485-497. https://doi.org/10.1007/s40732-017-0250-3

Luciano, C., Valdivia, S., Ruiz, F.J., Rodríguez, M., Barnes-Holmes, D., Dougher, M.J., López, J.C., Barnes-Holmes, Y., & Gutiérrez, O. (2014). Effects of an acceptance/defusion intervention on experimentally induced generalized avoidance: A laboratory demonstration. *Journal of the Experimental Analysis of Behavior, 101*, 94-111. https://doi.org/10.1002/jeab.68

Mandavia, A., Masuda, A., Moore, M., Mendoza, H., Donati, M.R., & Cohen, L.L. (2015). The application of cognitive defusion tehnique to negative body image thoughts: A preliminary analogue investigation. *Journal of Contextual Behavioral Science, 4*, 86-95. https://doi.org/10.1016/j.jcbs.2015.02.003

Marasigan, P.R. (2019). Using brief cognitive restructuring and cognitive defusion techniques to cope with negative thoughts. *Social Values and Society, 1*(4), 11-14. https://doi.org/10.26480/svs.04.2019.11.14

Masuda, A., Feinstein, A. B., Wendell, J. W., & Sheehan, S. T. (2010a). Cognitive defusion versus thought distraction: A clinical rationale, training, and experiential exercise in altering psychological impact of negative self-referential thoughts. *Behavior Modification, 34*, 520-538. https://doi.org/10.1177/0145445510379632

Masuda, A., Hayes, S. C., Sackett, C. F., & Twohig, M. P. (2004). Cognitive defusion and self-relevant negative thoughts: Examining the impact of a ninety year old technique. *Behaviour Research and Therapy, 42*, 477-485. https://doi.org/10.1016/j.brat.2003.10.008

Masuda, A., Hayes, S.C., Towhig, M.P. Drossel, C., Lillis. J., & Washio, Y. (2009) . A parametric study of cognitive defusion and the believability and discomfort of negative self-referential thoughts. *Behavior Modification, 33*, 250-262. https://doi.org/10.1177/0145445508326259

Masuda, A., Twohig, M.P., Stormo, A.R., Feinstein, A.B., Chou, Y., & Wendell, J.W. (2010b). The effects of cognitive defusion and thought distraction on emotional discomfort and believability of negative self-referential thoughts. *Journal of Behavior Therapy and Experimental Psychiatry, 41*, 11-17. https://doi.org/10.1016/j.jbtep.2009.08.006

Mathews, A., Ridgeway, V., & Holmes, E. A. (2013). Feels like the real thing: Imagery is both more realistic and emotional than verbal thought. *Cognition and Emotion, 27*, 217-229. https://doi.org/10.1080/02699931.2012.698252

McMullen, J., Barnes-Holmes, D., Barnes-Holmes, Y., Stewart, I., Luciano, M. C., & Cochrane, A. (2008). Acceptance versus distraction: Brief instructions, metaphors and exercises in increasing tolerance for self-delivered electric shocks. *Behaviour Research y Therapy, 46*(1), 122-129. https://doi.org/10.1016/j.brat.2007.09.002

Moltó, J., Segarra, P., López, R., Esteller, A., Fonfría, M., Pastor, C., & Poy, R. (2103). Adaptación española del International Affective Picture System- (IAPS) [Spanish adaptation of IAPS]. *Anales de Psicología*. *29*(3), 965-984 https://doi.org/10.6018/analesps.29.3.153591

Murray, H. A. (1958). *El Test de Apercepción Temática (2ª edición)* [Thematic Apperception Test]. Paidos.

Pierson, H., & Hayes, S.C. (2007). Using Acceptance and Commitment Therapy to empower the therapeutic relationship. In P. Gilbert & R. Leahy (Eds.), *The Therapeutic Relationship in Cognitive Behavior Therapy* (pp. 205-228). Routledge.

Pilecki, B.C., & McKay, D. (2012). An experimental investigation of cognitive defusion. *The Psychological Record, 62*, 19-40. https://doi.org/10.1016/s0272-7358(00)00057-X

Rodríguez-Carvajal, R., Moreno-Jiménez, B., & Garrosa, E. (2006). *Cuestionario de Regulación Emocional. Versión española* [Emotional Regulation Questionnaire Spanish Version]. Universidad Autónoma de Madrid.

Salzinger, K. (2011). Therapeutic change viewed through behavior analytic lenses. *Clínica y Salud, 22*(3), 237-244. https://doi.org/10.5093/cl2011v22n3a4

Tian, X., & Huber, D.E. (2010). Testing an associative account of semantic satiation. *Cognitive Psychology*, *60*(4), 267-290. https://doi.org/10.1016/j.cogpsych.2010.01.003

Titchener, E.B. (1916). *A textbook of Psychology*. MacMillan.

Tryon, W.W. (2005). Possible mechanisms for why desensitization and exposure therapy work. *Clinical Psychology Review, 25*, 67-95. https://doi.org/10.1016/j.cpr.2004.08.005

Valero-Aguayo, L. (2010). Software Tact and Emotions for naming and assessment of emotional responses through images [Computer software]. Universty of Málaga.

Vila, J., Sánchez, M., Ramírez, I., Fernández, M. C., Cobos, P., Rodríguez, S., Muñoz, M. A., Tormo, M. P., Herrero, M., Segarra, P., Pastor, M. C., Montañés, S., Poy, R., & Moltó, J. (2001). El Sistema Internacional de Imágenes Afectivas (IAPS): adaptación española. Segunda parte [The IAPS Spanish Adaptation Second Part II]. *Revista de Psicología General y Aplicada, 54*, 635-657.

Vilardaga, R., & Hayes, S.C. (2010). Acceptance and Commitment Therapy and the therapeutic relationship stance. *European Psychotherapy, 9*, 117-139.

Watson, C. (2007). *Verbal repetition in the reappraisal of contamination-related thoughts* [Unpublished doctoral dissertation]. University of Waterloo. https://uwspace.uwaterloo.ca/bitstream/handle/10012/3560/Verbal%20Repetition.pdf?sequence=1