Curriculum Vitae

Paulo Guilhardi

Date of Birth: 03/12/1977
Nationality: Brazilian
Birth Place: Campinas - SP

Contact Address:
Department of Psychology
Brown University
89 Waterman St (BOX 1853)
Providence, RI 02912
USA

(Download pdf vitae)

Contents:
Professional Appointments
Educational Background
  Dissertations
Publications
  Journals
  Chapters in Books
  Abstracts
Editorial Positions
  Guest Reviewer
Invited Lectures
Awards
Work Experience
  Research
  Teaching
Memberships
  Honorary Societies
  Psychological Societies
Courses Attended / Training

Professional Appointments

2006 - Present   Assistant Professor (Research), Department of Psychology, Brown University, Providence, RI, USA.
2005 - 2006   Research Associate, Department of Psychology, Brown University, Providence, RI, USA.

Educational Background

2005   Ph.D in Psychology at Brown University, Providence, RI, USA.
2002   Masters of Science at Brown University, Providence, RI, USA.
2000   'Bachelor' and 'Psychology Formation' degrees at Universidade Federal de São Carlos, São Carlos, Brazil.

Dissertations

Doctor of Philosophy in Psychology (Ph.D.)
Thesis: "A Unified Approach to the Study of Choice, Conditioning, and Timing" **(Download)**
  Abstract. The goal was to describe and integrate behavioral results that involved choice, conditioning, and timing procedures. Rats were

trained in four experiments in which manipulations could be made in the number of possible responses (choice procedure), the stimuli presented (conditioning procedure), and the intervals and reinforcement distribution (timing procedure). The pattern and rate of responses were used as dependent measures. The pattern of the response rate gradients obtained when two lever-press responses were used (Experiments 1 and 3) and a single stimulus (Stimulus A or Stimulus B) was presented, showed that the rats made correct responses and stimulus error responses. The proportion of correct responses was approximately 75% of the total correct and stimulus error responses. A summation rule using the response rate gradients of correct and stimulus error responses was used to predicted the response rate gradients when multiple stimuli were presented simultaneously (Compound AB), and when a single lever-press response was used (Experiments 2 and 4). The predictions applied to multiple intervals (15, 30, and 60 s) and multiple reinforcement distributions (fixed and random interval distributions). The systematic errors in the predictions of the summation were due to response competition. Therefore, a simple summation rule with response competition integrated procedures of choice, conditioning, and timing, and thus extended explanations from traditional theories of choice (e.g. matching law), conditioning (e.g., Rescorla & Wagner model), and timing (e. g., scalar timing theory). This integration can be further simplified and incorporated on process models that predict times of occurrences of responses such as packet theory.

Advisor: Russell M. Church
Committee: Donald S. Blough
                   Rebecca A. Burwell
                   Julius W. Kling

Masters of Science (M.Sc.)

Thesis: "Dynamics of Within- and Between- Interval Temporal Discrimination" **(Download)**

Abstract. The goals were to develop a multiple temporal discrimination (MTD) procedure, to evaluate measures of temporal discrimination, to compare stimulus and interval discrimination, and to provide a simple description of the dynamics of stimulus and temporal discrimination. Rats received initial training to three discriminative fixed-intervals (30-, 60- and 120 s) either simultaneously within a session for 30 sessions or in three blocks of 10 sessions each. The MTD procedure produced acquisition of multiple stimulus and temporal discrimination that occurred concurrently. Some dependent measures pertained to within-interval, some to between-interval, and some to both within-interval and between-interval temporal discrimination. The acquisition of a second discrimination occurred faster than initial acquisition. After performance on the three intervals during training reached asymptote, the duration of the intermediate interval varied every session to one of nine between 30 to 120 s, either randomly or in a ramp order. The rats rapidly adjusted the performance to the new intervals. The speed of initial learning, acquisition of a second discrimination, and transitions between intervals were well characterized by a linear operator model.

Advisor: Russell M. Church
Committee: Donald S. Blough
                   Ruth M. Colwill

Publications

Journals

Guilhardi, P., Yi, L., & Church, R. M. (submitted). A modular model of learning and performance. *Psychonomic Bulletin & Review.* **(Download)**

Abstract. A theory is described to account for acquisition and extinction of response rate (conditioning) and pattern (timing). This modular theory is a development of packet theory (Kirkpatrick, 2002; Kirkpatrick & Church, 2003) that adds a distinction between pattern and strength memory, and closed-form solutions of equations. The theory is described with equations related to a flow diagram, and it is illustrated by application to an experiment with rats with repeated acquisition and extinction in a multiple-cued-interval procedure. The predictions of different measures of performance based on the theory were evaluated with cross-validation; under the different conditions of the experiment, the predictions based on the theory were similar to predictions based on the reliability of the behavior.

Guilhardi, P., MacInnis, M. L. M., Church, R. M., & Machado, A. (submitted). Shifts in the psychophysical function in rats. *Behavioural Processes.* **(Download)**

Abstract. The primary goal was to compare results from a free operant procedure with pigeons (Machado & Guilhardi, 2000, Experiment 2) with new results obtained with rats. The secondary goal was to compare the results of both experiments with dependent variables that were not used in the original publication. As in the original study with pigeons, rats were trained on a two-alternative free-operant psychophysical procedure in which left lever press responses were reinforced for the first and second quarters of a 60-s trial, and right lever press responses were reinforced for the third and fourth quarters of the trial. The quarters were reinforced according to four independent variable interval (VI) schedules of reinforcement. The VI duration was manipulated in each quarter and shifts in the psychophysical functions that relate the responses as a function of time since trial onset were measured. Results reported by Machado and Guilhardi (2000) with pigeons were compared to those obtained with rats. In addition, results not originally reported were also compared. The availability of primary data provided the possibility of direct comparisons of results that were not used in the original study (e.g., conditions not reported, individual animals, and additional dependent measures).

Caetano, M. S., Guilhardi, P., & Church, R. M. (submitted). Memorization and relearning of fixed interval by rats. *Behavioural Processes.* **(Download)**

Abstract. When trained under two or three 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); under other conditions the pattern of responses early in a session was similar at different 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 between-session acquisition of discriminative fixed intervals did not examine this within-session effect (Guilhardi & Church, 2005a). A reexamination of these data (secondary data analysis) provided a replication and an extension of the previous conclusions to additional conditions. Twelve rats that were trained with three discriminative fixed intervals on each session memorized the intervals (Simultaneous group); 12 other rats that were trained in successive blocks of 10 sessions on each interval (Blocked group) responded differentially to the three discriminative intervals, but had to relearn them when they were presented within a session. The conclusion from both studies was that rats relearned when rapid relearning was possible, and memorized when it was not.

Guilhardi, P., & Church, R. M. (in press). The pattern of responding after extensive extinction. *Learning & Behavior.* **(Download)**

Abstract. Extensive extinction greatly reduces response rate and increases the relative frequency of short interresponse times, but does not affect temporal learning or operant response rate. In each of two experiments, 24 rats were trained in a multiple cued interval procedure with three stimuli (noise, light, and clicker) at three intervals (30, 60, and 120 s). In Experiment 1, after 50 sessions of extinction, response rate decreased from about 25 to 0.5 responses per minute, but temporal discriminations were maintained and the initial response gradients in reacquisition had a pattern that corresponded with the original (rather than current) training conditions. In Experiment 2, these results were replicated and extended by examination of the effect of stimulus duration on response patterns during extinction, but its lack of effect on reacquisition. The similarity of the initial performance in reacquisition to the asymptotic performance in acquisition was presumably due to the similarity of context.

Guilhardi, P., Yi, L. & Church, R. M. (2006). Effects of repeated acquisitions and extinctions on response rate and pattern. *Journal of Experimental Psychology: Animal Behavior Processes*, *32 (3)*, p 322-328. **(Download)**

Abstract. The procedure developed by Rescorla (2002) was used to study the effects of repeated acquisitions and extinctions of head entry responses into a food cup by rats. In each of four 20-session phases, food was delivered at the end of particular 30-s auditory and visual stimuli, but not at the end of different 30-s auditory and visual stimuli. Based on response rates to individual stimuli and compound stimuli, the increase in response rate in acquisition occurred more rapidly than the decrease in extinction. Acquisition, but not extinction, occurred faster after successive transitions between acquisition and extinction. Temporal gradients of responding developed during acquisition, and remained during extinction. Conclusions based on mean response rate, temporal gradients, and transfer tests were consistent.

Guilhardi, P., & Church, R. M. (2005). Dynamics of temporal discrimination. *Learning & Behavior, 33* (4), 399-416. **(Download)**

Abstract. The purpose was to describe and explain the acquisition of temporal discriminations, transitions from one temporal interval to another, and asymptotic performance of stimulus and temporal discriminations. Rats were trained in a multiple cued interval (MCI) procedure with a head-entry response on three signaled fixed-interval schedules of reinforcement (30, 60, and 120 s). They readily learned the three temporal discriminations whether they were presented simultaneously or successively, and they rapidly adjusted their performance to new intervals when the intermediate interval was varied daily. Although exponential functions provided good descriptions of many measures of temporal discrimination, different parameter values were required for each measure. The addition of a linear operator to a packet theory of timing with a single set of parameters provided a quantitative process model that fit many measures of the dynamics of temporal discrimination.

Guilhardi, P., Keen, R. G., MacInnis, M. L. M., & Church, R. M. (2005). How rats combine multiple time intervals. *Behavioural Processes*, *69* (2), 189-205. **(Download)**

Abstract. The procedures for classical and operant conditioning, and for many timing procedures, involve the delivery of reinforcers that may be related to the time of previous reinforcers and responses, and to the time of onsets and terminations of stimuli. The behavior resulting from such procedures can be described as bouts of responding that occur in some pattern at some rate. A packet theory of timing and conditioning is described that accounts for such behavior under a wide range of procedures. Applications include the food searching by rats in Skinner boxes under conditions of fixed and random reinforcement, brief and sustained stimuli, and several response-food contingencies. The approach is used to describe how multiple cues from reinforcers and stimuli combine to determine the rate and pattern of response bouts.

Church, R. M., & Guilhardi, P. (2005). A Turing test of a timing theory. *Behavioural Processes*, *69* (1), 45-58. **(Download)**

Abstract. A quantitative theory of timing or conditioning can be evaluated with a Turing test in which the behavioral results of an experiment can be compared with the predicted results from the theory. An example is described based upon an experiment in which 12 rats were trained on three fixed-interval schedules of reinforcement, and a simulation of the predicted results from a Packet Theory of Timing. An objective classification rule was used to determine whether a sample from the data or a sample from the theory was more similar to another sample from the theory. With an ideal theory, the expected probability of a correct classification would be 0.5. The observed probability of a correct classification was 0.6, which was slightly, but reliably, greater than 0.5. A Turing test provides a graded metric for the evaluation of a quantitative theory.

Keen, R. G., MacInnis, M. L. M., Guilhardi, P., Chamberland, K., & Church, R. M. (2005). The lack of behavioral effects of fenbendazole: a medication for pinworm infection. *Contemporary Topics in Laboratory Animal Science*, *44* (2), 17-23. **(Download)**

Abstract. Pinworm infection in rodent laboratories is common and often treated with fenbendazole, which is effective and has a low toxicity level. However, very little is known about the behavioral effects of the drug. The purpose of this study was to determine the behavioral effects of fenbendazole on rats tested by using various conditioning and timing procedures. These behavioral effects were examined both between animals (i.e., control versus medicated treatments) and within animals (baseline–treatment–baseline design). Fenbendazole reduced the detection of pinworm eggs, and it had no significant behavioral effects across multiple levels of analysis (e.g., from overall response rates to response patterns to interresponse intervals). All behavioral differences (e.g., discrimination ratios) were a result of task variables. These results suggest that behavioral studies are unlikely to be influenced by fenbendazole treatment given before or during a study.

Guilhardi, P. & Church, R. M. (2004). Measures of temporal discrimination: A case study in archiving data. *Behavior Research Methods, Instruments, & Computers*, *36* (4), 661-669. **(Download)**

Abstract. The primary data of many experimental studies of animal learning and performance consist of the times at which stimuli and reinforcers were delivered, and the times at which responses occurred. The articles based on most of these studies report selected data, either from some sessions or some animals, or summary measures of the behavior. The primary data are sufficient to produce any of the selected and summarized measures, but the selected and summarized data cannot produce many of the measures used in other experimental reports. It is now feasible to archive the primary data from animal behavior experiments so that they are accessible for others to perform secondary data analysis. The value of such secondary data analysis of archived data is described with a case study in which rats were trained on three fixed-interval schedules of reinforcement.

Machado, A., & Guilhardi, P. (2000). Shifts in the psychometric function and their implications for models of timing. *Journal of the Experimental Analysis of Behavior*, *74* (1), 25-54. **(Download)**

Abstract. This study examined how two models of timing, scalar expectancy theory (SET) and learning to time (LeT), conceptualize the

learning process in temporal tasks, and then reports two experiments to test these conceptualizations. Pigeons responded on a two-alternative free-operant psychophysical procedure in which responses on the left key were reinforceable during the first two, but not the last two, quarters of a 60-s trial, and responses on the right key were reinforceable during the last two, but not the first two, quarters of the trial. In Experiment 1 three groups of birds experienced a difference in reinforcement rates between the two keys only at the end segments of the trial (i.e., between the first and fourth quarters), only around the middle segments of the trial (i.e., between the second and third quarters), or in both end and middle segments. In Condition 1 the difference in reinforcement rate favored the left key; in Condition 2 it favored the right key. When the reinforcement rates differed in the end segments of the trial, the psychometric function - the proportion of right responses across the trial - did not shift across conditions; when it occurred around the middle of the trial or in both end and middle segments, the psychometric function shifted across conditions. Experiment 2 showed that the psychometric function shifts even when the overall reinforcement rate for the two keys is equal, provided the rates differ around the middle of the trial. This pattern of shifts of the psychometric function is inconsistent with SET. In contrast, LeT provided a good quantitative fit to the data.

Chapters in Books

MacInnis, M. L. M., & Guilhardi, P. (in press). Basic temporal discrimination procedures. In M. A. Anderson (Ed.), *Tasks and Techniques: A Sampling of Methodologies for the Investigation of Animal Learning, Behavior, and Cognition*, pp. XX-XX. Hauppauge, NY: Nova Science Publishers. **(Download)**

Abstract. During the last 15 years or so, the study of how animals time events has been guided to a large extent by two competing theories, the scalar expectancy theory, SET (Gibbon, 1977, 1991), and the behavioral theory of timing, BeT (Killeen and Fetterman, 1988). The present study reports the results of a series of experiments for which these two theories make substantially different predictions. However,

Machado, A., Keen, R., & Guilhardi, P. (2004). Aprendizaje dependiente del tiempo: explicaciones basadas en la representación frente a las basadas en la acción. [Learning to time: Representation-based versus action-based accounts]. In R. Pellón & A. Huidobro (Eds.), *Inteligencia y aprendizaje* [Intelligence and Learning], pp. 361 – 388. Barcelona, Spain: Editorial Ariel, S. A. **(Download English)** **(Download Spanish)**

Abstract. During the last 15 years or so, the study of how animals time events has been guided to a large extent by two competing theories, the scalar expectancy theory, SET (Gibbon, 1977, 1991), and the behavioral theory of timing, BeT (Killeen and Fetterman, 1988). The present study reports the results of a series of experiments for which these two theories make substantially different predictions. However, instead of focusing on BeT directly, we focus on a more detailed version of BeT, a model called Learning to Time, LeT (Machado, 1997). In what follows, we describe the major attributes of SET and LeT, derive their predictions for two timing tasks, and then report the corresponding experimental findings.

Church, R. M., Guilhardi, P., Keen, R., MacInnis, M. L. M., & Kirkpatrick, K. (2003). Simultaneous Temporal Processing. In H. Helfrich (Ed). *Time and Mind II: Information Processing Perspectives* (pp 3-30). Göttingen, Germany: Hogrefe & Huber. **(Download)**

Abstract. There is considerable evidence that animals can time multiple intervals that occur sepa-rately or concurrently. Such simultaneous temporal processing occurs both in temporal dis-crimi-na--tion procedures and in classical conditioning procedures. The first part of the chapter will consist of the review of the evidence for simultaneous temporal processing, and the condi-tions under which the different intervals have influences on each other. The second part of the chapter will be a brief description of two timing theories: Scalar Timing Theory and a Packet Theory of Timing. Scalar Timing Theory consists of a pacemaker-switch-accumula-tor system that serves as a clock, a memory that consists of examples of previously rein-forced intervals, and a decision process that involves a comparison of ratios to a criterion; the Packet Theory of Timing consists of a conditional expected time function that serves as a clock, a memory that consists of weighted sums of these values, and a probabilistic decision process that produces packets of responses. Both of these theories will be applied to an exam-ple of simultaneous temporal processing by rats, and will serve as the basis for some gen-eral comments about the basis for selecting and evaluating quantitative theories of timing.

Translations

Church, R. M. História da pesquisa sobre punição. In H. J. Guilhardi and N. C. Aguirre, *Sobre Comportamento e Cognição: Expondo a Variabilidade* (pp 251-271). Santo André, SP, Brazil: ESETec. Translation by P. Guilhardi. **(Download Portuguese)**

Abstract. (From the chapter). Estou muito contente por ter sido convidado para falar com vocês sobre a história da pesquisa sobre punição. Como estudante de doutorado no início da década de 50, eu li quase todos os experimentos em aprendizagem aversiva que foram realizados na primeira metade do século 20. Logo após, estive engajado em pesquisa sobre aprendizagem aversiva por aproximadamente 20 anos. No entanto, isto foi há muito tempo atrás - de meados dos anos 50 até meados dos anos 70...

Abstracts

Guilhardi, P., MacInnis, M. L. M., & Church, R. M. (2006). Shifts in the psychophysical function in rats. Poster presented at the 29th Annual Conference of The Society for the Quantitative Analysis of Behavior (SQAB). Atlanta, GA, USA.

Abstract. The goal was to compare results from a free operant procedure using pigeons (Machado & Guilhardi, 2000, Experiment 2) with new results obtained using rats. Moreover, the goal was to use the primary data obtained from the pigeons to compare the results of both experiments using dependent variables that were not necessarily used in the original publication. As in the original study with pigeons, rats were trained on a two- alternative free-operant psychophysical procedure in which left lever press responses were reinforced for the first and second quarters of a 60-s trial, and right lever press responses were reinforced for the third and fourth quarters of the trial. The quarters were reinforced according to four independent variable interval schedules of reinforcement (VI). The VI duration was manipulated in each quarter and shifts in the psychophysical functions that relate the two responses were measured. Results reported by Machado & Guilhardi (2000) using pigeons were compared to those obtained with rats. In addition, results not originally reported were also compared. The availability of primary data provides the possibility of direct comparisons of results that were not necessarily

published in the original study (e.g., conditions not reported, individual subjects, additional dependent measures). (p.15)

Keen, R., Guilhardi, P., & Church, R. M. (2006). The effects of response contingency on timing. Poster presented at the 29th Annual Conference of The Society for the Quantitative Analysis of Behavior (SQAB). Atlanta, GA, USA.

Abstract. The goal of the present study was to examine how the contingency between response and reinforcement affects timing behavior. In appetitive head entry experiments, rats received food contingent on their head being in the food cup (Dwell), their head entering the food cup (Entry), or independently of any response (Classical). These contingencies were either in a fixed interval or random interval procedure. The reinforcement schedule (Fixed or Random) had a strong effect on the response distribution, but a minimal effect on the response probability. Conversely, the response contingency (Dwell, Entry, or Classical) had a strong effect on the probability of a response, but a negligible effect on the response distribution. (p.18)

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 (SQAB). 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. (p. 11)

Guilhardi, P. Maintenance of Learning During Extensive Extinction. Paper presented at the 13th Annual International Conference on Comparative Cognition. Melbourne, FL, USA.

Abstract. The memory for interval durations of rats is maintained after extensive extinction when the conditions of original acquisition and extinction are the same. The goal was to determine whether the memory for interval durations is also preserved when the conditions during extinction are different from those of original acquisition. Twenty-four rats were trained on fixed-intervals 30-, 60-, and 120-s associated with noise, light, and clicker. The stimulus-interval associations during acquisition (A), were either maintained (12 rats) or changed (12 rats) during extensive extinction (B). Following extinction, half of each group of 12 rats had reacquisition of the same associations A, and the other half B. The rats learned new stimulus-interval associations during extinction, but the new learning did not eliminate the memory of original acquisition shown in the reacquisition transfer test. The restoration of the original context revealed the preservation of the original learning. (p. 6).

Church, R. M., & Guilhardi, P. (March, 2005). *A Turing Test of a Timing Theory.* Paper presented at the 12th Annual International Conference on Comparative Cognition. Melbourne, FL, USA.

Abstract. A quantitative theory of timing or conditioning can be evaluated with a Turing test in which behavioral results of an experiment can be compared with the predicted results from the theory. An example is described based upon an experiment in which 12 rats were trained on three fixed-interval schedules of reinforcement, and a simulation of the predicted results from a Packet Theory of Timing. An objective classification rule was used to determine whether a sample from the data or a sample from the theory was more similar to another sample from the theory. The probability of a correct classification was 0.6. This was substantially better than the worst possible theory in which correct classification would always occur (1.0), but reliably worse than an ideal theory in which correct classification would occur at chance (0.5). A Turing test provides a graded metric for the evaluation of a quantitative theory. (p.15).

Guilhardi, P. (March, 2005). *Predicting Random Interval Choice on the Basis of the Behavior on the Alternatives.* Paper presented at the 12th Annual International Conference on Comparative Cognition. Melbourne, FL, USA.

Abstract. The goal was to determine whether choice behavior between random interval alternatives could be predicted from the summation of behavior to each of the alternatives. Twenty-four rats were trained with two stimuli, each with a mean duration of 120s that could be presented simultaneously or successively. With probability 0.5, food was delivered with a random interval of 15s during one stimulus and with a random interval of 60s during the other stimulus. Half of the rats were trained with a single lever, and the other half were trained with different levers for the two intervals (choice procedure). The same simple quantitative rule based on the summation of the alternatives that accounted for behavior in a previous experiment with fixed interval alternatives, accounted for the choice performance. These results suggest that common principles determine behavior on a wide range of procedures such as fixed and random interval, peak, and choice. (p.16).

Guilhardi, P. (August, 2004). *A Quantitative Model of the Dynamics of Temporal Discrimination.* Paper presented at the 2nd International Conference of the Association for Behavior Analysis (ABA) and the XIII Encontro Brasileiro de Psicoterapia e Medicina Comportamental (ABPMC). Campinas, SP, Brazil.

Abstract. The acquisition of a temporal discrimination in a fixed interval schedule of reinforcement may be characterized by many standard measures, such as a temporal discrimination ratio, time to the first response, time to the median response, the time to change from a low response rate to a high response rate, and slope of the response rate gradient. The relationship of these summary measures to the amount of training may be fit with exponential learning curves, but the parameters of these curves are different for each measure. Alternatively, Packet Theory, a simple process model with a single set of parameters, can generate response times that fit the standard summary measures as well as other dependent measures. Data will be based on the response times of 24 rats trained on fixed-interval schedules of reinforcement (30, 60, and 120 sec). **(p. XX)**

Guilhardi, P., Keen, R., MacInnis, M. L. M, & Church, R. M. (May, 2004) *The Combination Rule for Multiple Intervals.* Paper presented at the 27th Annual Conference of The Society for the Quantitative Analysis of Behavior (SQAB). Boston, MA, USA.

Abstract. The procedures for classical and operant conditioning and many timing procedures involve the delivery of reinforcers that may be related in time to previous reinforcers, responses, and onset and termination of stimuli. The behavior resulting from such procedures can be described as bouts of responding that occur in some pattern at some rate. A packet theory of timing and conditioning is being

developed to account for behavior under a wide range of procedures. Applications include the behavior of rats in a Skinner box (such as food search and lever pressing) under fixed and random reinforcement distributions, brief and sustained stimuli, single and multiple responses (choice), and several response contingencies. This approach will be used to describe how multiple cues (from reinforcers, responses, and stimuli) determine the characteristics of response bouts, rate, and pattern. (p. 28)

Guilhardi, P. (March, 2004). *Predicting Choice on the Basis of Behavior on the Alternatives.* Paper presented at the 11th Annual International Conference on Comparative Cognition. Melbourne, FL, USA.

Abstract. The goal was to determine whether choice behavior between alternatives could be predicted from a combination of the behavior to each of the alternatives. Twenty-four rats were trained on two signaled peak intervals (e.g., 15 and 60 s) that were presented at the same or different times. Half were trained with a single lever, and the others were trained with different levers for the two intervals. The peak functions indicated that the rats learned both the times and the combination. A simple quantitative rule based on the alternatives accounted for the choice performance. (p.11)

Keen, R., Guilhardi, P., & Church, R. M. (March, 2004). *The Effects of Response Contingency on Timing.* Paper presented at the 11th Annual International Conference on Comparative Cognition. Melbourne, FL, USA. March, 2004.

Abstract. The goal of the present study was to examine how the contingency between response and reinforcement affects timing behavior. In appetitive head entry experiments, groups of rats received food contingent on its head being in the food cup (Dwell), its head entering the food cup (Entry), or independently of any response (Classical). These contingencies were either in a fixed interval or random interval procedure. The reinforcement schedule (Fixed or Random) affected the response distribution. Response contingency (Dwell, Entry, or Classical) affected the probability of a response but not the response distribution. (p. 10)

Guilhardi, P., & Church, R. M. (November, 2003). *A model of the dynamics of temporal discrimination.* Paper presented at the 44th Annual Meeting of the Psychonomic Society. Vancouver, B.C., Canada.

Abstract. The acquisition of a temporal discrimination in a fixed interval schedule of reinforcement may be characterized by many standard measures, such as a temporal discrimination ratio, the time to the first response, the time to the median response, the time to change from a low response rate to a high response rate, and the slope of the response rate gradient. The relationship of these summary measures to the amount of training may be fit with exponential learning curves, but the parameters of these curves are different for the different measures. Alternatively, a simple process model with a single set of parameters can generate response times that fit the standard summary measures, and others. Data will be based on the response times of 24 rats trained on fixed-interval schedules of reinforcement (30, 60, and 120 sec). (p.21)

Guilhardi, P. (March, 2003). *The cross-validation method for the evaluation of the adequacy, complexity, and generality of timing theories.* Paper presented at the 10th Annual International Conference on Comparative Cognition (CO3). Melbourne, FL, USA.

Abstract. Standard procedures of model evaluation and selection are based on measures of the adequacy of models, such as goodness-of-fit measures, calculated on all available data. Other measures are necessary to assess the complexity and generality of a model. The cross-validation method involves estimation of parameters of a model from some of the data, and the use of these parameters for goodness-of-fit measures on other data. This method is typically used to avoid overly complex models and to establish that the model applies to other samples of the data. It may also be used to determine whether a model is restricted to a particular dependent variable or procedure, or whether it is a general model of a process. The cross-validation method will be applied to evaluate the generality of the predictions of scalar timing theory with respect to different samples, different dependent variables, and different fixed-interval procedures. (p.12)

Guilhardi, P. (March, 2002). *Extinction of a Temporal Discrimination.* Paper presented at the 9th Annual International Conference on Comparative Cognition (CO3). Melbourne, FL, USA.

Abstract. The problem was to determine how extinction affects the temporal pattern of responding. Twenty-four rats were trained on three fixed intervals (30, 60, and 120 s) signaled by three different stimuli (noise, light, and clicker). Then they received 50 2-hr sessions of extinction of these temporal discriminations. Although there was a substantial decrease in the mean response rate, many of the properties of the temporal pattern of responding were maintained. (p.6)

Guilhardi, P., & Church, R. M. (March, 2002). *Dynamics of Within- and Between-Interval Temporal Discrimination.* Paper presented at the 73rd Annual Meeting of The Eastern Psychological Association (EPA). Boston, MA., USA.

Abstract. The goals were (1) to evaluate different dependent measures of temporal discrimination and (2) to describe and explain the dynamics of temporal discrimination during acquisition by rats of three different cued fixed-intervals and during adjustment to daily changes among nine fixed-intervals. A two-state analysis, with a measure of the time of transition between low- and high-response rates, described the dynamics of within- and between-interval temporal discrimination for all intervals and for all conditions of training. (p.45)

MacInnis, M. Church, R. M., & Guilhardi, P. (March, 2002). *Effects of Distribution of Reinforcements on Shifts in the Temporal Psychophysical Function in Rats.* Poster presented at the 73rd Annual Meeting of The Eastern Psychological Association (EPA). Boston, MA, USA. March, 2002.

Abstract (Poster). To examine the effect of the distribution of reinforcements, rats were trained on discrimination tasks in which responses on one lever were intermittently reinforced during the first 30 s, and responses on the other lever during the last 30 s, of a trial. Shifts in the psychophysical functions relating probability of responding on the second lever to time revealed effects of the distribution of reinforcements similar to those reported for pigeons (Machado and Guilhardi, 2000). **(p.XX)**

Guilhardi, P., & Church, R. M. (May, 2001). *Patterns of responding on a cued fixed-interval procedure.* Poster presented at the Twenty-fourth Annual Conference of the Society for Quantitative Analysis of Behavior (SQAB). New Orleans, LA, USA.

Abstract (Poster). The problem was to develop a model of fixed interval performance that would account for both asymptotic and dynamic

results. In a cued fixed-interval procedure, in which the interval randomly changes each session, rats readily develop a temporal gradient of responding that is appropriate for the fixed interval used on each session. Twenty-four rats were trained for 30 sessions with 30-, 60-, and 120-s intervals differentially signaled by white noise, light or clicker. Testing sessions consisted of random presentations of the same three cues. The intervals for the 30- and 120-s cues remained the same as in training; but on each session the other interval (that was 60-s during training) was one of nine different intervals ranging from 30 to 120 s. The mean response rate as a function of time since stimulus onset of individual rats was well described by a 3-parameter ogive with parameter values related to interval duration. Each session was characterized by a rapid adjustment to the session-specific middle interval. Responses occurred in packets, and an analysis of the probability of being in the packet as a function of the expected time to reinforcement described many of the properties of the response pattern of rats. (p.13)

Guilhardi, P., & Church, R. M. (April, 2001). *Temporal discrimination learning with frequent and unfrequent transitions between intervals.* Paper presented at the 72nd Annual Meeting of The Eastern Psychological Association (EPA). Washington, D.C., USA.

Abstract. Twelve rats were trained in a peak procedure with 30-, 60-, and 90- s intervals. Six of the rats had 20 15-hr sessions with each interval; six had 60 15-hr sessions divided into 5-hr blocks with each of the three intervals. The group with infrequent changes developed good temporal discriminations; the group with frequent changes did not. Rats, however, readily learned a cued interval procedure in which the temporal intervals were identified with different stimuli. (p.13)

Machado, A. & Guilhardi, P. (May, 2000). *Comparing Theories of Timing (SET versus BeT versus LeT). Proceedings and Abstracts of the 26thAnnual Convention for the Association for Behavior Analysis*, Washington, D.C., USA.

Abstract. This study examines how two models of timing, Scalar Expectancy Theory (SET) and Learning to Time (LeT), conceptualize the learning process in temporal tasks, and then reports two experiments to test these conceptualizations. Pigeons responded on a two-alternative, free-operant psychophysical procedure in which responses at the left key were reinforceable during the first two, but not the last two quarters of a 60--s trial, and responses at the right key were reinforceable during the last two, but not the first two quarters of the trial. In Experiment 1 three groups of birds experienced a difference in reinforcement rates between the two keys only at the end segments of the trial (i.e., between the first and fourth quarters), only around the middle segments of the trial (i.e., between the second and third quarters), or in both end and middle segments. In Condition 1 the difference in reinforcement rate favored the left key; in Condition 2 it favored the right key. When the reinforcement rates differed in the end segments of the trial the psychometric function--- proportion of right responses across the trial---did not shift across conditions; when it occurred around the middle of the trial or in both end and middle segments the psychometric function shifted across conditions. Experiment 2 showed that the psychometric function shifts even when the overall reinforcement rate for the two keys is equal, provided the rates differ around the middle of the trial. The pattern of shifts of the psychometric function is inconsistent with SET. In contrast LeT provided a good quantitative fit to the data. (p.153).

Guilhardi, P., Padovani, R. C. & de Souza, D. G. (October, 1999) *Desempenho em Razão Fixa como Função de Água e Leite como Reforçadores [Fixed-ratio Performance as a Function of Water and Milk as Reinforcers].* Poster presented in the XXIX Reunião Anual de Psicologia da Sociedade Brasileira de Psicologia (SBP). Campinas, SP, Brazil.

Abstract (Poster). Estudos sobre o comportamento operante com organismos infra-humanos empregam amplamente eventos que funcionam como reforçadores primários, como água ou alimento**.** O efeito de reforçadores primários é modulado por condições de privação e saciação, que variam ao longo de uma sessão experimental, pela própria natureza das operações de apresentações repetidas de tais reforçadores. Um esquema de reforçamento positivo potencial para análise de efeitos de saciação e privação, é o esquema de razão fixa (FR), que gera um padrão de respostas caracterizado por produção de pausas pós-reforçamento seguidas de respostas emitidas em taxa alta. Os parâmetros característicos neste esquema podem contribuir para a análise dos efeitos de variáveis de reforço no desempenho em FR. Dois estudos foram realizados com o objetivo de avaliar os efeitos de saciação e privação (Experimento I), bem como a influência da qualidade do reforçador nestes efeitos (Experimento II) sobre o padrão de respostas produzidos pelo esquema de FR. Os sujeitos foram ratos albinos *Wistar* machos (6 no Experimento I e 5 no Experimento II). A resposta de pressão à barra foi modelada e mantida em razão fixa (FR20). A sessão experimental durava 30 minutos, divididos para efeito de análise, em três períodos de dez minutos. No Experimento I, o reforçador foi água, e analisou-se os efeitos no padrão de distribuição de respostas ao longo da sessão. A primeira fase do Experimento II foi uma replicação sistemática do Experimento I. Em uma segunda fase foram alternadas, aleatoriamente, sessões com água e sessões com leite, com o objetivo de comparar os efeitos de água e leite enquanto reforçadores e verificar, caso fossem encontrados efeitos diferentes, se haveria mudança no padrão de respostas ao longo das sessões sob as duas condições. Tanto no Experimento I como no II, a taxa de respostas foi sendo gradualmente reduzida ao longo da sessão experimental para todas as condições. Este efeito parece ter sido função de um aumento na pausa pós reforçamento. A diminuição da taxa de respostas no Experimento II foi menos acentuada quando o reforço utilizado foi o leite, e a pausa pós-reforço foi menor do que a observada com água como reforçador. Os resultados indicam que as condições de saciação/privação influenciam diretamente o desempenho em razão fixa, e portanto requerem cautela na interpretação de dados obtidos com esse esquema, quando se analisa o desempenho agregado por extensos períodos de tempo. A pausa pós reforço característica desse esquema foi reduzida pelo leite, o que pode sugerir um maior valor relativo do leite em relação à água e uma interação entre o valor do reforçador e o custo de resposta exigido pela razão. Projeto financiado pelo CNPq (PIBIC para o primeiro autor e Bolsa de PQ para a terceira autora). (p.60).

Basso, A. F. T., Paulino, E. C., Vasconcelos, M., Guilhardi, P., Cortegoso, A. L., Prado, M. I. F. L. A., Kubo, O. M. (October, 1998). *Implementação do Serviço-Escola em Psicologia: Elaboração de Critérios e Procedimentos para Credenciamento de Supervisores junto ao Curso de Graduação em Psicologia.* Poster presented at the XXVII Reunião Annual de Psicologia da Sociedade Brasileira de Psicologia (SBP). Ribeirão Preto, SP, Brazil.

Abstract (Poster). O credenciamento de supervisores externos faz parte de um projeto mais amplo de viabilização do funcionamento do Serviço-Escola em Psicologia da Universidade Federal de São Carlos. Esta atividade foi proposta a partir da necesidade de critérios e procedimentos claros e bem definidos para credenciamento de supervisores externos ao Departamento para atuar em atividades de estágio junto ao Curso de Graduação em Psicologia da Universidade Federal de São Carlos. Esse credenciamento garantirá a possibilidade de formação dos alunos do curso em uma maior variedade de campos de intervenção com qualidade, "driblar" a conjuntura atual de extrema dificuldade para contratação de docentes, reduzir a demanda excessiva de trabalho, garantir a qualidade de ensino e ao mesmo tempo aumentar os trabalhos extensivos às demandas da comunidade. O presente trabalho teve por objetivo elaborar critérios e procedimentos para credenciamento de supervisores externos que garantissem a concretização geral do objetivo geral proposto para o Serviço-Escola. Para tal elaboração forma entrevistados professores do Departamento de Psicologia para um levantamento de potenciais supervisores externos ao quadro funcional desta Universidade e de critérios ou características que um trabalho acadêmico e de intervenção considerado como de qualidade apresentava ou pudessem nortear a seleção de profissionais de acordo com o objetivo do Serviço-Escola. Grande parte dos critérios apontados descreviam características subjetivas e de difícil quantificação. A partir do exame destes critérios foram derivados indicadores, de maneira a permitir mais facilmente, averiguar se um profissional atendia aos critérios considerados como necessário para se tornar supervisor de estágio. Tais critérios e seus indicadores

permitiam a indentificação de tr6es tipos de "fontes"que forneciam dados a respeito do supervisor: currículo, plano de trabalho e contrato social. Com base nos critérios, seus indicadores e os tipos de "fontes", foram construídos instrumentos e procedimentos correspondentes a: 1. contato inicial, 2. credenciamento inicial, 3. acompanhamento e avaliação, 4. renovação ou interrupção do credenciamento e 5. avaliação das atividades de estágio. O procedimento de credenciamento de supervisores externos, conjuntamente com as outras atividades do projeto mais amplo, contribuiu para a implementação do serviço-Escola em Psicologia em consonância com os objetivos do Curso de Psicologia desta Universidade. (p.204)

Guilhardi, P., Padovani, R. C., & Souza, D. G. (October, 1998). Qualidade dos reforçadores na manutenção do comportamento sob esquema de razão-fixa [Reinforcement quality in the maintenance of behavior under fixed-ratio schedule of reinforcement]. Paper presented at the VI Congresso de Iniciação Científica (CIC) da Universidade Federal de São Carlos, São Carlos, SP, Brazil.

Abstract. Estudos sobre o comportamento operante com organismos infra-humanos empregam amplamente eventos que funcionam como reforçadores primários, como água ou alimento. O efeito de reforçadores primários é modulado por condições de privação e saciação e estas condições variam necessariamente ao longo de uma sessão experimental, pela própria natureza das operações experimentais. Um estudo prévio mostrou que o desempenho em razão fixa sofria uma redução progressiva na taxa de respostas e um aumento na variabilidade ao longo da sessão experimental. Esta variabilidade é um problema em estudos que visam estudar comportamento em estado estável, porque a interpretação dos resultados pode ser equivocada. Embora este problema pudesse ser contornado selecionando-se apenas os dados do primeiro período, ele suscitou um questionamento sobre os possíveis determinantes da mudança no desempenho ao longo da sessão. A possibilidade de extinção e ou de distensão de razão ficou descartada pela imediata recuperação das taxas no início da sessão seguinte. A saciação seria uma outra possibilidade, mas ficou parcialmente descartada pela ingestão de água que os sujeitos apresentavam, quando tinham acesso à água no bebedouro da gaiola-viveiro, logo após o término da sessão. Contudo, essa ingestão levantou a possibilidade de uma interação entre nível de privação, valor relativo do reforçador e custo da resposta. Em outras palavras, com um custo de respostas alto, se o reforçador tiver um valor relativo reduzido e a privação não for alta, o responder poderá diminuir, mas se o custo do responder é reduzido, o organismo se comporta de modo a obter aquele mesmo reforçador. Neste caso, um reforçador com valor relativo maior do que a água, manteria por mais tempo o responder ao longo da sessão experimental. O objetivo deste estudo consistiu em comparar os efeitos de água e de leite como reforçadores para o desempenho de ratos, sob um esquema de razão fixa e verificar, caso fossem encontrados efeitos diferentes, se haveria mudança no padrão de respostas ao longo das sessões sob as duas condições. Foi empregado um delineamento de tratamento alternado, com sujeitos como seu próprio controle. Depois de estabelecida a linha de base, com 5 ratos Wistar, utilizando-se água como reforço, passou-se a uma condição experimental na qual se alternavam, aleatoriamente, sessões com água e sessões com leite. Observou-se que, no primeiro período de 10 minutos, o desempenho permaneceu estável tanto na presença da água quanto do leite. Os resultados mais significativos foram observados nos dois últimos períodos. Nas sessões com leite, as taxas de respostas passaram a se igualar nos três períodos, tornando-se, portanto, significativamente maiores do que eram na linha de base prévia, enquanto nas sessões com água o desempenho permaneceu similar ao da linha de base inicial. Outro aspecto observado foi que no terceiro período a pausa pós-reforço tornou-se nitidamente menor na presença do leite. Assim, o leite manteve o desempenho estável por mais tempo, sugerindo um maior valor reforçador para este estímulo ou, pelo menos, um processo de saciação diferente do que ocorre com a água. **(p.XX)**

Guilhardi, P., Souza, D. G. & Reis, M. J. D. (July, 1998). *Efeitos supressivos de choque elétrico em função do aumento gradual versus abrupto de sua intensidade em procedimento de punição. [Suppressive effects of electric shock as a function of abrupt vs. gradual increase in shock intensity on a punishment procedure].* Poster presented in the 50ª Reunião Anual da Sociedade Brasileira para o Progresso da Ciência (SBPC), Natal, RN, Brazil.

Abstract (Poster). (INTRODUÇÃO) Um estudo prévio de Azrin (1959) demonstrou que o grau dos efeitos supressivos de um choque elétrico introduzido como punição, sobre uma linha de base de comportamento mantido por reforçamento positivo, depende da maneira de introdução do evento aversivo. O presente estudo teve por objetivo replicar as descobertas de Azrin, explorando a faixa de intensidades sob as quais as taxas de linha de base são mantidas. (METODOLOGIA) Os sujeitos foram seis ratos albinos Wistar, mantidos a 85% de seus pesos corporais ad libitum, sob privação de água e com alimento livre na gaiola viveiro. Respostas de pressão à barra foram modeladas por aproximações sucessivas e mantidas sob um esquema de reforçamento em razão-fixa (FR 20). Após estabilização do desempenho foi introduzida uma contingência de punição em esquema contínuo (CRF). Para um grupo de três sujeitos o estímulo punitivo foi introduzido na intensidade de 2,0 mA; para um segundo grupo a intensidade inicial foi de 0,1 mA e aumentou gradualmente até atingir valores nos quais a supressão do responder era total. (RESULTADOS) Como no estudo original, as taxas de respostas foram imediatamente suprimidas para os sujeitos do Grupo 1. Para o segundo grupo, as taxas de respostas sob intensidades baixas não diferiram das taxas em linha de base, porém à medida que aumentava a intensidade, ocorreram efeitos supressivos nas sessões iniciais, seguidos de uma recuperação no responder ao longo das sucessivas sessões experimentais. Finalmente, em intensidades mais elevadas, que variaram para sujeitos individuais, mas foram sempre inferiores a 1,0 mA, ocorreu supressão total do responder. (CONCLUSÃO) Estes resultados replicaram parcialmente os obtidos no estudo original e têm implicações para um modelo animal de comportamentos masoquistas, definidos como comportamentos que incluem, entre suas conseqüências, eventos potencialmente aversivos. O entendimento de como tais padrões comportamentais são instalados e mantidos pode permitir o delineamento de procedimentos de intervenção em situações em que o comportamento produz sofrimento. (CNPq/PIBIC). (p. 1343)

Guilhardi, P. Souza, D. G. & Reis, M. J. D. (May, 1998). *Suppressive effects of electric shock as a function of abrupt vs. gradual increase in shock intensity.* Poster presented in the 24th Annual Convention of the Association for Behavior Analysis (ABA). Miami, FL, USA.

Abstract (Poster). A previous study by Azrin (1959) demonstrated that the degree of supressive effects of electric shock introduced as punishment on a baseline of positively reinforced behavior depends on how the aversive event is introduced. The present study aimed to replicate Azrin's findings, exploring the range of intensities under which the baseline rates are sustained. Subjects were six *albino* Wistar rats, maintained at 85% of their *ad libitum* body weight through water deprivation. Bar press responding was shaped by successive approximations and maintained under a fixed-ratio schedule of reinforcement (FR 20). Stable performances were followed by the introduction of a continuous (CRF) punishment contingency. Shock intensity was 2.0 mA for one group of subjects and was gradually increased from 0.1 to 2.0 mA for the second group. As in the original study, responding was immediately supressed for subjects in Group 1. In the second group response rates under the lower intensities did not differ from baseline rates. As the intensity increased, supressive effects occurred in the initial sessions, but were followed by recovery in responding over successive experimental sessions. These results have implications for an animal model of *masochist* behavior. **(p.XX)**

Pardo, M. B. L., Wolf, H. B., Menezes, H. S., Guilhardi, P., Ladvig, A. A. S. & Almeida, M. A. (October, 1997). *Levantamento das principais preocupações de mães com seus bebês nas primeiras semanas pós-parto: Estudo exploratório.* Poster presented at the XXVII Reunião anual de Psicologia da Sociedade Brasileira de Psicologia (SBP). Ribeirão Preto, SP, Brazil.

Abstract (Poster). Visando subsidiar a implantação de um futuro serviço de psicologia gestacional, este estudo foi realizado com os

objetivos de: identificar as principais preocupações das mães em relação aos bebês nas primeiras semanas pós-parto; analisar a possível influência das variáveis sócio econômica e experiência prévia de parto que poderiam interferir nas preocupações das mães em sua interação com o bebê. Participaram do estudo 27 mães, das quais parte delas, que estavam internas pelo Sistema Único de Saúde (SUS), responderam ao questionário na Maternidade de São Carlos e a outra parte em sua própria residência.As informações foram obtidas através de questionários, divididos em 7 categorias com 10 ítens cada categoria. As respostas aos questionários foram categorizadas comparando-se as principais preocupações das mães em função da classe sócio-econômica e experiência prévia de parto. Os resultados indicaram que os ítens das categorias, problemas orgânicos (2) e acidentes (5) foram os que apresentaram de uma maneira geral, mais preocupações por parte das mães. Não demonstrou-se padrões constantes de preocupações nas diferentes áreas abrangidas pelo questionário, com relação às classes sócio-econômica e experiência de parto. Isso pode ter ocorrido pelo fato de o estudo ter um número restrito de participantes. Em razão disso, seria interessante uma replicação do estudo com um maior número de participantes. Os resultados encontrados poderão ser utilizados como base para o desenvolvimento de um modelo de intervenção mais direcionada as principais preocupações das mães, com o objetivo de minimizar possíveis conflitos existente em sua interação com o bebê no período pós-parto. (pp. 163-164)

Guilhardi, P., Reis, M. J. D. & Souza, D. G. (September, 1997). *Explorações com um modelo animal de masoquismo: efeitos da forma de introdução do estímulo aversivo sobre uma linha de base de reforçamento positivo [Explorations on an animal model of masochism: introductory effect of the aversive stimuli on a positively reinforced baseline].* Paper presented at the V Congresso de Iniciação Científica (CIC) da Universidade Federal de São Carlos. São Carlos, SP, Brazil.

Abstract. O comportamento humano é frequentemente controlado por contingências aversivas. Sidman (1995) aponta as múltiplas formas sob as quais o controle aversivo ocorre. Uma das formas de controle aversivo é o que comumente chamamos de masoquismo. O DSM IV (Diagnostical and Statistical Manual of Mental Disorder IV) define masoquismo como "fantasias sexualmente excitante recorrentes e intensas, impulsos sexuais ou comportamentos envolvendo o ato (real não simulado) de ser humilhado, espancado, atado ou de outra forma submetido a sofrimento." (pp 501). Esta definição é importante na medida que descreve uma pessoa que se comporta produzindo sofrimento a si mesma. No entanto, esta descrição é restrita na medida em que não descreve fatores causais que permitam uma previsão e controle do fenômeno. Para superar tal descrição, um possível instrumento é a análise funcional, entendida como a relação entre eventos antecedentes, o comportamento (em termos da ação), e os eventos que são consequentes à ação que alteram a probabilidade de respostas futuras. Neste contexto, alguns autores descrevem protótipos de masoquismo. Um estudo animal clássico, Azrin (1969), pode nos fornecer argumentos para uma analogia entre o fenômeno humano e animal. A análise deste estudo pode também, fornecer elementos para uma discussão desta importante psicopatologia: masoquismo. Neste estudo, ratos foram modelados a comportar-se (pressão a uma barra), produzindo em seu ambiente consequências reforçadoras em um esquema de razão fixa, isto é, a cada certo número constante de respostas um reforço era deliberado ao rato. Foi inserido então um estímulo aversivo em esquema de reforço contínuo, isto é, cada resposta foi seguida de um estímulo aversivo. Mostrou-se que quando o estímulo aversivo foi introduzido em intensidades baixas seguido de um aumento gradual da intensidade, os sujeitos não alteravam o padrão de responder comparado ao padrão anterior à introdução do estímulo aversivo, enquanto que quando o estímulo aversivo foi introduzido inicialmente em intensidade alta, o responder foi suprimido. O produto manter o responder mesmo que a resposta produza um estímulo aversivo evidente, e periódicamente um reforço, pode ser considerado um análogo ao padrão descritivo apontado pelo DSM IV. A análise funcional permite o estudo do processo que induziu a este produto. Esta analogia traz implicações importantes ao estudo do fenômeno: entende-se o masoquismo como um processo de aprendizagem sob certas condições, e portanto não há uma atribuição mentalista ou puramente inata como determinantes da patologia; a análise funcional permite o entendimento do processo patológico do masoquismo como um todo, isto é, como seus padrões comportamentais são instalados bem como mantidos, permitindo um procedimento de intervenção em situações nas quais pessoas se comportam e produzem sofrimento; sempre há um reforçador que inicialmente mantém o comportamento e está associado ao masoquismo; questiona-se a necessidade de uma restrição à definição de masoquismo enquanto situações aversivas associadas ao reforçador prazer sexual, ampliando-se para um comportamento qualquer controlado por contingências similares. (p.140)

Editorial Positions

Guest Reviewer

2006   Acta Comportamentalia
                Behavioural Processes
                Medical Science Monitor

Invited Lectures

Guilhardi, P. *Quantificação na Análise do Comportamento* [Quantification in Behavior Analysis]. Lecture presented at the Laboratório de Estudos do Comportamento Humano [*Laboratory for the Study of Human Behavior*], São Carlos, SP, Brazil. January 8, 2003.

Awards

Research Fellowship (Aug. 1996 – Aug. 1998). Programa Institucional de Bolsas de Iniciação

Científica (PIBIC/CNPq). [Institutional Program of Scientific Initiating Fellowship]. Fellowship for researching at Universidade Federal de São Carlos.

Prêmio Jovem Pesquisador – 1997. The paper "*Explorações com um modelo animal de masoquismo: efeitos da forma de introdução do estímulo aversivo sobre uma linha de base de reforçamento positivo" [Explorations on an animal model of masochism: Introductory effect of the aversive stimuli on a positively reinforced baseline],* presented in the V Congresso de Iniciação Científica da Universidade Federal de São Carlos was awarded best session.

Work Experience

Research

June, 2005 – Present: **research associate,** Department of Psychology, Brown University, Providence, RI, USA.
Jul, 2004 – May, 2005: **research assistant** working with Dr. Russell M. Church, Department of Psychology, Brown University, Providence, RI, USA.
Jul, 2003 – Dec, 2003: **research assistant** working with Dr. Russell M. Church, Department of Psychology, Brown University, Providence, RI, USA.
Jul, 2002 – Dec, 2002: **research assistant** working with Dr. Russell M. Church, Department of Psychology, Brown University, Providence, RI, USA.
Jul, 2001 – Dec, 2001: **research assistant** working with Dr. Russell M. Church, Department of Psychology, Brown University, Providence, RI, USA.
Aug, 1998 – Feb, 1999: **visiting researcher** working with Dr. Armando Machado, Department of Psychology, Indiana University, Bloomington IN, USA.
Aug, 1996 – Aug, 1998: **researcher** at the Psychology of Learning Laboratory at Universidade Federal de São Carlos, São Carlos – SP, Brazil.

Teaching

Jan, 2004 – Jun, 2004: **teaching assistant** to Dr. Russell M. Church for Psychological Theories laboratory. Department of Psychology, Brown University, Providence, RI, USA.
Jan, 2003 – Jun, 2003: **teaching assistant** to Dr. Russell M. Church for Psychological Theories laboratory. Department of Psychology, Brown University, Providence, RI, USA.
Jan, 2002 – Jun, 2002: **teaching assistant** to Dr. Ruth M. Colwill for Animal Learning and Behavior laboratory. Department of Psychology, Brown University, Providence, RI, USA.
Jan, 2001 – Jun, 2001: **teaching assistant** to Dr. Jack Wright for Quantitative Methods in Psychology. Department of Psychology, Brown University, Providence, RI, USA.
Sep, 2000 – Dec, 2000: **teaching assistant** to Dr. Rachel Herz for Introduction to Psychology. Department of Psychology, Brown University, Providence, RI, USA.
Oct, 1999 – Dec, 1999: **teaching assistant** to Dr. Julio Cesar Coelho de Rose for Experimental Analyses of Behavior. Department of Psychology at Universidade Federal de São Carlos, São Carlos, SP, Brazil.

Memberships

Honorary Societies
2005 - The Phi Beta Kappa Society

Psychological Societies
2002 to 2004 - Comparative Cognition Society
2002 to 2003 - Eastern Psychological Association (EPA)
2001 to 2003 - Society for Quantitative Analysis of Behavior (SQAB)

2001 to 2003 - Association for Behavior Analysis (ABA)
1995 to 2001 - Associação Brasileira de Psicoterapia e Medicina Comportamental (ABPMC).

Courses Attended

2003

Training from Mathworks: Advanced Matlab. 8-hour course offered by the Matworks, Inc. March 9, 2003. Warwick, RI, USA.

1999

Atendimento Psicoterapêutico Individualizado à População de Baixa Renda: Estágio supervisionado de Terapia no Modelo de Seleção pelas Conseqüências. Estágio realizado no Instituto de Análise do Comportamento de Campinas (IAACAMP), com duração de 8 horas semanais, de Março à Dezembro em Campinas, SP, Brazil.

1998

Beyond the Standard Interpretation of Piaget. Week Course (mornings) lectured by Professors Armando Machado e Orlando Lourenço, February, Universidade Federal de São Carlos, São Carlos, SP, Brazil.

Reflexions on Psychology. Week course (afternoons) lectured by Professor Armando Machado, February, Universidade Federal de São Carlos, São Carlos, SP, Brazil.

Práticas Culturais, Construção de Conhecimento e Análise do Comportamento. 3-hour course lectured by Prof. Dr. Bernard Guerin at Universidade Federal de São Carlos, São Carlos, SP, Brazil.

1997

Temas Polêmicos em Análise do Comportamento. 3-hour course lectured by Professors Maria de Lourdes Fonseca Passos, Jair Lopes Junior e Maria Amália Pie Abib Andery, during the VI Encontro Brasileiro de Psicoterapia e Medicina Comportamental, promovido pela Associação Brasileira de Psicoterapia e Medicina Comportamental (ABPMC), September, 18th to 22nd, Santos, SP, Brazil.

Comportamento Verbal. 3-hour course lectured by Professor Antonio Ribeiro, during the VI Encontro Brasileiro de Psicoterapia e Medicina Comportamental, promovido pela Associação Brasileira de Psicoterapia e Medicina Comportamental (ABPMC), September, 18th to 22nd, Santos, SP, Brazil.

Consequências do Externalismo Behaviorista Radical. 7-hour course lectured by Professor Emmanuel Zagury Tourinho (Universidade Federal do Pará). Evento promovido pelo Instituto de Análise do Comportamento de Campinas (IACCAMP), October 28th, Campinas, SP, Brazil.

Seminários do Laboratório de Psicologia da Aprendizagem (LPA): Filosofia e Behaviorismo. Curso de extensão realizado pelo Laboratório de Psicologia da Aprendizagem, unidade do Departamento de Psicologia da Universidade Federal de São Carlos com duração de 60 horas/aula. August 4th to November 28th, São Carlos, SP, Brazil.

Educação do Indivíduo Portador de Deficiência Mental no Ambiente Escolar. Curso oferecido pela Universidade Federal de São Carlos, sob a responsabilidade do Programa de Pós-graduação em Educação Especial nos dias 17 à 21/11 e 24 à 28/11/1997, num total de 40 horas/aula ministrado pelos professores Muriel D. Saunders & Richard R. Saunders. São Carlos, SP, Brazil.

1996

Treino de Habilidades Sociais. 6-hour course lectured by Professor Vicente Caballo (University of Granada – Spain) during the V Encontro Brasileiro de Psicoterapia e Medicina Comportamental, promovido pela Associação Brasileira de Psicoterapia e Medicina Comportamental (ABPMC). September, 18th to 22nd Águas de Lindóia, SP, Brazil.

Comportamento Governado por Regras e Auto-Gerenciamento. 6-hour course lectured by Professor Richard Mallot (Western Michigan University – USA) during the V Encontro Brasileiro de Psicoterapia e Medicina Comportamental, promovido pela Associação Brasileira de Psicoterapia e Medicina Comportamental (ABPMC). September, 18th to 22nd Águas de Lindóia, SP, Brazil.

Linguagem e Pensamento. 4-hour course lectured by Professors Maria Amália Abib Andery and Tereza Maria Pires Sério (Pontifícia Universidade Católica de São Paulo – São Paulo, Brazil).

Evento promovido pelo Instituto de Análise do Comportamento de Campinas (IACCAMP), October 18th, Campinas, SP, Brazil.

1995

Functional Analytic Psychotherapy. 6-hour course lecture by Professor Robert J. Kohlenberg (Seattle, USA) during the IV Encontro Brasileiro de Psicoterapia e Medicina Comportamental, promovido pela Associação Brasileira de Psicoterapia e Medicina Comportamental (ABPMC). September, 22nd to 24th, Campinas, SP, Brazil.

Applied Behavior Analysis: Back to basics. 6-hour course lectured by Professor Murray Sidman (Boston, USA) during the IV Encontro Brasileiro de Psicoterapia e Medicina Comportamental, promovido pela Associação Brasileira de Psicoterapia e Medicina Comportamental (ABPMC). September, 22nd to 24th, Campinas, SP, Brazil.

Tópicos Especiais na Reabilitação de Pessoas com Deficiências. 15-hour course lectured by Professor Chrisan Shiro-Geist (University of Illinois at Urbana Champaign, Division of Rehabilitation Education) at Universidade Federal de São Carlos, November 8th and 9th, São Carlos, SP, Brazil.

Currículo Funcional para Deficientes Mentais. 15-hour course lectured by Professors Judith M. Le Blanc and Yolanda Liliana Mayo Ortega (Centro de Educación Especial Ann Sullivan – Lima/Peru) at Universidade Federal de São Carlos, São Carlos, SP, Brazil.