# Establishment and maintenance of equivalence classes and transfer of function in depressed and nondepressed individuals

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## Introduction

Recent studies[1,2] have demonstrated that ***depressed individuals*** have:

- memory deficits;
- enhanced recall of negative compared to positive events;
- and difficulties on disengaging from negative material;

Other studies have demonstrated a "happy superiority effect" for ***nondepressed individuals*** on maintenance of equivalence classes and transfer of function [3,4,5,6].

The present study investigated the establishment and maintenance of equivalence classes and transfer of function between **pictures of sad, happy and neutral faces (set A)** and **abstract stimuli (sets B, C and D)**, in depressed and nondepressed individuals.

## Method

Participants - University students, assigned to four groups:

| Depressed (BDI II score: 20 or higher) | | Nondepressed (BDI II score: 19 or less) | |
|---|---|---|---|
| Experimental (n=23) | Control (n=12) | Experimental (n=21) | Control (n=16) |

Data collected remotely and individually, in one or two sessions (30-90 min). Experimental groups were exposed to all phases, depending on their performance in Phase 1. Control groups were only exposed to Phase 2. Tasks were computerized. Procedures were approved by the Institutional Review Board.

**Phase 1: Establishment of three 4-member equivalence classes**
MTS: AB, AC and CD training and testing; Equivalence testing (BD and DB)

↓

**Phase 2: Transformation of function - Semantic Differential**
Rate D stimuli on the instrument comprised of 13 scales of seven points, anchored by opposite adjectives

↓

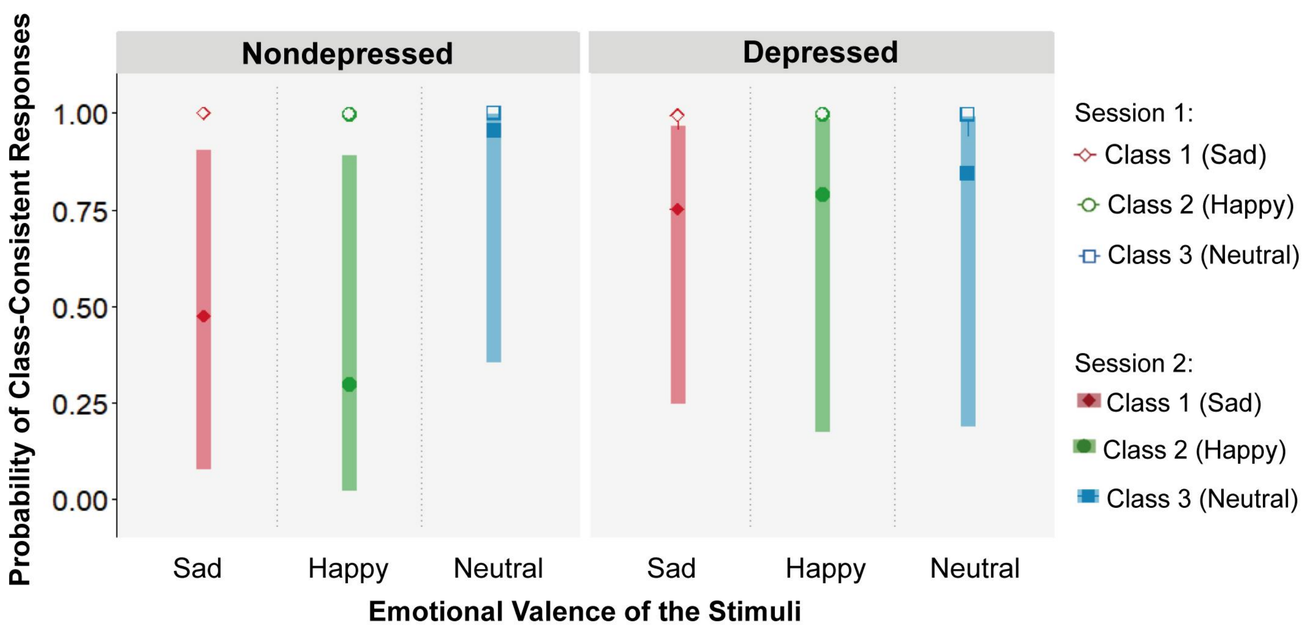
**Phase 3: Transformation of function - IRAP**
Stimuli used: D1/D2, equivalent to faces of sadness/happiness; and negative/positive adjectives from the Semantic Differential

↓ *30 days latter*

**Maintenance Test**
Equivalence test (BD and DB), Semantic Differential and IRAP were conducted again

## Results

**Fig. 1.** *Probability of Class-Consistent Responses During Equivalence Tests.*




*Note.* These data represent overall scores achieved by the Experimental Groups during equivalence tests as a function of the presumed emotional valence of the classes. Empty and filled markers represent participants' performances on Session 1 and Session 2, respectively. Error bars denote the 95 % confidence interval (±95 % CI).

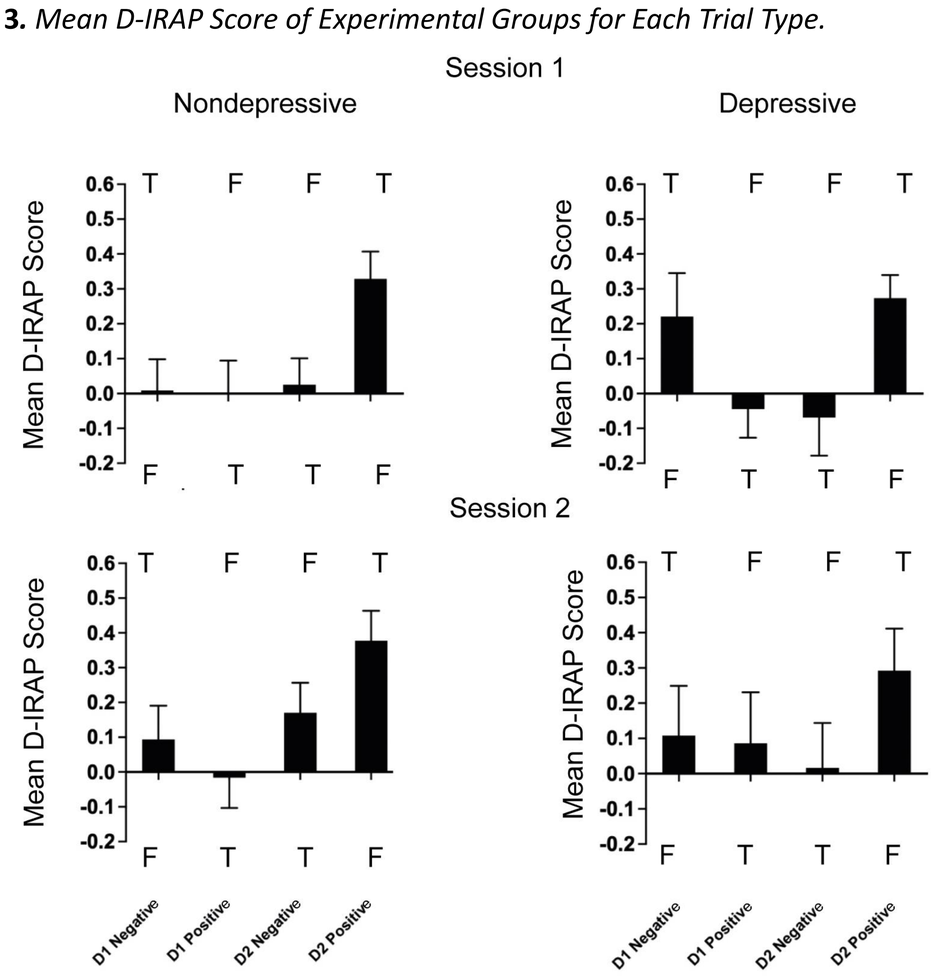
**Table. 1.** *Number of Participants that were Exposed One to Three Times to Training Blocks and Attained Baseline and Class Formation Criterions*

| | | No. of expositions to baseline training blocks | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | Attained criterion on baseline training | Attained criterion of equivalence test |
| No. of participants by group | Depressed | 12 | 4 | 7 | 19/23 | 14/19 |
| | Nondepressed | 15 | 1 | 5 | 17/21 | 15/17 |

**Fig. 2.** *Participants' Average Ratings On the Semantic Differential.*


*Note.* These data represent the overall ratings of abstract stimuli D made by the Experimental Groups and of the facial expressions A made by the Control Groups. Empty and filled markers represent the evaluations of D1, D2, and D3 on Session 1 and Session 2, respectively. Crossed markers correspond to the evaluations of A1, A2, and A3. Error bars denote the 95 % confidence interval (±95 % CI).

**Fig. 3.** *Mean D-IRAP Score of Experimental Groups for Each Trial Type.*




*Note.* "T" and "F" represent the response options "True" and "False", respectively.

## Conclusions

Results indicated that depressed and nondepressed participants demonstrated:

- establishment of classes - more depressed participants needed re-exposition to baseline training and failed to attain criterion in equivalence testing;
- maintenance of classes 30 days later - visually, depressed participants show better results, but no significant differences were found between groups;
- transfer of function in the Semantic Differential Ratings in Session 1 and 2;

Experimental groups differed in the evaluation of the abstract stimulus equivalent to the happy face in the Session 2, and also in the IRAP in Session 1- nondepressed participants showed a dominance effect for D2Positive trial type.

## References

1. Pergher, G. K., Grassi-Oliveira, R., de Ávila, L. M., & Stein, L. M. (2006). Memória, humor e emoção. *Revista Psiquiátrica RS, 28*(1), 61-68. http://doi.org/10.1590/S0101-81082006000100008.
2. Gotlib, I. H., & Joorman, J. (2010). Cognition and depression: current status and future directions. *Annual Review of Clinical Psychology*, 27 (6), 285-312. https://doi.org/10.1146/annurev.clinpsy.121208.131305
3. Bortoloti, R., & de Rose, J. C. (2009). Assessment of the relatedness of equivalent stimlu through a semantic differential. *The Psychological Record*, 59, 563-590. https://doi.org/10.1007/BF03395682
4. Bortoloti, R., & de Rose, J. C. (2011). Avaliação do efeito de dica semântica e da indução de significado entre estímulos abstratos equivalentes. *Psicologia: Reflexão e Crítica*, 24(2), 381-393. https://doi.org/10.1590/S0102-79722011000200020
5. Silveira, M. V., Aggio, N. M., Cortez, M. D., Bortoloti, R., Rico, V. V., & de Rose, J. C. (2016). Maintenance of equivalence classes and transfer of functions: the role of the nature of stimuli. *The Psychological Record, 66*(1), 65-74. https://doi.org/10.1007/s40732-015-0152-1
6. Silveira, M. V. Camargo, J.C., Aggio,. N. M., Ribeiro, G. W., Cortez, M. D., Young, M. E., & de Rose, J. C. (2021). The influence of training procedure and stimulus valence on the long-term maintenance of equivalence relations. *Behavioural Processes*, 185 https://doi.org/10.1016/j.beproc.2021.104343