

CURRICULUM VITAE

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Personal Information

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Educational Background

2006 Masters of Science at Brown University, Providence, RI, USA.
2003 Clinical Psychologist degree at Universidade Federal de São Carlos, São Carlos, Brasil.
2002 Bachelor in Psychology at Universidade de São Carlos, São Carlos, Brasil.

Dissertations

Masters of Science (M.Sc.)

Thesis: Speed of initial acquisition and daily transitions of temporal discriminations

Abstract: The present study investigated the effects of daily changes in fixed interval schedules of reinforcement on the speed of initial learning, speed of transitions between intervals, and pattern of responding after extensive training (asymptote). In Experiment 1, 12 rats were trained in the first session with three different fixed intervals, 30-, 60- and 120-s, signaled by three different stimuli, S1, S2 and S3, respectively. Beginning with the second session, S2 was varied daily, and could be 30-, 60- or 120s. Results using a curvature index showed a faster initial learning for the daily varied intervals than for the intervals that did not vary, suggesting that training on one interval improves performance on other intervals. Results also suggested more temporal discrimination for intervals that did not vary daily than for daily varied intervals at asymptote. In Experiment 2, 48 rats were divided into 6 groups, and the expected number of cycles per session of the varied interval (V) was manipulated: 0, 10, 20, 40 and 60 (Groups V0, V10, V20, V40 and V60, respectively). Results showed that the more training per session of the varied intervals the more temporal discrimination at asymptote. A cycle by cycle analysis at asymptote revealed a gradual adjustment in the pattern of responding for the varied intervals within every session. This adjustment was also observed in an additional group of rats for which one session of training consisted of either S1 30-s, S2 60-s or S3 120-s with daily changes in terms of what pair is trained, but no changes in the stimulus-interval pairs themselves (the stimuli were always

reliable), suggesting that the rats adjusted their performances whenever the interval in the previous cycle was a reliable cue to food prime in the current cycle, regardless of whether the stimulus also was a reliable cue or not. Some implications for timing theories and mathematical models are discussed.

Advisor: Russell M. Church
Committee: Donald Blough
Luiz Pessoa

Bachelor and Clinical Psychologist Formation degrees

Honor thesis: Transferência para estímulos abstratos de respostas emocionais a expressões faciais de alegria, ira e nojo.

Abstract: Um símbolo é um objeto (ou estímulo) que pode substituir um outro (o seu referente). A relação entre símbolo e referente pode ser concebida como uma relação de equivalência, conforme a definição matemática de equivalência: uma relação que é reflexiva, simétrica e transitiva. Estudos experimentais têm simulado a aquisição de propriedades simbólicas por estímulos abstratos, de acordo com esta definição. Os estudos têm permitido a investigação de diversas propriedades da aquisição de propriedades simbólicas, em situações artificiais de laboratório, permitindo a extrapolação destas propriedades para as situações naturais. Uma questão que tem sido investigada é a transferência de funções dos objetos para estímulos equivalentes a eles, ou seja, seus símbolos. Desta forma, os símbolos viriam a compartilhar propriedades dos objetos que simbolizam. Alguns estudos sugerem que o grau de transferência depende do número de estímulos nodais mediando a relação entre um símbolo e seu referente. Estes resultados têm sido questionados a partir de argumentos lógicos e metodológicos. Argumenta-se que a relação de equivalência não comporta graus, ou seja, não poderia haver estímulos mais equivalentes do que outros. O presente estudo introduz um novo método para investigar esta questão. Este método consiste no estabelecimento de relações entre estímulos significativos e estímulos arbitrários. Os estímulos significativos são retratos de faces expressando emoções de, respectivamente, alegria, raiva e nojo. Cada um destes estímulos é relacionado a três ou seis estímulos arbitrários, num arranjo em que o número de nódulos intermediários é crescente, e verifica-se a formação de relações de equivalência entre as faces e os estímulos abstratos relacionados a elas. Escalas ancoradas por pares de adjetivos polares são utilizadas para avaliar o significado das faces e também dos estímulos abstratos relacionados a elas com um e com quatro nódulos intermediários. Estas escalas permitem avaliar o grau de transferência das propriedades das faces para as figuras abstratas. Estudos preliminares comprovam que os estímulos abstratos passam a ser avaliados de maneira semelhante às faces. O presente estudo, realizado com estudantes universitários divididos em dois grupos - o primeiro com um nódulo intermediário entre o estímulo e seu referente, e o segundo com quatro nódulos - está avaliando se o grau de transferência depende do número de nódulos intermediários.

Advisor: Julio César Coelho de Rose

Publications

Journals

Caetano, M. S., Guilhardi, P. & Church, R. M. (2007). Differences between simultaneous and blocked training detected by a transfer test. *Behavioural Processes*, 75 (2), 176-181. Abstract. Secondary data analysis was used to compare responding early on a transfer test from rats previously trained simultaneously or successively on multiple temporal discriminations for the same number

of trials (Guilhardi & Church, 2005a). Three fixed intervals (30-, 60-, and 120-s) were signaled by three stimuli (light, noise, and clicker). Twelve rats were trained with the three stimulus-interval pairs intermixed on each experimental session (simultaneous condition); 12 other rats were trained in successive blocks of 10 sessions on each pair (blocked condition). Then, all rats had a transfer test in which all three stimulus-interval pairs were presented intermixed on each session. Rats in the simultaneous and blocked condition responded similarly during training, but differently during early stages of the transfer test. One possibility is that rats in the blocked condition were controlled by the previous interval, not by the current stimulus. These results challenge the usual assumptions from models of timing and conditioning that both simultaneous and blocked training produce learning of the associations between stimulus and interval in a multiple interval training task.

Translations

Spradlin, J. E. (1999). *As rotinas e suas implicações*. Translation by Marcelo S. Caetano, Desirée Cassado, Thiago H. Bomfim and Antonio Celso de N. Goyos.

Abstracts

Caetano, M. S. (2007). Response as a time marker in rats. Symposium presented at the 78th meeting of the Eastern Psychological Association (EPA). Philadelphia, PA, USA.

Abstract. A head-entry response, as well as a light stimulus, may be a time marker. Rats were trained in a 20-s DRL procedure in which head-entry was a time marker, and in a control procedure in which a light was yoked to responses of a rat in the DRL procedure. Response patterns of the two groups were similar, although response rate was lower in the DRL procedure than in yoked control procedure.

Caetano, M. S., Guilhardi, P. & Church, R. M. (2006). Memorization and relearning of discriminative fixed intervals in rats. Poster presented at the 29th Annual Conference of the Society for the Quantitative Analysis of Behavior. Atlanta, GA, USA.

Abstract. When trained under two or three discriminative fixed intervals that were signaled by different stimuli, rats adjusted their pattern of responses in two different ways: memorization or relearning (Caetano, 2006). Under some conditions the pattern of responses early in a session was controlled by the fixed interval (memorization), but under other conditions it was similar at different fixed intervals, but rapidly adjusted within the session (relearning). The goal was to investigate the conditions under which rats memorized or relearned. A previous experiment on the between-session acquisition of discriminative fixed intervals did not examine this within-session effect (Guilhardi & Church, 2005). A reexamination of these data (secondary data analysis) provided both a replication and an extension of the previous conclusions to additional conditions. Twelve rats that were trained with three discriminative fixed intervals within each session, memorized the intervals; 12 other rats that were trained in successive blocks of 10 sessions on each interval learned the three discriminative intervals but did not initially discriminate between intervals when presented with the three intervals within a session. The conclusion from both studies is that rats relearn when rapid relearning is possible, and they memorize when it is not. (pp. 11).

Caetano, M. S., Guilhardi, P. & Church, R. M. (2006). Training temporal discriminations in rats: memorization or relearning? Symposium presented at the 13th International Conference on Comparative Cognition. Melbourne, FL, USA.

Abstract. Rats can be trained to discriminate between time intervals when different intervals are signaled by different stimuli. This study paired three intervals (30, 60 and 120 s) with a single stimulus or with three different stimuli. The stimulus-interval combinations were trained either simultaneously (different combinations presented in the same session) or in blocks (one combination per session). When the stimulus-interval combinations were trained simultaneously with different stimuli signaling different intervals, the rats memorized the stimulus-interval combinations; when the stimulus-interval combinations were trained in blocks, even after extensive training, the rats relearned the stimulus-interval combinations on each session. An evaluation of possible cues used for prediction of food availability indicated the possibility that daily relearning of the interval was the default strategy, and memorization of the stimulus-interval combination occurred only when the default strategy was ineffective. (pp. 6).

Caetano, M. S., Guilhardi, P. & Church, R. M. (2005). Factors affecting the speed of learning of temporal discriminations. Symposium presented at the 12th International Conference on Comparative Cognition. Melbourne, FL, USA.

Abstract. The speed of learning temporal discriminations depends on the training procedure used. Training different intervals in a multiple cued interval (MCI) procedure produces faster learning when one of the intervals is changed daily, compared to when the interval is held constant. The goal of this study was to determine whether daily changes contribute to faster learning, and to identify procedural factors involved, such as amount of training and transfer. Twelve rats were trained with two constant intervals (30 and 120 sec), and one interval that varied daily (30, 60 or 120 sec). The speed of learning of the temporal intervals was assessed. In a second experiment, four groups were trained with different proportions of the changed interval (1, .67, .33 and 0), and the speed of learning under each condition was assessed. The results suggest that the faster learning occurred because of positive transfer from the amount of overall training. (pp. 15).

Caetano, M. S., Guilhardi, P. & Church, R. M. (2004). Factors affecting the speed of learning of temporal discriminations. Symposium presented at the 2^o Annual Convention of the Association for Behavior Analysis (ABA). Campinas, SP, Brazil.

Abstract. Previous experiments found that the initial learning rate of a temporal discrimination was slower than the rate of learning of subsequent temporal discriminations. In these experiments, learning of subsequent temporal discriminations occurred after the initial learning was at steady state. The goal of this study was to investigate whether the faster learning rate observed in subsequent acquisitions was due to (1) the prior learning of one temporal discrimination, (2) the different nature of initial vs. subsequent temporal discrimination training, or (3) a change of learning rate as a function of training. Twelve rats had initial training with intervals that varied daily (30, 60, or 120 sec). Factors that affect the speed of learning were identified using a linear operator model. These findings have direct implications for the development of models of the dynamics of timing and conditioning, such as Packet Theory.

Caetano, M. S., Bortoloti, R. & de Rose, J. C. C. (2002). Como medir a relação entre símbolos? Estudos utilizando o paradigma de equivalência. Poster presented at the XI Encontro Brasileiro de Psicoterapia e Medicina Comportamental (ABPMC). Londrina, PR, Brazil. Anais do XI Encontro Brasileiro de Psicoterapia e Medicina Comportamental, 2002. p. 222-223.

Caetano, M. S., Bortoloti, R. & de Rose, J. C. C. (2002). Measuring the relatedness of equivalent stimuli. Poster presented at the 28th Annual Convention of the Association for Behavior Analysis (ABA). Toronto, ON, Canada.

Caetano, M. S., Bortoloti, R. & de Rose, J. C. C. (2002). Relatedness of equivalent stimuli as a function of the number of nodes. Symposium presented at the 28th Annual Convention of the Association for Behavior Analysis (ABA). Toronto, ON, Canada.

Caetano, M. S., Bortoloti, R. & de Rose, J. C. C. (2002). Medindo o grau da relação entre estímulos equivalentes. Poster presented at the XXXII Reunião Anual da Sociedade Brasileira de Psicologia (SBP). Florianópolis, SC, Brazil. Resumos de Comunicação Científica da XXXII Reunião Anual de Psicologia, 2002. p. 111-111.

Bortolotti, R., de Rose, J. C., Caetano, M. S. & Galvão, O. F. (2002). Tempo de detecção de estímulos abstratos equivalentes a expressões faciais. Poster presented at the XXXII Reunião Anual da Sociedade Brasileira de Psicologia (SBP). Florianópolis, SC, Brazil. Resumos de Comunicação Científica da XXXII Reunião Anual de Psicologia, 2002. p. 111-112.

Caetano, M. S., Bortolotti, R. & de Rose, J. C. (2001). Transferência para símbolos abstratos de respostas emocionais a expressões faciais de ira, nojo e alegria. Poster presented at the X Encontro Brasileiro de Psicoterapia e Medicina Comportamental. Campinas, SP, Brazil. Resumos do X Encontro Brasileiro de Psicoterapia e Medicina Comportamental, 2001. p. 37-38.

Caetano, M. S., de Rose, J. C. C. & Bortoloti, R. (2001). Transferência para estímulos abstratos de respostas emocionais a expressões faciais de alegria, ira e nojo. Symposium presented at the IV Congresso de Iniciação Científica da Universidade Federal de São Carlos. São Carlos, SP, Brazil.

Abstract. Um símbolo é um objeto (ou estímulo) que pode substituir um outro (o seu referente). A relação entre símbolo e referente pode ser concebida como uma relação de equivalência, conforme a definição matemática de equivalência: uma relação que é reflexiva, simétrica e transitiva. Estudos experimentais têm simulado a aquisição de propriedades simbólicas por estímulos abstratos, de acordo com esta definição. Os estudos têm permitido a investigação de diversas propriedades da aquisição de propriedades simbólicas, em situações artificiais de laboratório, permitindo a extrapolação destas propriedades para as situações naturais. Uma questão que tem sido investigada é a transferência de funções dos objetos para estímulos equivalentes a eles, ou seja, seus símbolos. Desta forma, os símbolos viriam a compartilhar propriedades dos objetos que simbolizam. Alguns estudos sugerem que o grau de transferência depende do número de estímulos nodais mediando a relação entre um símbolo e seu referente. Estes resultados têm sido questionados a partir de argumentos lógicos e metodológicos. Argumenta-se que a relação de equivalência não comporta graus, ou seja, não poderia haver estímulos mais equivalentes do que outros. O presente estudo introduz um novo método para investigar esta questão. Este método consiste no estabelecimento de relações entre estímulos significativos e estímulos arbitrários. Os estímulos significativos são retratos de faces expressando emoções de, respectivamente, alegria, raiva e nojo. Cada um destes estímulos é relacionado a três ou seis estímulos arbitrários, num arranjo em que o número de nódulos intermediários é crescente, e verifica-se a formação de relações de equivalência entre as faces e os estímulos abstratos relacionados a elas. Escalas ancoradas por pares de adjetivos polares são utilizadas para avaliar o significado das faces e também dos estímulos abstratos relacionados a elas com um e com quatro nódulos intermediários. Estas escalas permitem avaliar o grau de transferência das propriedades das faces para as figuras abstratas. Estudos preliminares comprovam que os estímulos abstratos passam a ser avaliados de maneira semelhante às faces. O presente estudo, realizado com estudantes universitários divididos em dois grupos - o primeiro com um nódulo intermediário entre o estímulo e seu referente, e o segundo com quatro nódulos - está avaliando se o grau de transferência depende do número de nódulos intermediários.

Talks

Caetano, M. S. (2007). Discriminação temporal em ratos: Estímulo, resposta e auto-relato [*Temporal discrimination in rats: Stimulus, response, and self-report*]. Symposium presented at the 3rd Annual Interdisciplinary Conference of the Brazilian Researchers at Brown (CAINBRA). Providence, RI, USA.

Caetano, M. S. (2006). Estratégias de aprendizagem: Discriminação temporal em ratos [*Learning strategies: Temporal discrimination in rats*]. Symposium presented at the 2nd Annual Interdisciplinary Conference of the Brazilian Researchers at Brown (CAINBRA). Providence, RI, USA.

Awards

First Year Fellowship (September 2004 – May 2005). Fellowship for research in the first year of the Ph.D. program at Brown University. Providence, RI, USA.

Research Fellowship (March 2001 – July 2003). Programa Institucional de Bolsas de Iniciação Científica (PIBIC/CNPq). [Institutional Program of Scientific Initiating Fellowship]. Fellowship for research at Universidade Federal de São Carlos. São Carlos, SP, Brazil.

Work experience

Research

Jul, 2004 – Ago, 2004: **visiting researcher** working with Dr. Russell M. Church at the Timing Laboratory at Brown University, Providence, RI, USA.

Mar, 2004 – Jun, 2004: **research technician** at the Human Behavior Studies Laboratory at Universidade Federal de São Carlos, São Carlos, SP, Brazil.

Jul, 2003 – Nov, 2003: **visiting researcher** working with Dr. Russell M. Church at the Timing Laboratory at Brown University, Providence, RI, USA.

Mar, 2001 – Jun, 2003: **researcher** at the Human Behavior Studies Laboratory at Universidade Federal de São Carlos, São Carlos, SP, Brazil.

Jan, 2000 – Dec, 2000: **researcher** at the Psychology of Learning Laboratory at Universidade Federal de São Carlos, São Carlos, SP, Brazil.

Apr, 1999 – Dec, 1999: **research assistant** working with Dr. Antonio Celso de Noronha Goyos at the Laboratory of Interactive Media and Computerized Teaching at Universidade Federal de São Carlos, São Carlos, SP, Brazil.

Teaching

Jan, 2007 – present: **teaching assistant** to Dr. Jack C. Wright for Quantitative Methods in Psychology. Department of Psychology, Brown University, Providence, RI, USA.

Sep, 2006 – Dec, 2006: **teaching assistant** to Dr. Russell M. Church for Experimental Analysis of Animal Behavior and Cognition laboratory. Department of Psychology, Brown University, Providence, RI, USA.

Jan, 2006 – May, 2006: **teaching assistant** to Dr. Russell M. Church for Experimental Analysis of Animal Behavior and Cognition laboratory. Department of Psychology, Brown University, Providence, RI, USA.

Sep, 2005 – Dec, 2005: **teaching assistant** to Dr. Billy Wooten for Elementary Psychology: An Introduction to Mind and Behavior laboratory. Department of Psychology, Brown University, Providence, RI, USA.

Organization of scientific events

2007 – **Member of the organizational committee** of the 3^a Conferência Anual Interdisciplinar dos Brasileiros na Brown [*3rd Annual Interdisciplinary Conference of the Brazilian Researchers at Brown*]. Providence, RI, USA.

2003 – **Member of the organizational committee** of the II Jornada da Análise do Comportamento da Universidade Federal de São Carlos (JAC) [*II Conference on Behavior Analysis of Federal University of São Carlos*]. São Carlos, SP, Brazil.

2002 - **Member of the organizational committee** of the I Jornada da Análise do Comportamento da Universidade Federal de São Carlos (JAC) [*I Conference on Behavior Analysis of Federal University of São Carlos*]. São Carlos, SP, Brazil.

2002 – **Member of the organizational committee** for the IX Congresso Regional dos Estudantes de Engenharia Química (COREQ) [*IX Regional Conference of the Chemical Engineering Students*]. Universidade Federal de São Carlos, São Carlos, SP, Brazil.

Memberships

2006 to present – Eastern Psychological Association (EPA).

2004, 2006 to present – Association for Behavior Analysis (ABA).

2006 to present – Society for the Quantitative Analysis of Behavior (SQAB).

2003 to present – Comparative Cognition Society.

2000 to 2002 – Associação Brasileira de Psicoterapia e Medicina Comportamental (ABPMC) [*Brazilian Association of Psychotherapy and Behavioral Medicine*].

1999 to 2002 – Sociedade Brasileira de Psicologia (SBP) [*Brazilian Psychological Society*].