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CAROL REBESCHINI

**DESENVOLVIMENTO E EFICÁCIA DE UM TREINAMENTO PARA RECONHECIMENTO DE
EXPRESSÕES FACIAIS**

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Pontifícia Universidade Católica
do Rio Grande do Sul

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Dissertação de Mestrado realizada no Programa de Pós-Graduação em Psicologia da Pontifícia Universidade Católica do Rio Grande do Sul, como parte dos requisitos para a obtenção do título de Mestre em Psicologia, área de concentração: Cognição Humana.

Orientadora: Professora Doutora Adriane Xavier Arteche

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COMISSÃO EXAMINADORA:

PROF^a DRA. ADRIANE XAVIER ARTECHE - PUCRS

PROF^a DR. THIAGO GOMES DE CASTRO - UFRGS

PROF^a. DR. NELSON TORRO ALVES - UFPB

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RESUMO EXPANDIDO

O reconhecimento de expressões faciais é fundamental para a interação social. No entanto, nem todo indivíduo possui bom desempenho nesta habilidade – o que pode ter implicações para o ajustamento social. Hipotetiza-se que a habilidade de reconhecer expressões faciais possa ser treinada. Então, buscou-se investigar os treinamentos disponíveis na literatura, através de uma revisão sistemática. Foi utilizado o método PRISMA para a realização e descrição do primeiro estudo. As bases de dados Scopus, PubMed e PsycNET foram acessadas para avaliação duplo cego dos artigos publicados no período de janeiro de 2013 à agosto de 2018. Foram incluídos estudos empíricos, com delineamento experimental ou quase-experimental, publicados em inglês ou português. Foram excluídos estudos que não apresentaram medidas de verificação para acurácia de reconhecimento de expressões faciais, não reportaram em seus resultados dados sobre acurácia de reconhecimento de expressões faciais, e estudos realizados com público infanto-juvenil. Foram identificados inicialmente 1228 estudos e, após aplicados os critérios de exclusão, 35 artigos foram inclusos na revisão. A partir da análise de tais artigos, foi possível realizar o segundo estudo, que desenvolveu e avaliou a eficácia de um treinamento na forma de jogo computadorizado com o objetivo de melhorar a acurácia na habilidade de reconhecimento de expressões faciais. Um total de 82 estudantes de graduação participaram de um estudo com delineamento experimental e foram alocados entre grupo controle e experimento. Todos os participantes realizaram uma avaliação pré e pós intervenção que foi testada a acurácia do reconhecimento de expressões faciais utilizando-se estímulos apresentados em 200ms, 500ms e 1s. Entre as avaliações os indivíduos alocados para o grupo experimental receberam o treinamento, enquanto os estudantes do grupo controle assistiram a um documentário de conteúdo neutro. Além disso, 53,6% (n=19 grupo controle; n=25 grupo experimental) da amostra realizou um *follow up* e foi avaliada um mês após a baseline/pós intervenção. Comparações entre os dois grupos foram realizadas através de análises descritivas e, para avaliação da eficácia do treinamento, utilizou-se de análises de medidas repetidas ANOVAs. Foi considerado estatisticamente significativo $p < 0,05$. Os resultados indicaram uma diferença significativa nas médias de acurácia entre o pré e pós teste positiva para alegria e para raiva, nos três tempos de exposição e negativa para medo em 200ms e para nojo e surpresa nos três tempos. Além disso, observou-se um efeito significativo da interação Grupo*Tempo em raiva 200ms e marginalmente significativo em alegria a 500ms, com maior aprimoramento no grupo experimental do que no grupo controle. Por fim, foi observado um efeito negativo de

Grupo*Tempo em tristeza a 1000ms, com controles atingindo melhores escores. Na avaliação de *follow up*, alegria revelou efeito positivo e significativo nos três tempos entre pré-teste e *follow up* e efeito negativo e significativo em 200ms entre pós-teste e *follow up*. Entre pós-teste e *follow up* medo em 200ms e 1000ms, surpresa em 500ms e 1000ms e tristeza em 200ms mostraram melhora significativa, enquanto raiva nos três tempos mostrou efeito negativo e significativo entre pós teste e *follow up* e nojo em 500ms e 1000ms entre pré-teste e *follow up*. A interação Grupo*Tempo foi significativa no *follow up* em alegria 500ms, raiva em 200ms, tristeza em 1000ms, com escores mais elevados no grupo experimental, enquanto medo em 1000ms apontou para controles atingindo melhores escores. Melhorias nas habilidades sociais foram avaliadas apenas no *follow up* e apontaram para melhora significativa apenas no grupo experimental. Hipóteses explicativas para tais fenômenos incluem especificidades de cada emoção, da amostra, da avaliação e do treinamento e são discutidas ao longo deste estudo.

Palavras-chave: Treinamento; expressões faciais; Intervenções.

EXPANDED ABSTRACT

Facial expression recognition is fundamental for social interaction. However, not all individual performs well in this skill – what may have implications for social adjustment. It is hypothesized that the ability to recognize facial expressions can be trained. This study aimed to investigate the available interventions in the literature, with a systematic review. PRISMA method was used to perform and describe the first study. Scopus, PubMed and PsycNET databases were accessed in a double-blind evaluation of articles published from January 2013 to August 2018. Empirical studies, with experimental or quasi-experimental design, published in English or Portuguese were included. Studies that did not showed verification measures for accuracy of facial expressions recognition; or did not report data about facial expression recognition accuracy; or studies with children and adolescents were excluded. A total of 1228 studies were identified and, after applying the exclusion criteria, 35 articles were included in the review. After the analysis of these articles, it was possible to carry out the second study, which was the development and evaluation of the effectiveness of a training in form of a computerized game aiming to improve facial expression recognition accuracy. A total of 82 undergraduate students participated in this study with experimental design and were allocated between control or experimental group. All participants performed a pre- and post-test measuring the accuracy of facial expressions recognition using stimuli presented in 200ms,

500ms and 1s. The individuals allocated to the experimental group received the training, while the students in the control group only watched a documentary of neutral content. In addition, 53.6% (n=19 control group; n=25 experimental group) of the sample also performed a follow up and was evaluated one month after baseline/post-intervention. Comparisons between the two groups were performed with descriptive analyzes and, to evaluate the efficacy of the training, repeated measures ANOVAs were performed. Statistically significant was considered $p < 0.05$. Results suggested significant and positive time effect between pre- and post-test for happiness and anger, at the three times of exposure and significant and negative time effect for fear in 200ms and disgust and surprise at the three times of exposure. A significant Group*Time effect was observed in anger at 200ms and marginally significant in happiness at 500ms, with greater improvement in the experimental group than in the control group. A negative Group*Time effect was observed in sadness at 1000ms, with controls reaching better scores. At the follow up evaluation, happiness revealed a positive and significant time effect at the three times of exposure between pre-test and follow up and a significant negative effect in 200ms between post-test and follow up. Between post-test and follow up fear in 200ms and 1000ms, surprise in 500ms and 1000ms and sadness in 200ms showed significant improvement, while anger at the three times of exposure showed negative and significant time effect between post-test and follow up and disgust in 500ms and 1000ms between pre-test and follow up. The Group*Time interaction was significant at follow up in happiness 500ms, anger 200ms, and sadness 1000ms, with higher scores in the experimental group, while in fear 1000ms controls achieved better scores. Improvements in social skills were assessed only at pre-test and follow up and revealed significant improvement only in the experimental group. Explanatory hypotheses for those findings include specificities of each emotion, sample characteristics, assessment, and training limitations and are discussed throughout this study.

Key-words: Training; facial expression; interventions.

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1 APRESENTAÇÃO

A presente dissertação de mestrado foi desenvolvida na área de Cognição Humana do Programa de Pós-Graduação em Psicologia da Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS). O projeto visa desenvolver e avaliar a efetividade de um treinamento computacional de reconhecimento de expressões faciais de emoções básicas em adultos. O estudo foi orientado pela Prof. Dra. Adriane Xavier Artech e elaborado no Grupo de Neurociência Afetiva do Desenvolvimento (GNAT). Este projeto foi aprovado pela Comissão Científica da Faculdade de Psicologia e pelo Comitê de Ética em Pesquisa desta universidade (CAEE: 81889318.0.0000.5336).

Esta pesquisa faz parte do eixo de estudos do GNAT de avaliação de alterações cognitivas nos transtornos de humor e desenvolvimento infantil. Conforme o Ato de Deliberação 05/2012 do Programa de Pós-Graduação em Psicologia da PUCRS a presente dissertação contempla dois estudos, sendo o primeiro um artigo uma revisão sistemática, intitulada “Treinamentos para reconhecimento de expressões faciais para adultos: Uma revisão sistemática”. E o segundo, um estudo empírico, intitulado “Emotion hunters: Development and efficacy of a computerized game to improve facial affect recognition”.

2 INTRODUCAO

Cientificamente, o estudo das emoções iniciou no século XIX com Charles Darwin (1872) e Wilhelm Wundt (1896) que propuseram duas abordagens diferentes para distinguir as diferentes emoções. O primeiro propôs um modelo que especifica as emoções em módulos separados como medo, alegria ou raiva. Já o segundo criou um modelo dimensional, classificando-as segundo a intensidade (alta/baixa) e o prazer (agradável/desagradável) que elas geram no indivíduo. Wundt (1896) defendeu a combinação destas duas abordagens, o que ainda hoje é reconhecido por cientistas desta temática (Ekman, 2016). Nesta proposta, as emoções são vistas concomitantemente de forma dimensional e modular. Por exemplo, o módulo do medo difere do de tristeza, mas o desespero ainda traz uma variação no quão desagradável é sentir essa emoção devido a intensidade em que ela se apresenta. Atualmente, um dos maiores autores desta área é o psicólogo Paul Ekman, que publicou em 1957 seu primeiro artigo sobre comportamento não verbal (Ekman, 2016; Ekman, 1957; Ekman & Friesen, 1975).

Pode-se definir emoções básicas como estados de afeto agrupados por “famílias” que envolvem expressões faciais e reações fisiológicas específicas (Ekman, 1992). Atualmente seis tipos de emoções são consideradas básicas e universais, sendo elas: medo, raiva, alegria, nojo, tristeza e surpresa (Ekman & Friesen, 1975). Estas já eram as mesmas entendidas por Darwin e Wundt há mais de cem anos atrás.

A expressão das emoções através da face, assim como a acurácia no reconhecimento das mesmas, é fundamental para interação social. Tal habilidade é utilizada diariamente em diferentes contextos e pode ser influenciada por fatores como tipo e intensidade da emoção expressa e gênero da face e do identificador. Faces de alegria apresentam respostas mais rápidas e mais precisas, enquanto faces de medo tendem a gerar mais dificuldade no identificador, acarretando em menos acurácia e maior tempo de reação. Mulheres costumam apresentar melhor habilidade no reconhecimento de expressões não verbais quando comparadas com homens e o reconhecimento de faces femininas tende a ser mais acurado, porém mais lento, para ambos os sexos (Hall & Matsumoto, 2004; Hurley, Anker, Frank, Matsumoto, & Hwang, 2014; Wells, Gillespie, & Rotshtein, 2016).

A habilidade de reconhecimento de expressões faciais é uma ferramenta essencial para a interação social, pois a face transmite informações que ajudam a

modular o comportamento do receptor da mensagem (Smith et al., 2014). O ser humano é capaz de reconhecer e espelhar em seu próprio rosto uma expressão identificada em outra pessoa antes mesmo de percebê-la de forma consciente. Portanto, tais expressões, além de reflexivas, também possuem um potencial comunicacional, quando deseja-se passar uma mensagem através da face (Frith, 2009).

O desenvolvimento de empatia e competência social também estão relacionados à habilidade de reconhecimento de faces. Esta competência está inserida em um domínio cognitivo complexo chamado cognição social. Tal domínio refere-se a capacidade de compreender as intenções de outras pessoas e as regras sociais através de percepções ou impressões advindas de informações do ambiente (Ávila, Morais, Bomfim, & Chagas, 2016). Portanto, o reconhecimento de faces influencia diretamente funções específicas, como o comportamento social.

A região do rosto que apresenta maior potencial informativo para o reconhecimento de expressões faciais é a região dos olhos, incluindo as sobrancelhas (Eisenbarth & Alpers, 2011). Porém, estudos que utilizam *eye-tracking* apontam para a importância da região inferior da face para a identificação de alegria, surpresa e nojo, enquanto que a região superior seria mais utilizada para a identificação de medo, raiva e tristeza (Wells, Gillespie, & Rotshtein, 2016). Sendo assim, em indivíduos saudáveis, o foco da atenção visual na face deve variar conforme o tipo de emoção a ser identificada (Eisenbarth & Alpers, 2011).

Habilidades perceptivas, como discriminação de características sensoriais, podem ser treinadas e este processo é descrito na literatura como *aprendizagem perceptiva*. Este processo ocorre ao longo do desenvolvimento, permanecendo ativo na adultez, e se dá nos mais variados contextos, desde estruturas básicas presentes no ambiente, como memórias de objetos, até padrões mais complexos, como representações de expressões faciais. Desta forma, tornamo-nos familiares a estas informações e estímulos disponíveis no ambiente (Du, Zhang, Wang, Bi, & Qiu, 2016; Gilbert, Sigman, & Crist, 2001).

Diversos estudos associam diferenças na habilidade de reconhecimento de expressões faciais com psicopatologias específicas (Griffiths, Jarrold, Penton-Voak, & Munafò, 2015). Transtornos alimentares (Ridou, Wallis, Autwal, & Sellis, 2012), transtornos do espectro autista (Law Smith, Montagne, Perret, Gill, & Gallagher, 2010) e de ansiedade (Frenkel, Lamy, Algom, & Bar-Haim, 2009), por exemplo,

estão relacionados a diminuição na habilidade perceptiva de determinadas emoções. Indivíduos em quadros depressivos apresentam viés para reconhecimento de tristeza (Bourke, Douglas, & Porter, 2010), e portadores de transtorno de conduta para raiva (Schonenberg et al., 2014).

Diferenças na identificação e na expressão de faces emocionais contribuem para dificuldades interpessoais e manutenção de sintomatologia depressiva e ansiosa, diminuindo a sensação de bem-estar e qualidade de vida. Em estudo experimental, Alves, Rodrigues, Souza e Sousa (2012), avaliaram a atribuição de emoções a faces neutras por indivíduos com ansiedade social, um transtorno relacionado a baixa habilidade social, e concluíram que homens atribuíam mais frequentemente emoções de raiva e mulheres de tristeza a estas faces. Portanto, depressão e ansiedade estão associados a vieses para reconhecimento de faces para ambos os sexos; sendo o primeiro apenas para tristeza e o segundo também para as expressões de raiva e medo (Joormann & Gotlib, 2006). Sendo assim, apesar da inexistência de estudos comprobatórios, acredita-se que características como sexo, nível de habilidades sociais, depressão e ansiedade poderiam causar efeito moderador em intervenções para melhora nessa habilidade.

Alguns experimentos comprovaram a possibilidade de mudança nos vieses para habilidades de reconhecimento de faces. Penton-Voak et al. (2013), por exemplo, realizaram um estudo com jovens com alto risco de delinquência objetivando aumentar o reconhecimento de alegria ao invés de raiva em faces ambíguas. Para isso, imagens de expressões faciais foram expostas em uma sequência de maior para menor intensidade e após isso o participante deveria responder entre alegria ou raiva, seguido de um *feedback* do facilitador, até que o mesmo ficasse igualmente propenso a responder uma ou outra (devido a ambiguidade da expressão facial). Tal estudo não só atingiu seu objetivo, como também apontou para redução na auto e hetero percepção de comportamento violento dos participantes. Ou seja, acredita-se que a intervenção tenha demonstrado resultados positivos para além do contexto experimental.

Estudos apontam que intervenções podem resultar em melhora em habilidades de reconhecimento de faces para pacientes do espectro autista (Schmidt et al., 2011; Stichter, 2010), portadores de esquizofrenia (Marsh et al., 2016; Vázquez-Campo, 2016), prosopagnosia (Davies-Thompson et al., 2017), bipolaridade (Lahera et al., 2012). Porém, poucos relatos de pesquisas envolvendo intervenções com público

geral ou outros diagnósticos com menor grau de comprometimento das habilidades interpessoais foram publicados até o momento. Portanto, fazem parte desta dissertação de mestrado uma revisão sistemática da literatura acerca dos treinamentos para melhora na acurácia de reconhecimento de expressões faciais publicados nos últimos cinco anos e um estudo empírico sobre o desenvolvimento e avaliação da efetividade de uma intervenção computadorizada com o mesmo fim.

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3 ESTUDO 1

Facial Expression Recognition Training for Adults: A Systematic Review

Abstract

Facial expression recognition, as well as the ability of expressing through the face, is fundamental for social interaction. Individual differences in the accuracy of this skill can have implications in social adjustment. It's fundamental to understand how this skill can be enhanced by specific training. This is a systematic review about interventions that increase accuracy in the ability to recognize facial expressions. Method: The PRISMA method was used to perform and describe the present study. Articles published from January 2013 to August 2018 were searched for on the Scopus, PubMed and PsycNET databases. Results: 1228 studies were initially identified and, after applying the exclusion criteria, 35 articles were included in this review. The proposed interventions varied from 25 minutes to 50 hours, with samples of 8 to 484 individuals. Thirty-two (91.4%) studies displayed improvement in facial recognition ability in the post-test evaluation and the effect size ranged from $\eta^2=0.001$ to 0.87 and from $d=0.08$ to 3.30. Discussion: The studies showed wide variation in sample size, number of sessions and types of intervention. Most studies used exposure to photographs and identification of emotions with a gradual increase of difficulty. The majority of them improved facial expression recognition, which suggests that this ability can be improved upon with cognitive interventions.

Key-words: Training; facial expression; emotion recognition; interventions.

3.1 BACKGROUND

Emotions are present in the daily life of every individual. They have developed throughout the evolution of the human species according to adaptive functions. Subject's interpretations, evaluations and responses are also socially constructed (Leahy, 2016). Emotions are internal and non-palpable elements of the individual and there are multiple ways of externalizing them. One of those ways is through facial expressions. Facial expressions are an important element of social

interaction, since nonverbal behaviors allow us to communicate and interact with others. Although some of those forms of communication are learned, it has been shown that facial expressions also have innate characteristics (Miguel, 2015).

Charles Darwin in 1872, and later other researchers such as Ekman and Friesen (1969), proposed the idea that some facial expressions are universal and can be recognized independently of culture and population (Ragsdale et al., 2016). Although this debate has already existed for almost a hundred and fifty years, it is still considered a controversial affirmation, and evidence against this universality has been found in previous studies (Gendron et al., 2014; Jack et al., 2012). In this article we'll assume Darwin and Ekman's perspective that facial expressions are derived from the six basic emotions: happiness, sadness, anger, fear, surprise, and disgust (Ekman & Friesen, 1975) and that they occur from the combination of movements performed by the facial muscles of humans. In this way, it is possible to express not only the emotions, but also specific characteristics about the intensity of them (Vasconcellos et al., 2014).

The ability to recognize facial expressions is progressively developed throughout childhood (Durand et al., 2007; Widen, 2013), and during adolescence the accurate identification of more subtle and complex emotions is enhanced (Johnston et al., 2011). At five years, children can recognize happiness in faces, and a gradual improvement occurs in expressions of surprise, disgust and fear before the age of ten and, after that, in sadness and anger (Gao & Maurer, 2010). The development of the ability to identify emotional faces guides individuals in their social interactions since their first years of life (Montague & Walker-Andrews, 2001). However, misunderstandings can occur in this process, and people can have deficits in this ability (Endres & Laidlaw, 2009).

In order to minimize the negative impact of such impairments, some studies have demonstrated the effectiveness of training to improve the ability to recognize facial expressions (Du et al., 2016; Ragsdale et al., 2016; Yu et al., 2016). For example, an intervention study that explored the relationship between ambiguous-face recognition and aggressive thinking and behavior has found that diminishing the negative bias in recognition may also decrease self-reported anger and aggression in healthy adults (Penton-Voak et al., 2013). This finding also indicates that improving facial emotion recognition can generate more adaptive interpretations and behavior, improving social functioning.

Until now no systematic reviews have been carried out regarding the scope, differences and procedures performed by such studies. We believe that the systematization of this knowledge is relevant, in order to provide a useful tool for researchers and clinicians to make an informed choice regarding the best modality of training to be performed and, in turn, provide people with deficits in emotional processing better treatment choices. This study is a summarized way of (1) knowing what has already been done in this field; (2) what has showed good results; and (3) what is still needed to be done. Thus, the objective of this study was to perform a systematic review of interventions that aimed to evaluate the effectiveness and/or efficiency of training to improve the recognition of facial expressions in adults analyzing studies published in the last five years. In those studies, we analyzed (1) the characteristics of the samples, such as sex, diagnosis; when the intervention is focused on specific psychopathologies, and profession; when it is not focused on specific psychopathologies; (2) format of the interventions; (3) frequency of sessions; (4) existence of follow up evaluation; (5) effectiveness and/or efficiency of the interventions.

3.2 METHOD

3.2.1 Inclusion and Exclusion Criteria

The criteria for inclusion was: (1) Empirical articles; (2) Experimental or quasi-experimental studies with pre- and post-test evaluation; (3) Published in English or Portuguese; (4) in the areas of Psychology, Medicine or Neurosciences; (5) in human research; (6) published between 2013 and 2018. Exclusion criteria was: (1) did not present pre- and post-test evaluation measures for facial recognition ability; (2) did not report results on the accuracy of facial expression recognition; (3) were performed with children and adolescents.

3.2.2 Search Strategies and Data Collection Process

The first search was carried out in Scopus, PubMed and PsycNET databases in June 5, 2017, with the descriptions [Training OR Intervention] AND [Face OR Facial OR Emotion] AND [Expression OR Recognition] within the last five years. The second search was performed in the same databases, on August 28, 2018, with

the same descriptors, within the last year. The search results were filtered by articles in the areas of Psychology, Medicine or Neurosciences and research with humans. All articles were obtained online, from June 2017 to September 2018, through downloads in the mentioned databases.

3.2.3 Article Selection

Two blind evaluators conducted the article selection process. Initially a total of 2308 articles were found and, after excluding repeated ones, 747 titles and abstracts were read by two blind evaluators. We obtained 99% agreement between evaluators from this stage onwards and Kappa value was .94, interpreted as an almost perfect agreement (Cohen, 1960; McHugh, 2012). After reading abstracts and comparing the results of the evaluators, all the studies ($n = 68$) that were approved by one or both of the evaluators, were read in their entirety. After reading the full texts, 26 articles were included in the review.

In the second search, a total of 656 articles were found. After the exclusion of repeats, two blind evaluators read a total of 481 titles and abstracts. Of these, 21 articles were read fully after comparing the results of the evaluators, and 9 were accepted to be included in this review. Therefore, 35 articles were selected and included in this review in the two searches.

3.3 RESULTS

Thirty-five articles were included, of which 26 (74%) had adults with specific psychopathologies and only nine (26%) had healthy adults as subjects. Figure 1 shows the flowchart of this process, illustratively condensing the data search process to the final result. Detailed information about selected articles are shown in Table 1.

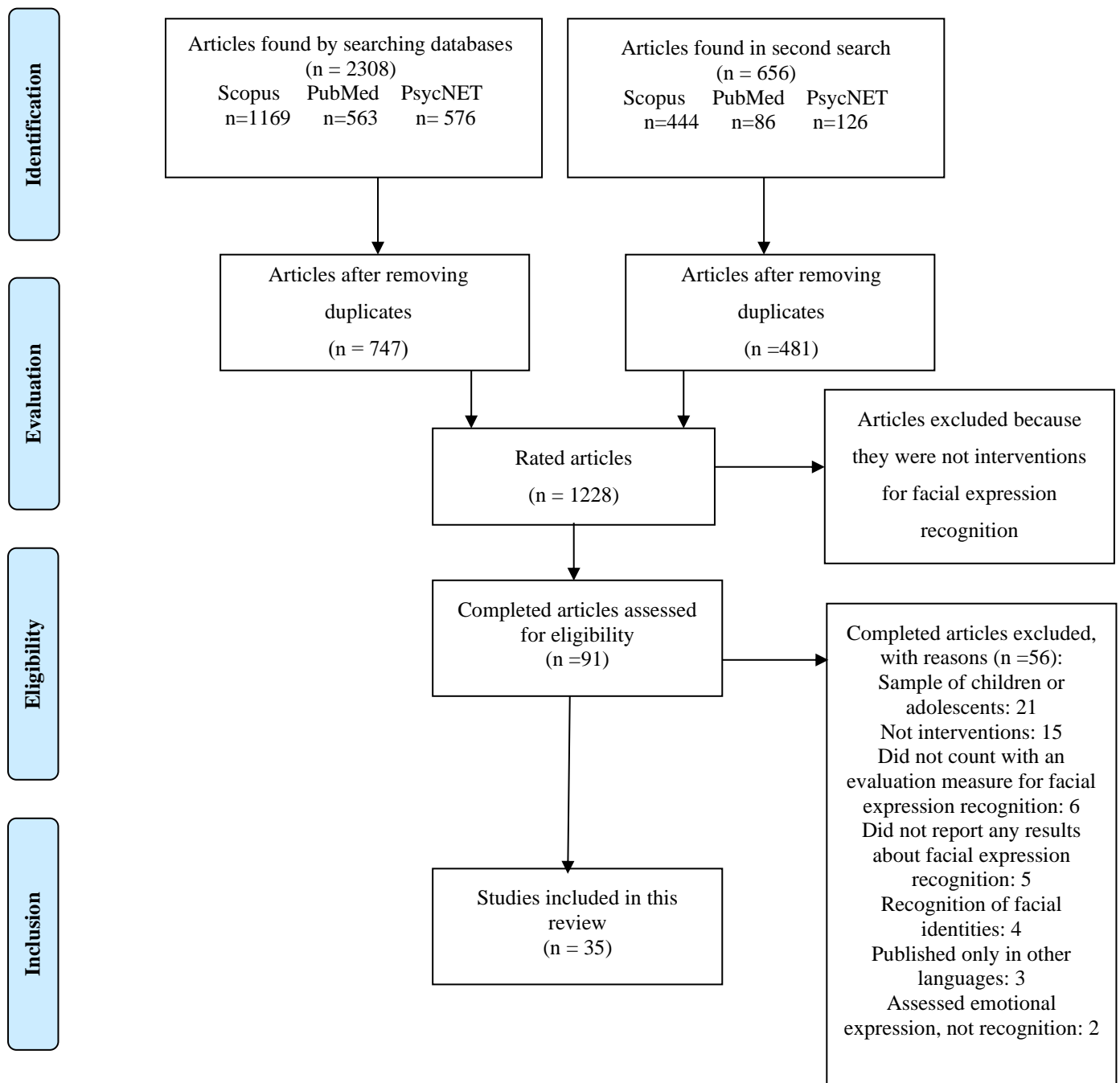


Figure 1: Flowchart of the identification, evaluation and selection of articles

Authors	Year	Type of intervention	Sample	Results	Limitations
Sevos, J., Grosselin, A., Gauthier, M., Carmona, F., Gay, A., Massoubre, C.	2018	Group. The intervention group received Cinemotion training: (1) the participant identifies the emotion expressed in cinematographic extracts; (2) implements strategies; (3) validates and reinforces the strategies learned; and (4) expresses the facial emotion trained during the session; and was then compared with a control group.	31 patients with Schizophrenia (25.8% women)	The intervention group presented a significant improvement in facial recognition of disgust, sadness and anger when compared to the control group [$\eta^2=0.31$].	There was no follow up. Only the emotions of happiness, sadness, fear, anger and disgust were trained. The sample was composed predominantly of men.
Maroño Souto, Y., Vázquez Campo, M., Díaz Llenderrozas, F., Rodríguez Álvarez, M., Mateos, R., & García Caballero, A.	2018	Individual. The computerized e-Motional Training (ET®) training was compared to the usual treatment.	60 participants with Schizophrenia (21.7% women)	Significant increase in facial expression recognition ability was observed in the intervention group when compared to the control group [$\eta^2=0.461$].	The sample was composed predominantly of men
Bechi, M., Bosia, M., Spangaro, M., Pignoni, A., Buonocore, M., Scrofani, D., ... Cavallaro, R.	2018	Group. Three interventions were compared: (1) Emotional recognition through video, without audio (ERV); (2) Emotional recognition through	35 participants with Schizophrenia	Only the ERV group showed a significant improvement in the accuracy of facial expression recognition [$d=0.57$].	Reduced sample size. Each group had 12 participants. There was no follow up. The sex of the participants was not reported.

		audio (ERA); (3) Control group (ACG).			
Thonse, U., Behere, R.V., Frommann, N., Sharma, P.S.V.N.	2018	Group. Training of Affect Recognition (TAR), Indian version, divided into three blocks with four sessions each.	10 participants with Schizophrenia	Significant improvement was observed in the post-intervention evaluation for the ability to recognize facial expressions [$d=0.858$].	Reduced sample size. The sex of the participants was not reported. There was no control group. There was no follow up. The training was not described in depth.
Gordon, A., Davis, P. J., Patterson, S., Pepping, C. A., Scott, J. G., Salter, K., & Connell, M.	2018	Group. The Social Cognition and Interaction Training (SCIT) program was compared to the usual treatment.	36 participants with Schizophrenia	There was no significant difference in the ability to recognize faces in the pre and post between groups [$\eta_p^2=0.001$]. However, the SCIT group presented a significant time effect [$\eta_p^2 = 0.328$]. The ability improved in post-test and remained at follow-up.	Reduced sample size. The sex of the participants was not reported.
Barbato, M., Buchy, L., Bray, S., MacMaster, F., Deighton, S., Addington, J.	2017	Individual. The Micro Expressions Training Tool (METT) and SETT (Subtle Expressions Training Tool) intervention was compared to varied games online.	14 participants with initial diagnosis of psychosis (16.6% women)	The groups did not differ in the post-test, but the ability to recognize facial expressions increased significantly in the experiment group [$d=0.95$].	Reduced sample size. The intervention group had only 8 individuals. The sample was composed predominantly of men There was no follow up.
Neumann, D., Westerhof-Evers, H. J., Visser-	2017	Individual. Two interventions were compared: (1) T-ScEmo, for	61 participants with traumatic brain injury	Significant improvement in facial recognition ability was identified in both groups, but	The sample was composed predominantly of men

Keizer, A. C., Fassoti, L., Schönherr, M. C., Vink, M., van der Naalt, J., & Spikman, J. M.		social cognition and emotional regulation; and (2) Cogniplus, for cognition in general.	(17% women)	with a higher intensity in the T-ScEmo group [$d=0.73$].	
Schlegel, K., Vicaria, I. M., Isaacowitz, D. M., Hall, J. A.	2017	Does not mention type of intervention. The TERA (Training Emotion Recognition Ability) intervention was compared to four different control groups.	Study 1: 103 university students (61% women) Study 2: 159 healthy adults (61% women) Study 3: 168 university students (50% women) Study 4: 98 elderly (64% women)	Three studies showed that the intervention increased the ability to recognize facial expressions and that the improvement was maintained for at least four weeks. Study four, with elderly population, did not show significant improvement [$d= 1.14$, $\eta^2 = 0.07$, $d = 0.84$, $d = 0.08$].	
Palumbo, D., Mucci, A., Piegari, G., D'Alise, V., Mazza, A., Galderisi, S.	2017	Individual. Two trainings were compared: (1) SoCIAL (Social Cognition Individualized Activities Lab), focused on emotional recognition and theory of mind; and (2) SSANIT (Social Skills and Neurocognitive Individualized Training),	10 participants with schizophrenia (60% women)	No training effect was observed for the ability to recognize facial expressions.	Reduced sample size. Only 5 participants in each group. Only the emotions of happiness, sadness, anger, disgust and fear were trained. There was no follow up.

		focused on cognitive remediation.			
Tsotsi, S., Kosmidis, M.H., Bozikas, V.P.	2017	Individual. Three interventions were compared: (1) Facial Affect Recognition (FAR) training: training for recognition of emotional cues on the face, (2) Attention-to-facial-features intervention: and (3) Usual treatment.	39 patients with schizophrenia (49% women) and 24 healthy controls (50% women)	The schizophrenic participants of the FAR group performed better in the post-test evaluation than in the other two groups [$\eta^2_p=0.31$], being comparable to the performance of the healthy controls in the pre-test.	There was no follow up.
Kempnich, C.L., Wong, D., Georgiou-Karistianis, N., Stout, J.C.	2017	Individual. MicroExpression Training Tool (METT): training to identify micro facial expressions through exercises with psychoeducational photos and videos.	22 individuals with Huntington's disease (50% women)	The group that performed the training had higher rates of improvement in general post-test performance when compared to the control group [$\eta^2_p = 0.36$], but sadness was the only emotion that presented significantly higher scores in the post-test compared to the baseline [$\eta^2_p = 0.20$].	Reduced sample size. The study ended with only 9 participants in the intervention group. It shows no results for the emotion of happiness.
Du, Y., Zhang, F., Wang, Y., Bi, T., Qiu, J.	2016	Does not mention the type of intervention. Exposure and classification of emotions to images of facial expressions with feedback received.	59 healthy individuals (83% female)	Perceptual learning of faces improved 41.34%. The results were maintained after one month.	The sample was composed predominantly of women. The emotions of disgust, fear, anger and surprise were not included in the training. There was no control group,

					therefore no data was provided for effect size calculation. Five experiments were performed, but none are described in depth.
Marsh, P.J., Polito, V., Singh, S., Coltheart, M., Langdon, R., Harris, A.W.	2016	Group. Two trainings were compared: "SoCog" Mental-State Reasoning Training (SoCog-MSRT): for ability to recognize mental states; and "SoCog" Emotion Recognition Training (SoCog-ERT): for the ability to recognize facial micro-expressions.	31 individuals with schizophrenia or schizoaffective disorder.	The training did not show improvement in the post test for the task of evaluating negative emotions. However, half of the participants in the ERT group showed a moderate increase in the accuracy of the recognition of T1 to T2 [d=0.68].	The sex of the participants was not reported.
Yu, E.H., Choi, E.J., Lee, S.Y., Im, S.J., Yune, S.J., Baek, S.Y.	2016	Group. Training in the form of an hour-long class on the seven facial expressions of basic emotions. The trainings (METT and SETT) were not described in depth, however it is known that exercises with photographs were used.	82 healthy individuals (46% female)	METT hitting average scores increased 29.3% [d = 1.22] and SETT 36.2% [d = -1.21] in post training.	The trainings used were not described in depth. There was no follow up.
Ragsdale, J.W., Van Deusen, R., Rubio, D., Spagnoletti, C.	2016	Group. Workshop including theory and practical exercises of attribution of emotions to the images and	156 healthy individuals (48,1% female)	Accuracy in face recognition ability increased from 54.7% to 79.6%.	There was no control group. There was no follow up. Does not provide training's effect size for improvement of

		interpretation of facial expressions.			facial affect recognition ability.
Gil-Sanz, D., Fernández-Modamio, M., Bengochea-Seco, R., Arrieta-Rodríguez, M., Pérez-Fuentes, G.	2016	Group. The Social Cognition Training Program (PECS) was tested in individuals with and without Schizophrenia. The program consists of four modules that aim to train emotional processing, theory of mind and attributive styles, social perception and personalization.	44 non-institutionalized schizophrenic patients (45% female) and 39 healthy controls (56% female)	Patients with schizophrenia who underwent training showed better performance when compared to those who did not, for recognition of faces of sadness, anger, fear and disgust [$d = 0.82$].	
Vázquez-Campo, M., Maroño, Y., Lahera, G., Mateos, R., García-Caballero, A.	2016	Individual. The e-Motional Training (ET®) program was compared with the usual treatment (occupational therapy and leisure group).	21 patients with schizophrenia (37% women)	The intervention group presented significant improvement in the ability of emotional recognition, mainly for the emotions of fear, sadness and anger [$d = 3.30$]	Reduced sample size. The intervention group had 10 participants at the end of the experiment. The sample was composed predominantly by men There was no follow up.
Taylor, R., Cella, M., Csipke, E., Heriot-Maitland, C., Gibbs, C., Wykes, T.	2016	Group. The Social Cognition and Interaction Training (SCIT) program was compared with the usual treatment.	36 schizophrenic men under forensic care	The SCIT group showed a significant improvement in the ability to recognize facial expressions when compared to the usual treatment group ($\eta^2=0.24$).	The sample was composed exclusively of women There was no follow up. Reduced sample size. The intervention group had 16 participants at the end of the experiment. The intervention was not described in depth. Trained emotions are not

					described.
Gaudelus, B., Virgile, J., Geliot, S., Franck, N., Dupuis, M., Hochard, C., ..., Peyroux, E.	2016	Individual. Comparison of two treatments: GAÏA s-face program (GAÏA arm), focusing on the recognition of facial expressions; and RECOS program (RECOS arm), focusing on selective attention.	40 individuals with schizophrenia (20% women).	The study showed a significant improvement in facial recognition ability in both groups, with greater effect in GAÏA arm group (16.21%) [$d = 2.41$].	The sample was composed predominantly of men There was no follow up. Reduced sample size. The RECOS group had 15 participants at the end of the experiment. There was no control group.
Pollux, PM	2016	Individual. Training with face recognition tasks with emotional photographs and feedback receiving.	16 healthy adults (81% female)	Their results pointed to the significant effect of pre and post-test training for accuracy in face recognition [$\eta p^2 =$ 0.87].	The sample was composed predominantly of women. Reduced sample size. The intervention group had only 8 participants. The emotions fear, disgust and anger were not included in the training.
Byrne, L.K., Pan, L., McCabe, M., Mellor, D., Xu, Y.	2015	Group. Comparison of the usual treatment with the same, followed by the combination of two computerized trainings, Facial Affect Recognition training (FAR) and Computerized Drill Training (CDT), composed of twelve sessions of exposure and classification of emotions to the	40 men with schizophrenia	The pre and post test change in the intervention group was statistically significant [$d = -$ 0.80].	The sample was composed exclusively of men. There was no follow up.

		images of facial expressions with feedback receiving; associated with arithmetic exercises, lists of numbers, combination of pairs, spatial working memory and word list.			
Griffiths, S., Jarrold, C., Penton-Voak, I.S., Munafò, M.R.	2015	Individual. Exposure and classification of emotions to images of facial expressions with feedback received.	119 healthy individuals (74.8% female)	There was no improvement in the accuracy of face recognition ability. Participants were only biased towards detecting trained emotion.	The sample was composed predominantly of women. The emotion sadness, disgust, anger and surprise were not included in the training. There was no follow up.
Neumann, D., Babbage, D.R., Zupan, B., Willer, B.	2015	Individual. Three computerized interventions were compared. (1) Intervention "faces": exposure and classification of emotions to images; (2) Intervention "stories": inferences of emotional states from contextual information presented in video stories; (3) Cognitive training control: composed of computer games focused on improving cognitive processes, but without any type of training focused on emotions.	71 individuals with brain injury (26% women)	Compared with the control group, the "faces" group presented a significantly greater increase in the recognition of facial expressions [$d = 1.08$].	The sample was composed predominantly of men. The emotions of disgust and surprise were not included in the training.

Bölte, Sven; Ciaramidaro, Angela; Schlitt, Sabine; Hainz, Daniela; Kliemann, Dorit; Beyer, Anke; Poustka, Fritz; Freitag, Christine; Walter, Henrik	2015	Individual. Comparison of the usual treatment with the same, followed by a computerized cognitive training of recognition of facial expressions through exposure and classification of emotions to the images with feedbacks.	32 autistic adolescents and adults (6% women) and 25 healthy controls (16% women)	The "autism-experiment" group presented significantly superior results when compared with the "autism control" group [$d = -0.49$].	The sample was composed predominantly of men. There was no follow up.
Pollux, P.M., Hall, S., Guo, K.	2014	Individual. Exposure and classification of emotions to images of facial expressions with feedback received.	16 healthy individuals (50% female)	Individuals obtained an increase in the accuracy of the recognition of low and moderate intensity faces (10- 40%). However, precise measurements of such an increase were not achieved by the lack of baseline assessment.	Reduced sample size. There was no pre-intervention evaluation. There was no follow up. The emotions of disgust, anger and surprise were not included in the training.
Drusch, K., Stroth, S., Kamp, D., Frommann, N., Wölwer, W.	2014	Group. Training of emotional recognition with gradual increase of difficulty through photographs of facial expressions and social situations.	16 patients with schizophrenia and 16 healthy controls (22% women)	The accuracy in face recognition ability increased by about 10% [$d = -0.19$].	The sample is composed predominantly of men There was no follow up.
Hasson-Ohayon, I., Mashiach-	2014	Group. Comparison of psychological	55 patients with	The SCIT group significantly improved the face recognition	The intervention was not described in depth.

Eizenberg, M., Avidan, M., Roberts, D.L., Roe, D.		orientation with the same, followed by the training of social cognition and interaction training (SCIT). The training was not described in the body of the text.	Schizophrenia, Schizoaffective Disorder or Mood Disorders (44% women)	ability [$d = 0.44$].	
Schönenberg, M., Christian, S., Gaußer, A.K., Mayer, S.V., Hautzinger, M., Jusyte, A.	2014	Does not mention the type of intervention. Comparison of two trainings: (1) Sensitivity training of emotional expressions; and (2) Attention training. Both using modified videos of emotional faces neutral until expressions of specific emotions.	44 men incarcerated for domestic violence and 43 controls	Only the group trained for emotional sensitivity showed a significant improvement in facial recognition ability.	The sample was composed exclusively of men. No effect size data was presented.
Hurley, C.M., Anker, A.E., Frank, M.G., Matsumoto, D., Hwang, H.C.	2014	Individual. Exposure and classification of emotions to images of facial expressions receiving feedback associated with psychoeducation.	Study 1: 231 (56.2% women) healthy individuals Study 2: 155 (36% female) healthy individuals	Both studies showed improvement in post-training, however, percentages of increase in accuracy of face recognition ability were not described.	There was no follow up. It does not present training effect size data for improved face recognition ability.
Huelle, J.O., Sack, B., Broer, K., Komlewa, I., Anders, S.	2014	Individual. Watch and sort facial expressions on video clips without feedback	38 healthy women	Accuracy in face recognition increased 10% in post-training.	The sample was composed exclusively of women. The emotions of happiness and surprise were not included in the training.

					No data were presented for effect size. There was no follow up. There was no control group.
Rocha, N.B., Queirós, C.	2013	Group. Metacognitive and social cognitive training (MSCT) to remedy deficits and correct biases in social cognition.	35 patients hospitalized with Schizophrenia (11.4% women)	The MSCT group demonstrated significant improvement in emotional recognition tasks [$d = -0.99$].	The sample was composed predominantly of men There was no follow up. Reduced sample size. The intervention group had only 18 participants. Trained emotions are not described.
Bartholomeusz, C.F., Allott, K., Killackey, E., Liu, P., Wood, S.J., Thompson, A.	2013	Group. The evaluation of the Social cognition and interaction training (SCIT), for recognition of facial expressions and attributive styles.	12 participants in the first psychotic episode (58% women)	Participants improved significantly in emotional recognition of low intensity expressions [$\eta^2 = 0.42$], demonstrating that SCIT is potentially beneficial for young people in the early stage of psychosis.	There was no follow up. Reduced sample size. There was no control group. Trained emotions are not described. The training was not described in depth.
Lindenmayer, J.P., McGurk, S.R., Khan, A., Kaushik, S., Thanju, A., Hoffman, L., Valdez, G., Wance, D., Herrmann, E.	2013	Individual. Comparison of the cognitive remediation program (CR) isolated or associated to the program of emotional perception (MRIGE). Use of interactive games to classify emotional states through videos.	59 patients hospitalized with Schizophrenia or Schizoaffective Disorder	CR associated with MRIGE produced greater improvements in emotion recognition and emotional discrimination when compared to CR alone [$d = -1.17$].	The sex of the participants was not reported. There was no follow up. Fear emotion was not included in the training. There was no control group.

Lahera, G., Benito, A., Montes, J.M., Fernández-Liria, A., Olbert, C.M., Penn, D.L.	2013	Group. Comparison of interaction training and social cognition (SCIT) with usual treatment.	37 patients with Bipolar Disorder or Schizoaffective Disorder (63% women)	The SCIT presented an improvement effect on social cognition and social functioning, including face recognition [$d = -0.49$].	There was no follow up. Trained emotions are not described.
Kandalaft, M.R., Didehbani, N., Krawczyk, D.C., Allen, T.T., Chapman, S.B.	2013	Individual. Virtual reality training for social cognition (VR-SCT), enabling the participant to interact with people and social situations in a virtual environment.	8 patients with Autistic Spectrum Disorder (25% women)	The training found a significant increase in social cognitive measures of the theory of mind and in the recognition of facial expressions [$\eta^2 = 0.69$], as well as in social and occupational functioning.	The sample was composed predominantly of men. Reduced sample size. There was no control group. There was no follow up.

Table 1

Empirical studies about facial expression recognition interventions

3.3.1 Characteristics of Samples

Concerning the samples, 54% (n = 19) of the articles proposed interventions for individuals with schizophrenia or psychotic disorders, 26% (n = 9) with healthy populations, 5.71% (n = 2) with autistic spectrum disorders and cerebral injuries and 2.85% with Huntington's disease (n = 1), mood disorders (n = 1) and male aggressors (n = 1). Of these, two studies had mixed populations, one of them being adolescents and healthy adults versus people with autistic spectrum disorder (Ciaramidaro et al., 2015), and another with healthy children versus healthy adults (Pollux, Hall, & Guo, 2014).

Only 20% (n = 7; Barbato et al., 2017; Huelle et al., 2014; Hurley et al., 2014; Lindenmayer et al., 2013; Neumann et al., 2015; Pollux, Hall, & Guo, 2014; Schlegel et al., 2017) of the articles provided information about the ethnicity of the subjects; six of them reported majorities of Caucasians and one (Lindenmayer et al., 2013) reported 55.56% of African Americans. Concerning the age of the samples, 51.42% (n = 18) reported that their subjects were adults ranged between 18 to 70 years old and 14.28% (n = 5) reported young adults (under 33 years old); 34.28% (n = 12) opted to report the average age of participants, which varied within a range of 19.56 (Schlegel et al., 2017) to 47.45 (Kempnich, Wong, Georgiou-Karistianis, & Stout, 2017).

3.3.2 Format of Interventions

Regarding the type of intervention used, twelve studies (34.28%) used exercises with exposure and attribution of emotions to images, with or without multiple-choice options. One study (Du et al., 2016) also used imaging exposure, but with attribution of emotional intensity, not emotional state.

Seven studies (20%; Barbato et al., 2017; Hooker et al., 2013; Hurley et al., 2014; Kempnich et al., 2017; Lindenmayer et al., 2013; Marsh et al., 2016; Yu et al., 2016) used the Micro Expression Training Tool (METT) and Subtle Expression Training Tool (SETT), a well known and validated tool developed by *Paul Ekman Group*, purchased through the website (www.paulekman.com). The first aims to improve the detection capacity of micro expressions and the second to recognize specific movements of certain regions of the face, which are used when the subject tries to control a strong emotion.

Five studies (14,28%; Bartholomeusz et al., 2013; Hasson-Ohayon et al., 2014; Lahera et al., 2013; Taylor et al., 2016; Gordon et al., 2018) used the *Social Cognition and Interaction Training* (SCIT), which utilizes 16 to 20 45-min manualized group sessions, twice a week. The treatment comprises three phases: (1) training of recognition of emotions considering social context; (2) recognition of attributive styles and "discover situations"; and (3) integration of these skills into real life situations. The first sessions are based on emotional perception and the following on Theory of Mind, attributive styles and other processes, such as reaching conclusions and tolerating ambiguity.

In addition to SCIT, two other interventions also included modules focused on Theory of Mind and attributive styles. E-Motional Training (ET®) and the Treatment for Social cognition and Emotion regulation (T-ScEmo). The first was evaluated in two studies (5,71%; Vasquez-Campo et al., 2016; Maroño Souto et al., 2018) and utilizes modulation training of the emotional perception and an animation for Theory of Mind and attributive styles.

The first four sessions focus on recognizing facial expressions through games, starting with easier tasks and increasing the level of difficulty, until micro-expressions. The final eight sessions consist of an interactive animation in which after each scene the participant is invited to answer questions about the characters involving Theory of Mind, social perception and attributive styles. The second was tested by Westerhof-Evers et al. (2017) and consists of three modules that aim to improve social relations, through improvement in emotional recognition, Theory of Mind, perspective taking, increase of desired behaviors and inhibition of unwanted behaviors for individuals with traumatic brain injury.

Two studies (5,71%; Byrne et al., 2015; Tsotsi, Kosmidis, & Bozikas, 2017) tested *Facial affect recognition (FAR) training*, in which the six emotions were divided into specific modules containing three phases. In the first phase the subjects were exposed to an image and had to respond which of the seven emotions better represented the photographs. The phase ends when the subject responds correctly to all five images of the same emotion. In the second stage the trained emotion was compared with a neutral face. The participant was exposed to two photos of the same model expressing a neutral face and an emotional face and was instructed to point out the facial differences in the two photographs. Then, the facilitator emphasized the differences not pointed out by the participant. The third and last phase was

practical, in which the participants were exposed to images of all six emotions and were instructed to show the facilitators the differences between the faces.

Sevos et al. (2018) developed and made a pilot study with the intervention Cinemotion, which consists of four steps repeated successively in each session. Participants are invited to (1) watch a movie clip associated with a specific emotion and discuss what they have observed; (2) analyze the facial expressions of the actors based on a description provided by the facilitators, focusing on the eyes, mouth and nose cues; (3) re-watch the films to reinforce the knowledge gained; (4) to simulate and demonstrate, with the facilitator, the emotions taught. The fourth step is recorded and the next session begins with the video recorded at the last meeting.

Schlegel et al. (2017) tested, with four experiments, the Training Emotion Recognition Ability (TERA) program. In which participants were given instructions about the meaning of each emotion, how they are expressed, non-verbal cues and two videos illustrating each of them. After this stage, in the practical part, they were exposed to small video clips, in which actors express different emotions while nonsense phrases are uttered. This way they could train the acquired knowledge without using contextual clues, such as the phrases issued. Another similar intervention was developed by Bechi et al. (2018), which also used videos and classification of expressions, but evaluating half of the subjects using videos without audio and other half with audio without images, to unravel the effect of learning associated with sound and image.

Gaudelus et al. (2016) also compared two individualized interventions developed by the authors: GAÏA s-face program (GAÏA arm) and RECOS program (RECOS arm). The first is a social cognition remediation training focused on recognizing facial expressions. The program lasts ten weeks and the sessions take place three times a week for one hour. Every week one of the sessions are performed individually by the patient in their daily context, without the aid of the facilitator. The training consists of three phases, (1) exercises of emotion recognition through photographs; (2) computer exercises with videos that increase difficulty gradually; and (3) generalization exercises, working on complex emotions. The second is a neurocognitive remediation program consisting of three weekly sessions lasting one hour. The treatment uses manual and computerized tools, in the office and at home.

The MRIGE program was tested and developed by Lindenmayer et al. (2013) in which participants can access a platform where each emotion is demonstrated and defined through videos, audios and images. The access happens in an app that allows the user to

interact with such scenarios, adding notes, playing five different types of games, or reading educational stories.

Rocha and Queirós (2013) tested the Metacognitive and social cognition training (MSCT). The program aims to remedy deficits and correct biases in social cognition through 18 group sessions in ten weeks. The first session focuses on the relationship between emotions, thoughts and behaviors, focusing on mistakes made when it's believed that a causal relation exists. After that, the first weekly session is psychoeducative about metacognition and the second one focuses on cognitive remediation in an interactive way (emotional clue processing, social situations analysis, understanding non-literal speech, deception and the ability to create a new perspective). In the last session patients are encouraged to transpose the learning into their daily lives. All the sessions have interactive exercises, which used video clips and photographs about the differentiation of facts and assumptions. Ability to identify sarcasm, deception, ambiguous situations and to put yourself in another's perspective are also trained during sessions, with homework, and group discussion.

Kandalaft et al. (2013) evaluated Virtual Reality Training for Social Cognition (VR-SCT). The system developed as a semi-structured intervention that gives realistic and dynamic opportunities to engage, practice and obtain feedback on significant social scenarios of young adults. In this intervention the participant is introduced to different routine situations and asked to interact in a specific place and with a specific person, according to each scenario. This exposure stimulates real-life performance of emotion recognition (recognizing the feelings and tone of voice of others), Theory of Mind (recognizing and responding to the thoughts and desires of others, as per the author's definition), and conversation skills. After the training they found a significant increase in social cognitive measures of Theory of Mind and in emotion recognition, as well as in social and occupational functioning. This indicates that virtual reality has the potential to be a tool for improvement in social skills, cognition and functioning in autism.

3.3.3 Frequency of Sessions and Follow up

The thirty five studies presented interventions ranging from 25 minutes (Hurley et al., 2014) to fifty-hours (Hooker et al., 2013) in duration, with samples of eight (Kandalaft et al., 2013) to 484 individuals (Hurley et al., 2014). Seventeen studies (48.6%) reported to have individual training, fifteen (42.8%) were performed in groups and three (8.6%) of them did

not mention the format of the interventions. Twelve studies (34%) reported to have follow ups, the others did not report either way.

It was not possible to reach any conclusive pattern regarding the duration of the intervention or individualized/groupal format versus effectiveness. Both large and small effect size were performed by long-term interventions. Also it was possible to identify short interventions with strong effect size as well as others with no significant differences between pre and post evaluation.

3.3.4 Evaluative Measures in the Interventions

The most used evaluation measure in interventions ($n = 7$; 20%; Bechi et al., 2018; Hasson-Ohayon et al., 2014; Lahera et al., 2013; Lindenmayer et al., 2013; Palumbo et al., 2017; Rocha & Queirós, 2013; Taylor et al., 2016) was Facial Emotion Identification Test (FEIT; Kerr & Neale, 1993), which consists in exposure and classification of black and white images through multiple-choices, containing facial expressions of the six basic emotions and neutral faces. Other measures used in more than one study were: Ekman 60 Faces Test (Ekman & Friesen, 1976), used in three studies (Taylor et al., 2016; Vázquez-Campo et al., 2016; Kandalaft et al., 2013); Diagnostic Assessment of Nonverbal Accuracy 2-Adult Faces (DANVA 2-AF; Nowicki & Duke, 1994), used in two studies (Bartholomeusz et al., 2013; Neumann et al., 2015); the Test of Reconnaissance des Emotions Faciales (TREF; Gaudelus & Franck, 2012), used in two studies (Gaudelus et al., 2016; Sevós et al., 2018); and the Penn Emotion Recognition task (ER40; Gur et al., 2002), also used in two studies (Barbato et al., 2017; Lahera et al., 2013). Other studies used similar tests, developed by the authors. All of the studies that performed pre-test evaluations used instruments in which participants are exposed to images and should classify the photo they saw according to a multiple choice list containing the six basic emotions and the neutral face option.

3.3.5 Effectiveness of Interventions

Thirty-two studies (91.4%) had positive results in the ability to recognize faces at the post-test, showing a variation in their effect size of $\eta^2 = 0.001$ to 0.87 and $d = 0.08$ to 3.30 and only three of them did not achieve any improvement (Griffiths et al., 2015; Marsh et al., 2016; Palumbo et al., 2017). Four studies (Hurley et al., 2014; Huelle et al., 2014; Ragsdale et

al., 2016; Schöenberg et al., 2014), despite signaling positive results, did not present enough data to perform the calculation on their effect sizes. No pattern of format of intervention versus effect size was observed.

3.4 DISCUSSION

From the analysis it is possible to observe a large variation in the sample size, in the duration of interventions and number of sessions, which makes the interpretation of the results more difficult, and consequently also presented a wide variability in effect size. In the studies performed with Schizophrenic participants, the samples were composed mainly of men, which is congruent, since this is a disorder with higher incidence in this sex (<http://www.who.int/news-room/fact-sheets/detail/schizophrenia>, retrieved October 22, 2018). In the studies with healthy adults sample ($n = 9$), almost half (44.44%) had women predominance, and all the studies that reported the origin of their samples utilized university students ($n = 8$).

Regarding the format of the interventions, not many conclusions regarding to what leads to a better outcome could be achieved, since there was no homogeneity in the results of the interventions. The use of exposure and classification images or videos was the most used strategy. In addition, gradual increase of difficulty activities was pointed out as important for the effectiveness of interventions. The only intervention highlighted by significant innovation comparing to the others was developed by Kandalaft et al. (2013), using a virtual reality scenario. An important aspect to consider about the results is that 54.2% of interventions developed and used their own measures to evaluate the improvement in facial expressions ability. Despite that they all utilized exposure and classification of images, the fact that they were not all well validated may compromise the reliability of the results.

Although 91.4% of the studies indicated an improvement in facial expression recognition ability, this improvement was sometimes not recognized in all the basic facial expressions but only in specific ones. As it's shown in Table 1, nine studies didn't include all six of the basic emotions in the training and three didn't describe the trained facial expressions. Besides that, only 34% had follow up evaluation, which also compromises in part the reliability of such results. Another hypothesis that should be considered is the existence of a publication bias, since it's possible that other studies have been performed but not published for not presenting positive results.

This study was the first systematic review about interventions that aimed to improve facial expression recognition skills in adults. As per our limitations, it is emphasized that the search was carried out only in three databases and only Portuguese and English articles were accepted. It is believed that an increase in the possibility of creating new interventions solving the methodological problems committed so far is possible from the findings of this review.

3.5 CONCLUSION

The number of publications about facial affect recognition increases every year, nevertheless there aren't many interventions aiming to improve this ability. This review pointed to a deficit of homogeneity in the existent interventions, which may indicate that this is still a young field. Most interventions still not include follow up evaluations and those which do only analyze the subjects progress for a few months. In order to remedy this lack, it would be appropriate that future interventions prioritize the use of well known evaluation tests in rigid experimental design, following the subjects for a longer period of time.

It's possible to say that facial affect recognition ability can be trained but the influence of improvements in this ability in daily life still not well known. For future research, it's important to develop studies assessing the effect of improvements in facial expressions recognition in everyday life and try to make clearer which populations would be better benefited with these changes.

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4 ESTUDO 2

Emotion hunters: development and efficacy of a computerized game to improve facial affect recognition

Abstract

Facial affect recognition may play a determinative role in the social functioning of human beings. However, not all individuals perform this skill well – which may have implications for social adjustment. It has been hypothesized that this ability can be trained. This study aimed to develop and evaluate the efficacy of a computerized game to improve this ability. A total of 82 undergraduate students were allocated to an experimental (n=41) or a control (n=41) condition. Accuracy in facial affect recognition was assessed in three exposure times (200, 500 and 1000ms) before and after the intervention. 53,6% (n=44) of these subjects were also tested one month later in all measures. The effect of the training was examined via repeated measure analysis. Results revealed significant and positive time effect for all participants between pre- and post-test for anger and happiness. Differences between groups, with greater improvement in the experimental group, were observed in anger and marginally significant in happiness. Those results, with the exception of the first one, were confirmed in the follow up evaluation. Explanatory hypotheses for those and others findings include specificities of each emotion, sample characteristics, assessment, and training limitations and are discussed throughout this study.

Key-words: Training; facial expression; emotion recognition; interventions.

4.1 BACKGROUND

Basic emotions can be described as affective states organized into clusters that are comprised of facial expressions and physical reactions (Ekman, 1992). There are six types of emotions universally known: happiness, fear, anger, sadness, disgust and surprise (Ekman, & Friesen, 1975). The ability of identifying facial expressions begins to develop early in childhood and by ten years old children already understand all six of them (Durand, Galloway, Seigneuric, Robichon, & Baudouin, 2007). Good accuracy in interpretation of facial expressions is a key skill in social interaction. The face shows the state of mind from one to another and permits each person to adjust their behavior accordingly (Smith, Cottrell, Gosselin, & Schyns, 2005). Misunderstanding facial clues can lead to a generalization of

negatives beliefs about social interactions and maintain symptoms of anxiety and avoidance (Button, Lewis, Penton-Voak, & Munafo, 2013).

Despite its innate developmental trajectory, research has shown that facial affect recognition is trainable (Du, Zhang, Wang, Bi, & Qiu, 2016). Training people to interpret facial expressions correctly or solving deficits in this ability may be clinically beneficial. Good improvement following training has been found in interventions for facial recognition accuracy in some mental diseases, such as schizophrenia (Maroño Souto et al., 2018; Thonse, Behere, Frommann, & Sharma, 2018), autism (Bölte et al., 2015; Kandalaft, Didehbani, Krawczyk, Allen, & Chapman, 2013) or mood disorders (Hasson-Ohayon et al., 2014; Lahera et al., 2013). Nevertheless, it was also found that people without any diagnosis could benefit from these kinds of interventions (Du, Zhang, Wang, Bi, & Qiu, 2016; Pollux, 2015; Schlegel, Vicaria, Isaacowitz, & Hall, 2017). This could be explained by the fact that this ability is a central part of a construct called social skills, that depend on decoding complex signals, not only spoken but also from non-verbal language (Frith, 2009).

A systematic review (Rebeschini, de Moura, Gerhardt, & Arteche, 2018, submitted) about facial affect recognition interventions found nine experiments using healthy adults in the past five years. Among these studies only one did not show improvement in this ability (Griffiths, Jarrold, Penton-Voak, & Munafò, 2015), although six of them did not have a follow up evaluation of the participants to check if the effects of the training remained after a period of time. None of them created interactive strategies to train this ability, they only used exposure and classification image activities in the form of courses.

Tsotsi, Kosmidis and Bozikas (2017) published a successful thirty minutes intervention made for people with schizophrenia, and Paul Ekman's group sells on their website (www.paulekman.com) a one-hour computerized training for people without any mental diseases (Micro Expression Training Tool - METT). But none of them made it in form of an interactive game. Although METT's efficacy is well known, all versions are now paid and only available in English. We hypothesize that even better results could be achieved using an interactive tool, as a computerized game. It could call the participant's attention and lead to better engagement with players. This study aimed to develop and evaluate a computerized game to improve facial expressions recognition ability in adults in general.

4.2 METHOD

4.2.1 Measures

1. Sociodemographic Questionnaire: developed specially for the study containing information about life history, economic conditions, use of medications, history of psychiatric diagnosis, diseases, etc.
2. Facial Emotion Recognition Task (FERT): three tasks with different images were developed for this study, one for each evaluation. Each task was composed of 28 images of adult faces containing six facial expressions of each basic emotion (sadness, fear, disgust, happiness, anger, surprise) and one with a neutral face. All facial expressions were represented by both male and female faces to eliminate gender bias. The pictures were selected from the NimStim Set of Facial Expressions (Tottenham et al., 2009) and presented in three different exposure times (first 200ms, then 500ms and then 1000ms). The selected images had low or moderate intensities and were presented on a computer (laptop) with a 15-inch screen using the program PsychoPy. All images were randomized three times, one randomization for each time of exposure. After the image stimuli was shown, participants were asked to make a forced choice decision pressing the number correspondent to the emotion that, in their opinion, best described the image that they saw using a list of six emotions and the neutral option.
3. Patient Health Questionnaire-9 (PHQ-9) (Kroenke, Spitzer, & Williams, 2001): Self-report scale for detecting depressive symptomatology composed of 9 items. The participant should respond on a likert scale from 0 to 3 regarding the intensity of symptoms listed in the last two weeks, ranging from "no time" to "almost every day."
4. State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970): An instrument consisting of two self-reporting scales composed of 20 items each (to be scored from 1 to 4) to assess statuses and traits of anxiety
5. Efficacy Assessment Questionnaire: At the follow up stage, after one month of training, participants were questioned about their perception of the effectiveness of the training using one open question ("Did you notice any change in your facial expression recognition ability in the last month?") and two objective ones (1. "In a 1-5 scale, 1 meaning *not at all* and 5 meaning *a lot*, how much you believe that your facial expression recognition ability improved after the training?" 2. "In a 1-5 scale, 1 meaning *not at all* and 5 meaning *a lot*, how much do you think you have been more alert to people's facial expressions after the

training?’’).

4.2.2 Participants

Eighty-five undergraduate students were assessed for eligibility and three were excluded for not completing the baseline assessment. To participate subjects should be at least 18 years old undergraduate students and have no prior history of psychotic or developmental disorder. Five participants had already completed another graduation course. Group sample characteristics are shown in Table 1.

Table 1

Sample descriptives	Experimental group	Control group	<i>p</i> value
	(n=41)	(n=41)	
Sex			0,627
Male	11	13	
Female	30	28	
Ethnic group	(n=35)	(n=35)	0,898
Caucasian	32	31	
Afro-descendants	2	3	
Mixed	1	1	
Scholarity			0,939
Undergraduate students	36	37	
Already graduated in another course	5	4	
Marital status			0,044*
Married	1	6	
Unmarried	40	34	
Occupation	(n=39)		0,121
Employed	19	27	
Unemployed	20	14	
Area of study			0,718
Exacts	3	4	
Humans/health	37	37	
Age (Mean±s.d.)	23.34±5.28	26.02±6.28	0,04*
Use of psychiatric medication			0,008**
Yes	18	7	
No	23	34	
Use of drugs in the last week	(n=38)	(n=40)	0,136
Yes	11	6	
No	27	34	
Use of alcohol			0,211

Yes	33	37	
No	8	4	
STAI trait	42.04±10.98	42.26±12.28	0,504
Low Anxiety	4	7	
Moderate Anxiety	27	22	
Severe Anxiety	10	12	
PHQ-9	7.07±4.82	6.87±6.26	0,875
Have depressive symptomatology	14	10	
Don't have depressive symptomatology	27	31	
Attended other training/course		(n=40)	0,081
Yes	3	0	
No	38	40	
Watched the serie "Lie To Me"			0,182
Yes	20	26	
No	21	15	

*p<0,05; **p<0,01.

4.2.3 Design and procedure

This study was designed as an experimental intervention. All participants were recruited voluntarily via online advertising in social media and allocated to a training or a control condition. The study was approved by the Scientific Committee and the Research Ethics Committee of the Pontifical Catholic University of Rio Grande do Sul (PUCRS)(CAEE: 81889318.0.0000.5336). The study was conducted within the university, in private rooms and was facilitated by graduate psychologists or final year undergraduate psychology research assistants previously trained.

Subjects were tested before and after the intervention and 53,6% (n=44) of them were also tested a month later. Half of the subjects were randomized for the intervention condition and enrolled in the game and the other half of them were allocated to a control condition. In the control condition, subjects watched two short documentaries unrelated to facial expressions. The process was individualized and took two hours in the first interview (pre and post-assessment and training/documentary) and one hour in the follow up session, one month later. Procedures are represented in Figure 1.

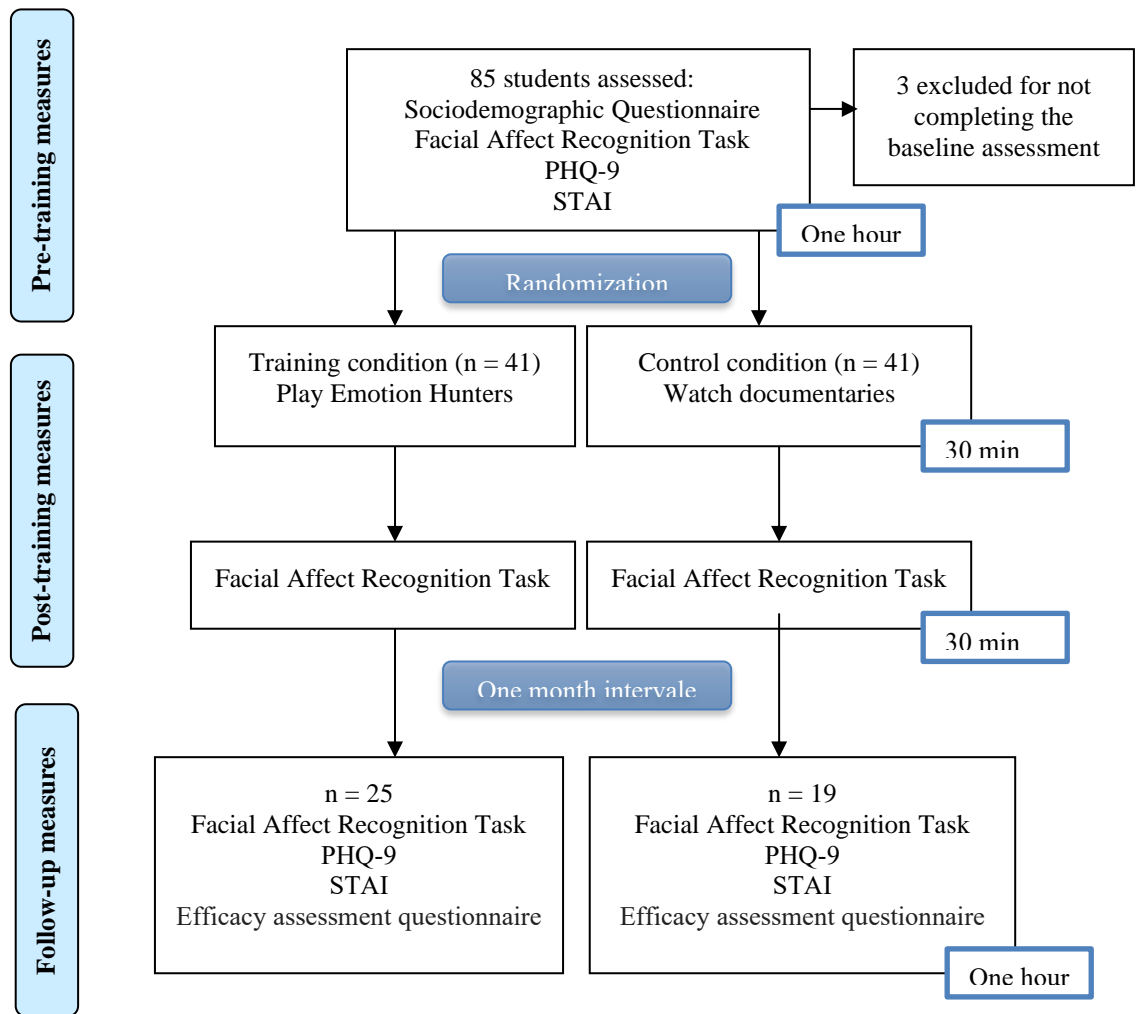


Figure 1. Procedures of data collection

4.2.4 Experiment Description

The Emotion Hunters game aims to improve facial expression recognition accuracy and it was designed to take about thirty minutes. It includes psychoeducation and direct training of facial recognition. The program must be installed prior to the application on the computer. Internet connections are not required. Each participant's output is generated automatically at the end of the game. The images were taken from NimStim Set of Facial Expressions (Tottenham et al., 2009) and Chicago Face Database (Ma, Correll, & Wittenbrink, 2015), two internationally validated image databases.

It begins an introduction of a character named Alfred, an alien coming from a distant planet in order to understand the emotions of humans. He asks the player to assist him in this process. All the educational content of the game can be heard and read at the same time, in

order to guarantee the player's understanding. After the participant agrees to assist Alfred, a new screen appears with explanations about how the game works.

It starts with an introduction explaining the importance of feeling, expressing and recognizing emotions to human development and their social interactions. Then the participant is instructed that he/she may find six chests in a green field, corresponding to the six basic emotions (happiness, sadness, fear, anger, surprise, and disgust). After that, the player can move Alfred with the keyboard arrows, searching for the first chest.

Each time the participant opens a chest, a psychoeducation module begins describing the evolutionary and adaptive aspects of the respective emotion. After this, a photo of a face expressing that emotion is exposed, highlighting the facial clues that configure the facial expression demonstrated. Then the practical part begins.

There are three different types of games. See examples in Figure 2. The same type of game (but with different stimuli) is repeated in two chests. The player has, in each chest, a total of six trials of the same type of game with different stimuli. The participant can have a maximum of three attempts to succeed in each trial. After each attempt the participant receives positive feedback if succeeds, or negative, in case of failing. All participants must find, open and play the six trials in the six chests to finish the game. After completing it, the participant receives a message of thanks from Alfred along with a congratulations for becoming a master of emotions.

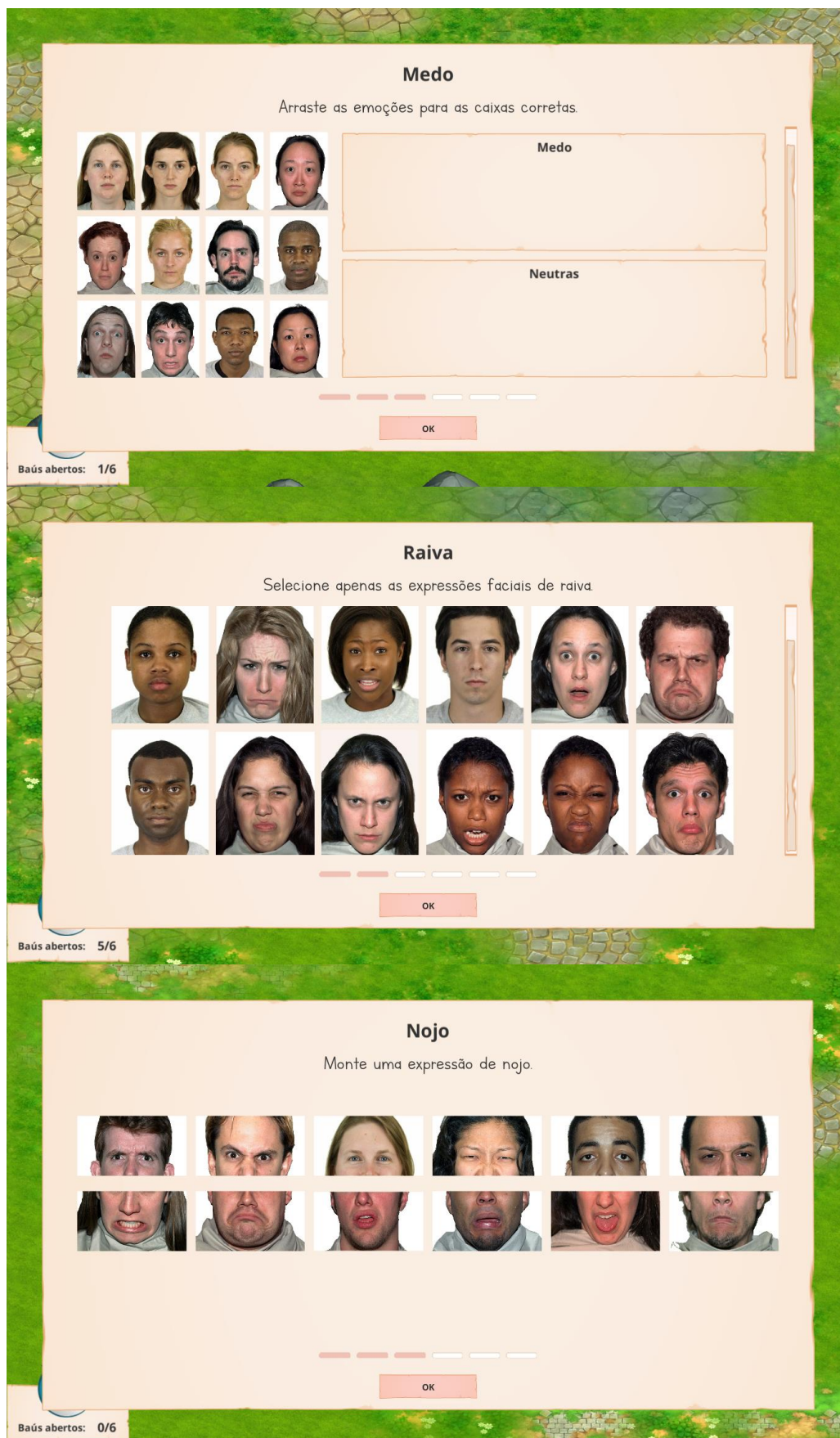


Figure 2. Examples of types of games included in Emotion Hunters

4.2.5 Statistical Analysis

Statistical analyses were performed using 18.0 version of the *Statistical Package for the Social Sciences* (SPSS) software. Descriptive analyzes (frequency, mean and standard deviation) were performed for sociodemographic variables, for results from the scales, for measuring players patterns in Emotion Hunters and also for comparing the perception of improvement in the Efficacy assessment questionnaire. Scoring of the facial affect recognition task was based on accuracy: one point was assigned for each correct answer in each trial. An average of accuracy was established for each emotion in each stimuli exposure time. Repeated measures (ANOVA) were performed in a 2 (group) x 3 (time of exposure) x 2 (time: pre- and post-test) design, aiming to investigate within and between group effects. A $p < 0.05$ was assumed for significant results. The analyses were performed with and without the 25 participants with use of psychiatric medication but the results remain the same. Here we present the statistics including them.

4.3 RESULTS

4.3.1 Playing Emotion Hunters

Players took an average of 33 minutes ($sd=7,179$) to play the game. 20% ($n=17$) of them opened the happiness chest as the first one and 15% ($n=12$) as the second. Fear's chest was opened for 16% ($n=13$) of players as the second chest and the same mean was found for these chest as the forth one. Disgust's chest order was 18% ($n=15$) as the last one and 12% ($n=10$) as the fourth. Anger was opened as the second one for 17% ($n=14$) of them and for 10% as the last one. Surprise's chest was first for 13% of them ($n=11$) and for 18% the third ($n=15$). Sadness' chest was opened for the same amount of players as the third or fifth (15%; $n=12$). Table 2 show means, standard deviations, minimum and maximum errors for each chest.

When questioned whether they believed that their facial expression recognition ability had improvement from pre to post test, participants in the training group ($M=3,40$; $sd=1,11$), reported significantly higher levels of agreement than controls ($M=2,75$; $sd=1,11$), [$F(1,44)=3,756$, $p=0,059$, $\eta^2=0,08$].

Table 2
Errors patterns in Emotion Hunters

	Min	Max	Mean	Sd
Happiness	0	2,83	0,7154	0,58954
Anger	0,17	3	1,5244	0,67037
Disgust	0	3	1,4065	0,79237
Fear	0	2,67	0,5691	0,44873
Sadness	0	3	0,9878	0,64268
Surprise	0,5	2,17	1,0976	0,38725

4.3.2 Time and training effect on facial expression accuracy

Table 3 shows the mean accuracy for each emotion, at pre-, post-test and follow up*, for each group, in the three times of stimulus exposure. Happiness presented the highest accuracy mean in the three exposure times in both groups (over 69% at pre and 96% at post). Fear at pre-test showed the lowest accuracy score in the three exposure times in both groups (ranging 36-45% at pre and 30-40% at post).

Time Effect

Happiness and anger showed a significant time effect in the three exposure times with participants from both groups improving their accuracy levels. Accuracy in happiness at 200ms [$F(1,80)=203,931$, $p<0,0001$, $\eta^2=0,718$], increased from 73% (sd=0,147) to 98% (sd=0,065) in the experimental group and from 69% (sd=0,172) to 96% (sd=0,119) in the control group. At 500ms [$F(1,80)=180,247$, $p<0,0001$, $\eta^2=0,693$], it increased from 70% (sd=0,157) to 98% (sd=0,054) in the experimental group and from 76% (sd=0,157) to 97% (sd=0,093) in the control group. And at 1000ms [$F(1,80)=152,404$, $p<0,0001$, $\eta^2=0,656$], from 72% (sd=0,156) to 100% (sd=0,000) in the experimental group and from 75% (sd=0,176) to 96% (sd=0,099) in the control group.

Anger at 200ms [$F(1,80)=45,534$, $p<0,0001$, $\eta^2=0,363$], increased from 47% (sd=0,261) to 81% (sd=0,185) in the experimental group and from 54% (sd=0,231) to 67% (sd=0,292) in the control group. At 500ms [$F(1,80)=63,172$, $p<0,0001$, $\eta^2=0,441$], scores changed from 66% (sd=0,220) to 89% (sd=0,158) in the experimental group and from 70% (sd=0,184) to 85% (sd=0,209) in the control group. And at 1000ms [$F(1,80)=45,345$, $p<0,0001$, $\eta^2=0,362$], from 70% (sd=0,178) to 90% (sd=0,145) in the experimental group and from 75% (sd=0,205) to 89% (sd=0,157) in the control group.

Contrary to our hypothesis, fear at 200ms as well as disgust and surprise at the three

times of exposure showed a reversed time effect, with participants decreasing their accuracy scores in T2. Fear 200ms [$F(1,80)=7,908$, $p=0,006$, $\eta^2=0,090$], decreased from 36% ($sd=0,268$) to 30% ($sd=0,276$) in the experimental group and from 42% ($sd=0,257$) to 31% ($sd=0,254$) in the control group.

Disgust at 200ms [$F(1,80)=6,098$, $p=0,016$, $\eta^2=0,071$], decreased from 60% ($sd=0,176$) to 48% ($sd=0,208$) in the experimental group and from 53% ($sd=0,247$) to 48% ($sd=0,284$) in the control group. At 500ms [$F(1,80)=25,758$, $p<0,0001$, $\eta^2=0,224$], accuracy scores decreased from 69% ($sd=0,56$) to 56% ($sd=0,199$) in the experimental group and from 72% ($sd=0,222$) to 57% ($sd=0,226$) in the control group. And at 1000ms [$F(1,80)=42,291$, $p<0,0001$, $\eta^2=0,346$], decreased from 74% ($sd=0,162$) to 58% ($sd=0,213$) in the experimental group and from 79% ($sd=0,231$) to 55% ($sd=0,246$) in the control group.

Surprise at 200ms [$F(1,80)=10,755$, $p=0,002$, $\eta^2=0,119$], decreased from 74% ($sd=0,212$) to 64% ($sd=0,201$) in the experimental group and from 73% ($sd=0,223$) to 65% ($sd=0,261$) in the control group. At 500ms [$F(1,80)=16,437$, $p<0,0001$, $\eta^2=0,170$], accuracy decreased from 81% ($sd=0,222$) to 66% ($sd=0,220$) in the experimental group and from 78% ($sd=0,234$) to 65% ($sd=0,310$) in the control group. And at 1000ms [$F(1,80)=13,203$, $p<0,0001$, $\eta^2=0,142$], decreased from 78% ($sd=0,217$) to 70% ($sd=0,231$) in the experimental group and from 76% ($sd=0,230$) to 60% ($sd=0,267$) in the control group.

Training Effect

Anger at 200ms of exposure was the only emotion presenting significant Group*Time Effect [$F(1,80)=10,217$, $p=0,02$, $\eta^2=0,113$], accuracy increased from 47% ($sd=0,261$) to 81% ($sd=0,185$) in the experimental group and only from 54% ($sd=0,231$) to 67% ($sd=0,292$) in the control group. Happiness at 500ms showed a marginally significant Group*Time Effect [$F(1,80)=3,324$, $p=0,072$, $\eta^2=0,040$]. Accuracy increased from 70% ($sd=0,157$) to 98% ($sd=0,054$) in the experimental group and from 76% ($sd=0,157$) to 97% ($sd=0,093$) in the control group. Sadness at 1000ms showed a reversed Group*Time Effect [$F(1,80)=6,185$, $p=0,015$, $\eta^2=0,072$] in the experimental group accuracy means began in 80% ($sd=0,20$) and ended in 77% ($sd=0,20$), while in the control group it began in 73% ($sd=0,27$) and finished in 83% ($sd=0,22$).

Table 3.

Accuracy means for each emotion, at pre-, post-test and follow up

	Pre			Post			Follow		
	200ms	500ms	1000ms	200ms	500ms	1000ms	200ms	500ms	1000ms
Happiness	71,64	73,47	73,78	97,25	98,17	98,47	92,12	95,75	96,12
Anger	51,22	68,59	72,86	74,39	87,50	90,24	56,37	70,37	75,37
Fear	39,63	39,93	44,62	30,79	35,98	37,8	35,85	35,18	49,75
Surprise	74,08	79,88	77,13	64,63	66,15	65,24	70,37	77,87	77,12
Sadness	61,89	71,03	76,83	57,31	74,08	80,49	68,87	72,75	78
Disgust	57,01	71,03	77,13	48,78	57,01	57,01	56	58,75	57,75

Follow up facial emotion accuracy evaluation

At the follow up only 53,6% of the subjects were evaluated. Analysis were made comparing T1xT3.

Time Effect

Happiness showed significant positive time effect at the three times of exposure [200ms: $F(2,42)=47,956$, $p<0,0001$, $\eta^2=0,695$]; 500ms: $F(2,42)=76,975$, $p<0,0001$, $\eta^2=0,786$]; 1000ms: $F(2,42)=55,861$, $p<0,0001$, $\eta^2=0,727$]. While disgust showed a significant negative time effect at 500ms $F(2,42)=10,827$, $p<0,0001$, $\eta^2=0,340$] and 1000ms $F(2,42)=14,288$, $p<0,0001$, $\eta^2=0,405$].

Training Effect

Significant group*time effect was observed in happiness at 500ms $F(2,42)=2,868$, $p<0,0001$, $\eta^2=0,120$], in anger at 200ms $F(2,42)=3,463$, $p=0,041$, $\eta^2=0,142$], sadness at 1000ms $F(2,42)=4,217$, $p=0,021$, $\eta^2=0,015$] and fear at 1000ms $F(2,42)=2,991$, $p=0,061$, $\eta^2=0,125$]. Comparing pre-test with follow up, happiness accuracy increased 26% in the experimental group and 21% in the control group. Anger improvement was 13% in experimental group and less than 4% in the control group. In sadness, the improvement achieved 4% in the experimental group and no improvement was found in the control group. In fear a different phenomenon was observed, with experimental group accuracy decreasing 6% while the control group improved 16%.

4.4 DISCUSSION

This study aimed to develop and evaluate a computerized game to improve facial expression recognition ability in adults. A review about the existent interventions was conducted and Emotion Hunters was developed following deep analysis about the positive and negative aspects reported by previous researchers. The game was planned based on four pro-learning aspects: (1) psychoeducation about emotions and facial emotion recognition; (2) instructions about facial areas activated in each emotion; (3) repeated exposition to facial images followed by the classification of them; (4) immediate feedback after each trial. The result was an interactive tool to train facial expression recognition in thirty minutes on average. Subjects took the expected time to complete the game and most of them began with the happiness chest, which was good considering the ideal of a game with a gradual increase of difficulty. As expected, people who played the game reported in the follow up evaluation higher scores of beliefs that the study improved their facial recognition accuracy.

The choice of using only low and moderate intensities of facial expressions images in the task was made considering that our sample would be composed mainly for healthy adults. We intended to make the process not long enough to make the participant tired and we supposed they would achieve almost 100% of accuracy using high intense pictures. That may explain the low means of accuracy in the baseline evaluation, since most studies use three levels of intensity.

Pre- and post-test means of accuracy with the highest and lowest scores in happiness and fear respectively were congruent with the literature (Ruffman, Henry, Livingstone, & Phillips, 2008). Happiness seems to be easier to recognize than the other emotions due to the specificity of the smile as the most evident characteristic, while fear tends to be easily mistaken by surprise or sadness (Goren, & Wilson, 2006). Happiness and anger improved accuracy in all groups at the three times of exposure and the follow up evaluation showed that those scores were still better than in pre-test after one month. One hypothesis that may explain this phenomenon is that happiness was already easy for participants to recognize, and could be common for people to get even better in something known than in something new. Anger is the only basic emotion with the internal part of the eyebrows wrinkled down, something that may have facilitate the learning by decreasing confounding factors. One aspect in favor of this hypothesis is the fact that those two emotions had those singular and easy to recognize

aspects signalized at the game and were also the only two emotions showing group*time effect, with higher improvement in subjects from experimental group. Also, the follow up results showed that the improvements could persist one month after training.

Fear at 200ms and surprise and disgust in the three times of exposure decreased accuracy in the post-test. However, in the follow up evaluation fear at 200ms improved accuracy scores compared to the pre-test and surprise finished with almost the same scores from the beginning. Sadness also didn't show significant time effect in the post-test, but at the follow up subjects performed better than in the pre-test. Although we realize that the follow up was made with few subjects, it may mean that the intervention improved the recognition of happiness, anger and fear, did not affect sadness and surprise and decreased accuracy of disgust. Two explanatory hypothesis for this finding are (1) is possible that subjects got overloaded with information and it occasioned a confounding factor or (2) it also could be a non-identified problem with the task.

Group*Time Effect between pre- and post-test was only observed in anger and marginally significant in happiness, where the experimental group performed better than the control one. These results were confirmed in the follow up. Conversely to our hypothesis, sadness showed better improvement in the control group, but compared to the pre-test this emotion ended up with the experimental group achieving an improvement in the follow up and the control group not. At this part of the evaluation, another phenomenon happened, with fear (which didn't point to any significant result in the post-evaluation) ending with an improvement of accuracy in the control group and a decrease in the experimental group. As this unexpected phenomenon only happened in the follow up at 1000ms of exposure and this emotion also showed low error mean at the game, we assume that the reason could be associated with a habituation or tiredness of the task, not with a real decrease.

No literature was found about the higher improvement of anger recognition in Time*Group Effect. We hypothesized, as already mentioned, that this phenomenon could be explained by the fact that this emotion has fewer confounding features along with lower accuracy rates at baseline than happiness – leaving more room for improvement. A relevant characteristic is that the sample was 71% female and women are known as being more accurate than men in facial expression recognition (Wingenbach, Ashwin, & Brosnan, 2018). The dissemination of the research was made through online platforms or posters in the university corridors and 90% of subjects came from humanities or health courses and 56% of them also had already watched the series *lie to me*, something that leads us to think that there

might be a bias of students' interest in the subject.

There was no significant specificity observed in subjects who received the training, but both groups improved facial expressions recognition, suggesting that exposure to the task already promotes an improvement in this ability. As the main difference between the game and the task is the existence of psychoeducation information and feedback, we could assume that subjects don't necessarily need those strategies to learn and that offering a context where one is intensely exposed to facial expressions might contribute to greater attention to this stimuli and therefore maximize accuracy. This assumption is consistent with the natural developmental trajectory of recognition of facial expressions given that the majority of our learning is via simple observation of others faces. Although the learning with feedback is known as the most effective one, some studies showed that the exposure to facial expressions images without any feedback can also improve subjects accuracy (Huelle, Sack, Broer, Komlewa, & Anders, 2014; Hurley, 2012). Actually, the effect of the feedback mechanism is sometimes contradictory, because it can make people more aware of their errors and start questioning themselves about their recognition ability (Blanch-Hartigan; 2012). An additional hypothesis is that the changes do not reflect a real change, but simply an effect of learning the task itself. Although the images are different, the task is the same at the three evaluations.

Another important aspect about the baseline was the differences between groups in use of psychiatric medication. We assumed that it could be pointed out as a confounding factor in our results. Aiming to exclude this hypothesis, we performed the analysis with and without the 25 participants with any use of psychiatric medication. The results remain the same, suggesting that it did not interfere with our findings.

One weakness about Emotion Hunters that may have interfered with the results is the absence of a predetermined order to open the chests, so it has no assurance of a gradual increase of difficulty. We hypothesize that this may have affected the results, since some players began training easier emotions to recognize, like happiness, and others with more difficult ones, like fear or surprise. It's possible that the players who started with the most difficult ones got frustrated early on in the beginning.

This study was the first computerized game in Latin America aiming to train facial expression recognition ability. As limitations we highlight the size and female predominance of the sample and the fact that they were all undergraduate students from a private university. Also, only half of the subjects were tested in the follow up evaluation, which leads to less reliability about the maintenance of effects. Design limitations include the fact that

participants only played the game for half an hour, so the effect of prolonged exposure to the training game could not be assessed. Besides that, the game did not count on a gradual increase of difficulty, something that literature point as an important mechanism of learning. Further studies with bigger sample and long-term follow up are pointed as important to explore those results.

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5 CONSIDERAÇÕES FINAIS

A presente dissertação de mestrado teve como objetivo a construção e verificação da efetividade de uma intervenção computadorizada para aumentar a habilidade de reconhecimento de expressões faciais em adultos. Para isso, foram produzidos dois artigos: um teórico e um empírico. O primeiro estudo objetivou a revisão, de forma sistemática, das intervenções que já foram realizadas com objetivo de melhorar esta habilidade. Através de tal procedimento, foi possível analisar os acertos e erros realizados pelos pesquisadores desta área de conhecimento. Sendo assim, tornou possível a realização do segundo artigo de forma mais apropriada.

O segundo estudo foi idealizado levando em consideração pressupostos apontados nos artigos incluídos nos resultados do primeiro estudo como importantes para o desenvolvimento de uma ferramenta capaz de melhorar a habilidade de reconhecimento de expressões faciais. Sendo assim, contou com estratégias de (1) psicoeducação sobre emoções e reconhecimento de expressões faciais; (2) instruções sobre áreas da face ativadas na expressão de cada emoção; (3) exposição e classificação de imagens de indivíduos expressando as seis emoções básicas e a expressão neutra; e (4) recebimento de *feedback* imediato quanto ao desempenho do participante.

Emotion Hunters foi desenvolvido com o auxílio de um programador terceirizado. A abertura dos baús espalhados ao longo do mapa não contou com uma ordem pré-determinada, portanto cada participante recebeu primeiramente o treinamento da emoção correspondente à direção que decidiu se locomover com o cursor. Acredita-se que esta falha possa ter influenciado nos resultados, uma vez que os indivíduos que começaram treinando emoções mais difíceis de reconhecer, como medo ou surpresa, pareciam frustrar-se mais intensamente logo no início do jogo, enquanto que participantes que iniciavam com emoções amplamente reconhecidas, como alegria, contaram com aumento gradual de dificuldade, o que foi apontado na literatura como uma importante ferramenta pró-aprendizagem.

Além disso, alguns erros no programa, como o bloqueio de imagens na tela, podem ter influenciado nos resultados de alguns participantes. Apesar disso, o aumento da acurácia do reconhecimento de raiva e de habilidades sociais foi constatado, além de a maioria dos jogadores ter relatado gostar da experiência e acreditar em um aumento em suas habilidades de reconhecimento de expressões faciais. Portanto, acredita-se na importância da correção dos erros apontados e do desenvolvimento e aprimoramento de mais ferramentas semelhantes.

Uma vez que, apesar de não ter havido efeito significativamente superior no grupo experimento para a maioria das emoções, o estudo contribui com os demais pesquisadores que apoiam a possibilidade de aprimoramento da habilidade de reconhecimento de expressões faciais através de treinamento.

Para futuros direcionamentos de pesquisa, salienta-se a importância de um programa que aponte ao jogador o motivo de seus erros após o recebimento do *feedback* negativo. Pois acredita-se que alguns participantes não tenham conseguido entender seus padrões de confusão entre algumas emoções. Para isso, se faz necessário o fomento em tais tecnologias, uma vez que a interação entre as ciências humanas e da saúde com a informática vem sendo uma tendência cada vez mais predominante no cenário científico mundial.

6 ANEXOS

ANEXO A – APROVAÇÃO DO COMITÊ DE ÉTICA EM PESQUISA

PONTIFÍCIA UNIVERSIDADE
CATÓLICA DO RIO GRANDE
DO SUL - PUC/RS



PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Eficácia de um treinamento de reconhecimento de expressões faciais de emoções básicas em adultos

Pesquisador: Adriane Arteché

Área Temática:

Versão: 2

CAAE: 81889318.0.0000.5336

Instituição Proponente: UNIAO BRASILEIRA DE EDUCACAO E ASSISTENCIA

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 2.587.434

Apresentação do Projeto:

Trata-se de um estudo experimental que propõe um treinamento para aprimoramento de habilidades de reconhecimento de expressões faciais, já que o aumento da acurácia dessas habilidades poderia beneficiar o indivíduo, gerando melhor desempenho interpessoal, seja na vida pessoal ou profissional. Acredita-se que, por se tratar de uma intervenção de curto prazo e baixo custo, será possível ser realizada em diferentes instituições e populações, tanto em indivíduos saudáveis quanto nas mais variadas psicopatologias envolvendo baixa habilidade social.

Objetivo da Pesquisa:

Objetivo Primário:

Investigar o efeito do treinamento para reconhecimento de expressões faciais de emoções básicas em adultos.

Objetivo Secundário:

1. Avaliar se o treinamento reduz o tempo de reação na habilidade de reconhecimento de expressões faciais de emoções básicas.
2. Avaliar se o treinamento maximiza a acurácia na habilidade de reconhecimento de expressões faciais de emoções básicas.
3. Avaliar a especificidade do efeito do treinamento para as diferentes emoções e diferentes intensidades.

Endereço: Av. Ipiranga, 6681, prédio 50, sala 703

Bairro: Partenon

CEP: 90.619-900

UF: RS

Município: PORTO ALEGRE

Telefone: (51)3320-3345

Fax: (51)3320-3345

E-mail: cep@puccrs.br

PONTIFÍCIA UNIVERSIDADE
CATÓLICA DO RIO GRANDE
DO SUL - PUC/RS



Continuação do Parecer: 2.587.434

4. Investigar a estabilidade dos efeitos do treinamento das habilidades de reconhecimento de expressões faciais de emoções básicas.

5. Investigar o efeito moderador das variáveis sexo, idade, nível de habilidades sociais, área de atuação e intensidade de sintomas de depressão e ansiedade no efeito do treinamento.

Avaliação dos Riscos e Benefícios:

Apresenta riscos mínimos e como possíveis benefícios o aprimoramento nas habilidades de reconhecimento de expressões faciais.

Comentários e Considerações sobre a Pesquisa:

Trata-se de um estudo experimental com dois grupos de 45 participantes (intervenção e controle) e avaliação pré e pós intervenção e follow up.

Considerações sobre os Termos de apresentação obrigatória:

Apresentou todos os termos.

Conclusões ou Pendências e Lista de Inadequações:

O projeto está eticamente adequado.

Considerações Finais a critério do CEP:

Diante do exposto, o CEP-PUCRS, de acordo com suas atribuições definidas nas Resoluções CNS nº 466 de 2012, nº 510 de 2016 e Norma Operacional nº 001 de 2013 do CNS, manifesta-se pela aprovação do projeto de pesquisa proposto.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1053063.pdf	26/03/2018 17:32:24		Aceito
Outros	cartaResposta.doc	26/03/2018 17:32:00	Adriane Arteche	Aceito
Outros	CartaResposta.jpeg	29/01/2018 15:45:51	Adriane Arteche	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE_2.docx	29/01/2018 15:42:51	Adriane Arteche	Aceito

Endereço: Av.Ipiranga, 6681, prédio 50, sala 703

Bairro: Partenon

CEP: 90.619-900

UF: RS

Município: PORTO ALEGRE

Telefone: (51)3320-3345

Fax: (51)3320-3345

E-mail: cep@pucrs.br

**PONTIFÍCIA UNIVERSIDADE
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DO SUL - PUC/RS**



Continuação do Parecer: 2.587.434

Outros	lattes.pdf	09/01/2018 16:32:06	Adriane Artech	Aceito
Outros	aceites.pdf	09/01/2018 16:31:15	Adriane Artech	Aceito
Outros	DocumentoUnificadoProjetoPesquisa_1 513372122966.pdf	09/01/2018 16:30:28	Adriane Artech	Aceito
Outros	questionarios.pdf	09/01/2018 12:48:38	Adriane Artech	Aceito
Outros	cartaEncaminhamentoApresentacao.pdf	09/01/2018 12:47:02	Adriane Artech	Aceito
Projeto Detalhado / Brochura Investigador	Projeto_FINAL.pdf	09/01/2018 12:41:36	Adriane Artech	Aceito
Folha de Rosto	folha_de_rosto.pdf	09/01/2018 12:36:24	Adriane Artech	Aceito
Orçamento	orcamento.pdf	12/12/2017 16:33:30	Adriane Artech	Aceito
Cronograma	cronograma.pdf	12/12/2017 16:32:54	Adriane Artech	Aceito

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

PORTO ALEGRE, 09 de Abril de 2018

**Assinado por:
Paulo Vinicius Sporleder de Souza
(Coordenador)**

Endereço: Av.Ipiranga, 6681, prédio 50, sala 703
Bairro: Partenon **CEP:** 90.619-900
UF: RS **Município:** PORTO ALEGRE
Telefone: (51)3320-3345 **Fax:** (51)3320-3345 **E-mail:** cep@puccrs.br

ANEXO B – MATERIAL UTILIZADO PARA DIVULGAÇÃO



Treinamento de reconhecimento de expressões faciais

Estamos convidando estudantes de graduação maiores de 18 anos para participar de um programa de treinamento que busca melhorar a habilidade de reconhecimento de expressões faciais.

A participação é voluntária e gratuita!

Contatos para interessados:

 (51) 9 9961 4225
 reconhecimentodefases@gmail.com

 GNAT – Grupo de Pesquisa em Neurociência Afetiva e Transgeracionalidade



CAAE: 81889318.0.0000.5336

ANEXO C - QUESTIONÁRIO SOCIODEMOGRÁFICO

QUESTIONÁRIO SOCIODEMOGRÁFICO

Nome completo: _____

Idade: _____ Data de Nascimento: _____ Raça: _____

Escolaridade: _____ () Escola Pública () Escola Privada

Profissão: _____ Curso de formação: _____

Você trabalha? _____ Quantas horas por dia? _____

Qual o seu curso atual de formação? _____

Qual semestre? _____

Você já fez outra faculdade antes da atual? Se sim, qual e por quanto tempo?

E-mail: _____

Estado civil: _____ Tel.: Residencial _____ Celular: _____

Endereço: _____

Você já teve alguma doença que necessitasse internação hospitalar, procedimento cirúrgico ou tratamento continuado? Se sim, qual? _____

Você atualmente faz uso de alguma medicação psiquiátrica? () Não () Sim. Qual?

- | | | |
|------------------------|---------------------------|-----------------------------|
| () Alprazolam | () Clonazepam/Rivotril | () Diazepam/Valium |
| () Fluoxetina/Prozac | () Citalopram | () Amitriptilina |
| () Escitalopram | () Bupropiona/Wellbutrin | () Clomioramina/Anafril |
| () Paroxetina | () Sertralina/Tolrest | () Venlafaxina |
| () ácido valpróico | () Carbamazetpina | () Lamotrigina |
| () Lítio | () Aripiprazol | () Clorpromazina/Amplictil |
| () Haloperidol/Haldol | () Olanzapina | () Quetiapina |

() Risperidona () Imipramina/Tofranil () Outra: _____

Especificar dose e há quanto tempo utiliza: _____

Você já fez uso no passado de alguma medicação psiquiátrica? () Não () Sim. Qual?

() Alprazolam	() Clonazepam/Rivotril	() Diazepam/Valium
() Fluoxetina/Prozac	() Citalopram	() Amitriptilina
() Escitalopram	() Bupropiona/Wellbutrin	() Clomioramina/Anafril
() Paroxetina	() Sertralina/Tolrest	() Venlafaxina
() ácido valpróico	() Carbamazetpina	() Lamotrigina
() Lítio	() Aripiprazol	() Clorpromazina/Amplictil
() Haloperidol/Haldol	() Olanzapina	() Quetiapina
() Risperidona	() Imipramina/Tofranil	() Outra: _____

Especificar dose e por quanto tempo utilizou: _____

Alguma vez você já recebeu o diagnóstico de algum dos transtornos psiquiátricos?

() Não () Sim. Qual?

() Transtorno de Humor Deprimido/Depressão
() Transtorno de Humor Bipolar
() Esquizofrenia
() Transtorno do Pânico
() Transtorno de Ansiedade
() Fobia Social
() Déficit de Atenção e Hiperatividade
() Transtorno Obsessivo-Compulsivo/TOC
() Transtorno de Estresse Pós-Traumático/TEPT
() Transtorno Alimentar/Bulimia/Anorexia/Compulsão alimentar
() Outro transtorno psiquiátrico: _____

Especificar quando: _____

Na última semana você utilizou alguma das drogas abaixo? () Não () Sim. Qual?

() Cigarros () Maconha () LSD ou alucinógenos (cogumelo/daime)

() Crack () Cocaína () Anfetaminas (pílulas pra emagrecer)

() Tranquilizantes () Ecstasy () Solventes (cola, éter, lança-perfume)

() Esteróides/anabolizantes (bomba)

() Outros tipos de drogas: _____

Especificar quanto tempo faz e qual a dose: _____

No passado (há mais de uma semana) você utilizou alguma das drogas abaixo?

() Não () Sim. Qual?

() Cigarros () Maconha () LSD ou alucinógenos (cogumelo/daime)

() Crack () Cocaína () Anfetaminas (pílulas pra emagrecer)

() Tranquilizantes () Ecstasy () Solventes (cola, éter, lança-perfume)

() Esteróides/anabolizantes (bomba)

() Outros tipos de drogas: _____

Especificar quanto tempo faz e qual a dose: _____

Você faz uso de álcool? () Sim () Não

Você já tentou diminuir ou cortar a bebida? () Sim () Não

Você já ficou incomodado ou irritado com outros porque criticaram seu jeito de beber? ()

Sim () Não

Você já se sentiu culpado por causa do seu jeito de beber? () Sim () Não

Você já teve que beber para aliviar os nervos ou reduzir os efeitos de uma ressaca?

() Sim () Não

Qual sua bebida de preferencia? _____

Com que frequência você utiliza a sua bebida de preferencia? _____

Especificar a dose: _____

Você já fez algum treinamento prévio para reconhecimento de expressões faciais? Qual?

Quando? _____

Você já pesquisou sobre isso? Quando? Onde? _____

Você assiste ou assistiu a série “*Lie to me*”? () Sim () Não

ANEXO D – PHQ-9

QUESTIONÁRIO SOBRE A SAÚDE DO PACIENTE-9 (P H Q - 9)

Durante os <u>últimos 14 dias</u> , em quantos foi afectado/a por algum dos seguintes problemas? (Utilize "✓" para indicar a sua resposta)	Nunca	Em vários dias	Em mais de metade do número de dias	Em quase todos os dias
1. Tive pouco interesse ou prazer em fazer coisas	0	1	2	3
2. Senti desânimo, desalento ou falta de esperança	0	1	2	3
3. Tive dificuldade em adormecer ou em dormir sem interrupções, ou dormi demais	0	1	2	3
4. Senti cansaço ou falta de energia	0	1	2	3
5. Tive falta ou excesso de apetite	0	1	2	3
6. Senti que não gosto de mim próprio/a — ou que sou um(a) falhado/a ou me desiludi a mim próprio/a ou à minha família	0	1	2	3
7. Tive dificuldade em concentrar-me nas coisas, como ao ler o jornal ou ver televisão	0	1	2	3
8. Movimentei-me ou falei tão lentamente que outras pessoas poderão ter notado. Ou o oposto: estive agitado/a a ponto de andar de um lado para o outro muito mais do que é habitual	0	1	2	3
9. Pensei que seria melhor estar morto/a, ou em magoar-me a mim próprio/a de alguma forma	0	1	2	3

FOR OFFICE CODING 0 + _____ + _____ + _____
=Total Score: _____

Se indicou alguns problemas, até que ponto é que eles dificultaram o seu trabalho, o cuidar da casa ou o lidar com outras pessoas?

Não dificultaram <input type="checkbox"/>	Dificultaram um pouco <input type="checkbox"/>	Dificultaram muito <input type="checkbox"/>	Dificultaram extremamente <input type="checkbox"/>
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ANEXO E – IDATE

Leia com atenção cada pergunta e atribua um valor ao lado de cada afirmação, conforme o gabarito abaixo, que melhor indicar **como você se sente nessa momento**.

	Quase sempre=4	Frequentemente=3	Às vezes=2	Quase nunca=1
01. Sinto-me calmo	1	2	3	4
02. Sinto-me seguro	1	2	3	4
03. Estou tenso	1	2	3	4
04. Estou arrependido	1	2	3	4
05. Sinto-me à vontade	1	2	3	4
06. Sinto-me perturbado	1	2	3	4
07. Estou preocupado com possíveis infortúnios	1	2	3	4
08. Sinto-me descansado	1	2	3	4
09. Sinto-me ansioso	1	2	3	4
10. Sinto-me “em casa”	1	2	3	4
11. Sinto-me confiante	1	2	3	4
12. Sinto-me nervoso	1	2	3	4
13. Estou agitado	1	2	3	4
14. Sinto-me uma pilha de nervos	1	2	3	4
15. Estou descontraído	1	2	3	4
16. Sinto-me satisfeito	1	2	3	4
17. Estou preocupado	1	2	3	4
18. Sinto-me confuso	1	2	3	4
19. Sinto-me alegre	1	2	3	4
20. Sinto-me bem	1	2	3	4

IDATE – Traço

Leia com atenção cada pergunta e atribua um valor ao lado de cada afirmação, conforme o gabarito abaixo, que melhor indicar **como você geralmente se sente**.

	Quase sempre=4	Frequentemente=3	Às vezes=2	Quase nunca=1
01. Sinto-me bem	1	2	3	4
02. Canso-me facilmente	1	2	3	4
03. Tenho vontade de chorar	1	2	3	4
04. Gostaria de poder ser tão feliz quanto os outros parecem ser	1	2	3	4
05. Perco oportunidades porque não consigo tomar decisões rapidamente	1	2	3	4
06. Sinto-me descansado	1	2	3	4
07. Sou calmo, ponderado e senhor de mim mesmo	1	2	3	4
08. Sinto que as dificuldades estão se acumulando de tal forma que não as consigo resolver	1	2	3	4
09. Preocupo-me demais com coisas sem importância	1	2	3	4
10. Sou feliz	1	2	3	4
11. Deixo-me afetar muito pelas coisas	1	2	3	4
12. Não tenho muita confiança em mim mesmo	1	2	3	4
13. Sinto-me seguro	1	2	3	4
14. Evito ter que enfrentar coisas ou problemas	1	2	3	4
15. Sinto-me deprimido	1	2	3	4
16. Estou satisfeito	1	2	3	4
17. Ideias sem importância entram na minha cabeça e ficam me preocupando	1	2	3	4
18. Levo os desapontamentos tão a sério que não consigo tirá-los da cabeça	1	2	3	4
19. Sou uma pessoa estável	1	2	3	4
20. Fico tenso e perturbado quando penso em meus problemas do momento	1	2	3	4

ANEXO F – IMAGENS ADULTOS

Exemplo das imagens de expressões faciais emocionais utilizadas na avaliação de reconhecimento de expressões e retiradas do banco NimStim.



ANEXO G - TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO (TCLE)

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO (TCLE)

EFICÁCIA DO TREINAMENTO DE RECONHECIMENTO DE EXPRESSÕES FACIAIS DE EMOÇÕES BÁSICAS EM ADULTOS

Você está sendo convidado(a) a participar como voluntário(a) da pesquisa intitulada “Eficácia do Treinamento de Reconhecimento de Expressões Faciais de Emoções Básicas em Adultos”, coordenada pela pesquisadora Professora Dra. Adriane Xavier Arteche, do Grupo de Neurociência Afetiva e Transgeracionalidade (GNAT) do Programa de Pós-Graduação em Psicologia (PPGP) da Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS). Este projeto tem como objetivo investigar o efeito de um treinamento de reconhecimento de expressões faciais de emoções básicas em adultos. Acreditamos que é importante porque, caso o treinamento seja efetivo, poderá beneficiar diversas populações (indivíduos saudáveis ou com patologias específicas) em diferentes contextos, levando o participante a ter maior eficácia na sua habilidade de reconhecimento de expressões faciais.

A pesquisa está sendo conduzida pela aluna de mestrado Carol Rebeschini, do PPGP da PUCRS, sob a supervisão e orientação da Professora Dra. Adriane Xavier Arteche. Sua colaboração inclui responder a uma tarefa de habilidades sociais, uma de reconhecimento de faces, uma escala de sintomas de depressão, uma de sintomas de ansiedade e um inventário de habilidades sociais. Após isso, você será randomizado para um de dois grupos: intervenção (receberá o treinamento proposto e passará por uma reavaliação, com os mesmos instrumentos da avaliação inicial, após um mês) ou controle (apenas assistirá a um vídeo documental e passará pela mesma reavaliação relatada anteriormente). Estas atividades serão realizadas na sua própria universidade e gravadas em vídeo para posterior análise da flutuação de suas expressões faciais durante o treinamento. Apenas os membros da equipe de pesquisa terão acesso às suas respostas.

Você será esclarecido(a) sobre a pesquisa em qualquer aspecto que desejar. Você é livre para recusar-se a participar, retirar seu consentimento ou interromper a participação a qualquer momento. Sua participação nesse estudo é voluntária e se você decidir não participar ou quiser desistir de continuar em qualquer momento, tem absoluta liberdade de fazê-lo. Na

publicação dos resultados desta pesquisa, sua identidade será mantida no mais rigoroso sigilo. Serão omitidas todas as informações que permitam identificá-lo.

O maior desconforto para você será o tempo que deverá dispor para responder aos instrumentos. A pesquisa acontecerá na sua universidade de estudo em horário alternativo às suas aulas, portanto não haverão gastos extras com transporte ou locomoção. Você tem o direito de solicitar uma indenização por qualquer dano que resulte da sua participação neste estudo. Em caso de algum problema relacionado com a pesquisa, você terá direito a assistência gratuita, que será prestada pelos pesquisadores responsáveis em horário e local a serem combinados com você.

O benefício será a sua contribuição para o desenvolvimento e avanço científico na temática, a possibilidade de melhorar sua habilidade de reconhecimento de faces, caso a intervenção seja efetiva, e um retorno verbal que você poderá ter, caso deseje, sobre os dados levantados na avaliação. Caso você seja alocado no grupo controle, após o término da pesquisa você será convidado para também passar pelo treinamento caso deseje.

Qualquer desconforto causado, ou dúvidas relativas a esta pesquisa poderão ser discutidos a qualquer momento com os pesquisadores responsáveis, Adriane Xavier Arteche e Carol Rebeschini, pelo telefone do GNAT, (51) 3320-7739 ou das pesquisadoras, (51) 9 9417-7070 e (51) 9 9961-4225. Caso você tenha qualquer dúvida quanto aos seus direitos como participante de pesquisa, entre em contato com Comitê de Ética em Pesquisa da Pontifícia Universidade Católica do Rio Grande do Sul (CEP-PUCRS) em (51) 33203345, Av. Ipiranga, 6681/prédio 50 sala 703, CEP: 90619-900, Bairro Partenon, Porto Alegre – RS, e-mail: cep@pucrs.br, de segunda a sexta-feira das 8h às 12h e das 13h30 às 17h. O Comitê de Ética é um órgão independente constituído de profissionais das diferentes áreas do conhecimento e membros da comunidade. Sua responsabilidade é garantir a proteção dos direitos, a segurança e o bem-estar dos participantes por meio da revisão e da aprovação do estudo, entre outras ações.

Ao assinar este termo de consentimento, você não abre mão de nenhum direito legal que teria de outra forma. Não assine este termo de consentimento a menos que tenha tido a oportunidade de fazer perguntas e tenha recebido respostas satisfatórias para todas as suas dúvidas. Se você concordar em participar deste estudo, você rubricará todas as páginas e

assinará e datará duas vias originais deste termo de consentimento. Você receberá uma das vias para seus registros e a outra será arquivada pelo responsável pelo estudo.

Atenciosamente,

Carol Rebeschini

Matrícula: 17190314-9

CRP: 07/23922

Local e data



Profa. Dra. Adriane Xavier Arteche

Matrícula: 10083974

CRP: 07/10538

CONSENTIMENTO DO(A) PARTICIPANTE

Eu, _____, após a leitura deste documento e de ter tido a oportunidade de conversar com a pesquisadora responsável, para esclarecer todas as minhas dúvidas, acredito estar suficientemente informado(a), ficando claro para mim que minha participação é voluntária e que posso retirar este consentimento a qualquer momento sem penalidades ou perda de qualquer benefício. Estou ciente também dos objetivos da pesquisa, dos procedimentos aos quais serei submetido(a), dos possíveis danos ou riscos deles provenientes e da garantia de confidencialidade e esclarecimentos sempre que desejar. Diante do exposto expresso minha concordância de espontânea vontade em participar deste estudo.

Assinatura do participante

Local e data

DECLARAÇÃO DO PROFISSIONAL QUE OBTVEU O CONSENTIMENTO

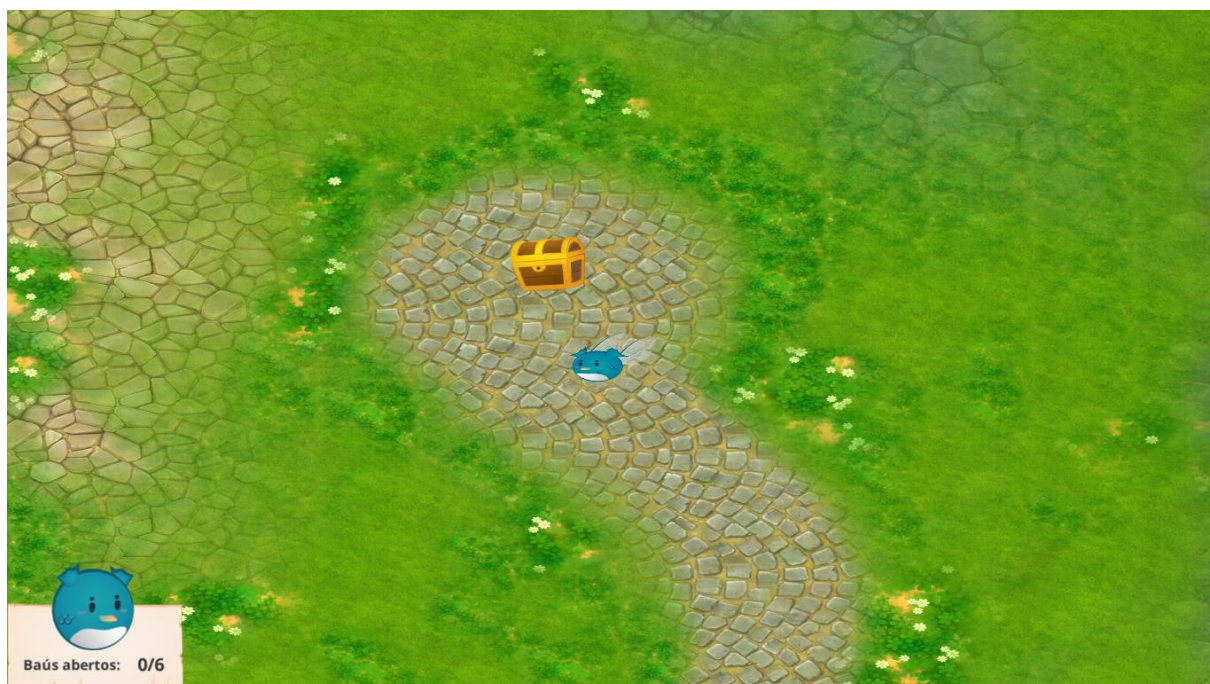
Expliquei integralmente este estudo ao participante. Na minha opinião e na opinião do participante, houve acesso suficiente às informações, incluindo riscos e benefícios, para que uma decisão consciente seja tomada.

Assinatura do investigador

Local e data

Nome do investigador

ANEXO H – ABERTURA EMOTION HUNTERS



ANEXO I – EXEMPLO DE PSICOEDUCACAO NO EMOTION HUNTERS

Tristeza

A tristeza é a emoção que mais evitamos sentir, afinal, ninguém gosta de ficar triste. Porém, essa é uma emoção tão importante quanto todas as outras. Desde que somos bebês ela nos ajuda na comunicação dos nossos desconfortos, através do choro. Depois que aprendemos a falar, ela continua nos ajudando a aprender com nossos erros e a pensarmos de forma mais profunda e criativa. É a tristeza que nos move a introspecção, a pensarmos melhor sobre os caminhos que a vida nos oferece e a nos colocarmos no lugar do outro. Além disso, o choro, manifestação da tristeza, também facilita a busca por apoio, já que quando choramos aumentamos a probabilidade de chamar a atenção de alguém que possa nos ajudar. Sendo assim, podemos dizer que quando evitamos sentir tristeza a qualquer custo, também nos afastamos de nós mesmos, somos menos autênticos e podemos até nos distanciarmos de quem amamos.

OK

Baús abertos: 5/6

Medo

Sinais de medo

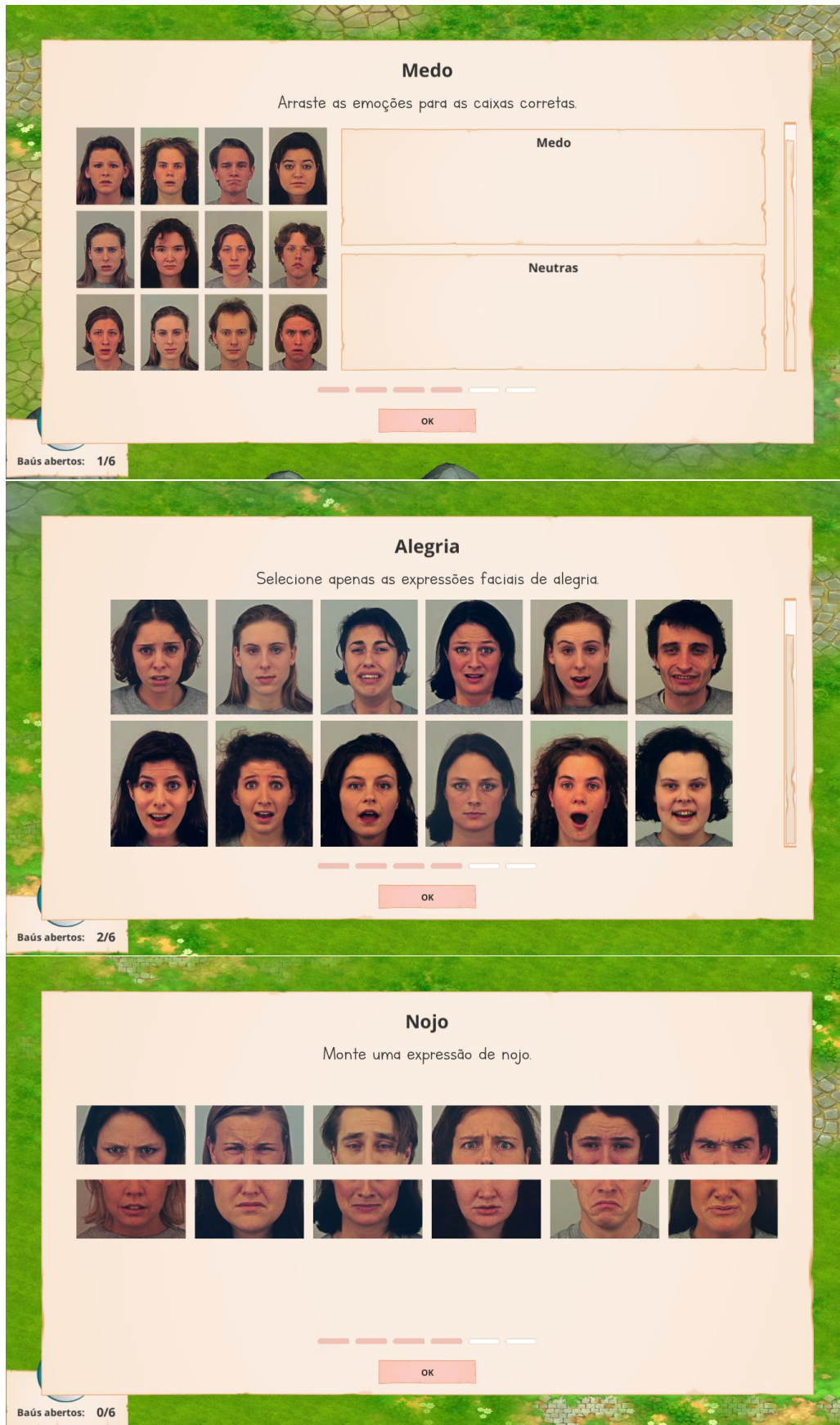


- ① sobrancelhas levantadas e juntas
- ② pálpebras superiores levantadas
- ③ pálpebras inferiores contraídas
- ④ lábios levemente esticados horizontalmente em direção às orelhas

OK

Baús abertos: 1/6

ANEXO J – EXEMPLO DE JOGOS NO EMOTION HUNTERS



ANEXO K – EXEMPLO DE FEEDBACKS POSITIVOS E NEGATIVOS NO EMOTION HUNTERS



