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Analysis of Schedule-Induced Consumption and Grooming in Humans during a Simulated Slot Machine Task

Mark J. Rzeszutek
St. Cloud State University, mark.rzeszutek@gmail.com

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by

Mark J. Rzeszutek

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Michele Traub

Abstract

Problem gambling is a burden to the individual gambler and society. Efforts to study the development of problem gambling are thus socially important. Consumption has been demonstrated to have a relation with increased gambling persistence, but little research has been done on concurrent consumption and gambling. Schedule-induced behavior, or adjunctive behavior, may provide a possible means to study concurrent consumption and gambling. In an effort to better understand factors that might contribute to problem gambling, four experiments were conducted that involved manipulations of a simulated slot machine with concurrent access to food and non-alcoholic drink. All experiments consisted of two, approximately 30-minute, sessions. Experiment 1 had six participants complete the same win conditions across sessions. Experiment 2 had six participants complete different win conditions across sessions. Experiment 3 had six participants complete the same win conditions across sessions, while the simulation played on its own. Experiment 4 had six participants complete two sessions of the same win conditions, but with light sequences that were altered across sessions. While participants did not display the characteristic pattern of schedule-induced behavior in a molecular win-to-win analysis, other molar session-wide patterns emerged with regards to consumption and grooming. Implications for human schedule-induced behavior and gambling research are discussed.

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Chapter 1: Overview

Introduction

An estimate of the financial burden of a single problem gambler to the American government ranges from $2,000-20,000 annually (Fong, 2005; National Gambling Impact Study Commission [NGISC], 1999). Additional burdens to the individual gambler might consist of financial stressors (e.g., debt, bankruptcy; Fong, 2005; NGISC, 1999) and psychological burdens (e.g., depression, comorbid addictions, suicide; Fong, 2005; NGISC, 1999; Petry, Stinson, & Grant, 2005). Given the personal and societal tolls problem gambling brings, determining the factors involved in the development of pathological gambling are of importance to both the individual and society.

Of course, one cannot develop problematic gambling if one does not engage in gambling behaviors. Some casinos will offer amenities to entice individuals to enter their casino, remain in the casino, and return to the casino on future occasions. These amenities include restaurants, entertainment options, complimentary beverages (sometimes alcoholic, like in Reno, NV and Las Vegas), player reward points exchangeable for activities, items, and additional credits toward gambling, and others. Arguably such amenities might play some role, even ancillary, in the development of problematic gambling. Roehl (1996) found that casinos that provided patrons access to amenities, such as restaurants, resulted in patrons spending more on gambling than casinos that did not have amenities. Furthermore, Suh, Tanford, and Singh (2012) found that when casinos provided complimentary dining, patrons spent more money on gambling when compared to noncomplimentary dining. Suh (2012) found that of different strategies to increase consumer spending on gambling, complimentary food and drink was the most effective. Survey research has found that addictive substances such as nicotine and alcohol have been found to be

positively correlated with gambling (Baron & Dickerson, 1999; Bussu & Detotto, 2015; Markham, Young, & Doran, 2012; Sullivan & Beer, 2003). Some of these activities, namely food, drink, and nicotine consumption, are concurrently available with gambling in casinos (i.e., one can drink alcohol while gambling, but one cannot necessarily sit at a restaurant or take in a show while gambling). If access to concurrent food and drink increases gambling behavior, that may be a factor in the development of problem gambling. Therefore, better understanding the functional relations between gambling and these activities will be of benefit to the gambling researcher, clinician, and policy maker.

Gambling and Consumption

While the literature shows positive correlations between increased consumption and gambling, the research does not investigate these relations under concurrent arrangements. Instead, researchers tend to supply the intoxicating or stimulating agent (e.g., alcohol, nicotine) prior to the gambling task. For example, Kyngdon and Dickerson (1999) studied gambling persistence in a simulated gambling activity following alcohol consumption. Those who consumed alcohol persisted at gambling for twice as many plays as the placebo group, and those who consumed alcohol were more than three times as likely to spend all the money they were given to gamble. Ellery, Stewart, and Loba (2005) studied video lottery terminal (VLT) play following alcohol consumption. Results indicated that those who consumed alcohol played longer than those who did not, and that probable pathological gamblers who consumed alcohol tended to place larger bets than those who did not consume alcohol or non-pathological gamblers. Meier and Weatherly (2008) studied gambling risk and persistence after participants chewed nicotine gum. There were no significant differences based on interactions of gum or smoking status on risk or persistence. Cronce and Corbin (2010) studied the effects of initial

gambling outcomes and prior alcohol consumption to determine their effects on within-session betting on a simulated slot machine. There were no demonstrated effects on gambling persistence in relation to alcohol consumption, although those who consumed alcohol tended to make larger bets. Ellery and Stewart (2014) studied the effects alcohol consumption had on VLT gambling and cognitions. The results of this study indicated that probable pathological gamblers gambled more per minute after consuming alcohol, whereas there was no effect in the other conditions. Barrett, Collins, and Stewart (2015) studied the effects of tobacco and alcohol consumption on regular VLT players. There was an increase mean wager size for cigarettes containing nicotine, but no other significant interactions were found. On the subjective measures, alcohol increased the desire to gamble.

These between-group studies sometimes demonstrated an increased persistence and riskiness following alcohol consumption; however, in all cases, consumption occurred prior to the gambling task and no within-subject data were presented. While between-subject designs are a useful tool in studying gambling behavior, within-subject designs could better our understanding of the development of problem gambling (see Witts & Harri-Dennis, 2015).

Rzeszutek and Witts (2016) tested gambling persistence in six participants with concurrent consumption and gambling, rather than consumption occurring prior to gambling. Participants completed two sessions of varying food and drink availability as well as food and drink delivery conditions. The participants played on a simulated slot machine that was programmed to stop producing wins after 30 spins. Participants did not receive any food or drink during the initial 30 spins. At the 30th spin, participants were told by the experimenter that they were able to continue gambling for as long as they chose, if they were getting food and drink that session, and if applicable how many times they would get food and drink (e.g., all at once or

repeated deliveries). All participants persisted at gambling longer when food and drink were concurrently available with the gambling task when compared to sessions where food and drink were not available. Interestingly, the two participants assigned to receive food and drink in both sessions both persisted longer in their second session, when they also consumed more. Rzeszutek and Witts provide preliminary within-subject evidence that increased consumption is correlated with greater gambling persistence. However, the relationship between consumption and gambling persistence is not yet understood. One possible paradigm to study gambling and food and drink consumption might be found in schedule-induced behavior (SB; Staddon, 1977).

Adjunctive/Schedule-Induced Behavior

Also known as adjunctive behavior (Falk, 1971; Falk, 1977), SB refers to a behavior that is induced by other behavior whose reinforcement is contingent on meeting particular schedule requirements. The most prevalent SB research centers on schedule-induced polydipsia (SIP), which was first reported by Falk (1961). SIP is an increase in water consumption to levels two to three times above baseline, typically induced by a fixed-time (FT) schedule of food delivery. The occurrence of SB is typically assessed by a scheduled condition (e.g., VI) and some baseline condition, such massed reinforcer, extinction, or continuous reinforcer condition (Roper, 1981). It has been argued that without adequate baseline conditions an increase of some secondary behavior cannot be asserted as having been schedule induced, as the increase may have been caused by other variables (Overskeid, 1992; Roper, 1981). Behaviors other than drinking have been induced in various species under intermittent schedules, such as aggression, defecation, eating, and locomotion (Roper, 1981). While there is a debate in the generality of SB across species as well as the types of behaviors that can be induced (Roper, 1981), the processes that might be involved in induction have been implicated in pathologies such as drug and alcohol

addiction (Falk, 1998; Riley & Weatherington, 1989). If induction is a potential causal factor in the development of substance-based addictions, they could also play a role in the development of behavioral addictions like problem gambling.

Currently there is no explanation of the processes underlying induced behavior. Schedules of reinforcement are thus far necessary in inducing behavior, and this might be due to the schedule altering motivational states (Staddon, 1977), producing displacement behaviors to maintain an organism in an environment (Falk, 1971; Falk, 1977), sensitizing the induced or elicited behavior (Weatherington, 1982), producing Pavlovian signalling of times of low reinforcement probability (Lashely & Rosselini, 1980), or reinforcing the secondary behaviors otherwise normally considered induced (Killeen & Pellön, 2013). Regardless of the exact process of how SB develops, it has two noteworthy characteristics: it develops over repeated interactions with a schedule of reinforcement, and the distribution of induced behavior shifts to the period immediately following reinforcer delivery (Patterson & Boakes 2012; Staddon, 1977; Staddon & Ayres, 1975). Deprivation of the scheduled reinforcer (e.g., food) has also been argued as a necessary characteristic of some SB (Falk, 1971; Falk 1977; Roper, 1981), although there is evidence that deprivation may not be a necessary condition to induce behaviors (Todd, Cunningham, Janes, Mendelson, & Morris, 1997). However, due to a relative lack of research in humans and SB (Falk, 1994), it is not certain if deprivation of the scheduled reinforcer is necessary condition for SB in humans.

One of the possible explanations of the temporal locus of SB (i.e., the occurrence of SB immediately following reinforcer delivery) is *delay reduction theory* (DRT; Fantino, Preston, & Dunn, 1993). DRT predicts that an organism will prefer stimuli that are correlated with a reduction in time to reinforcement relative to stimuli that are correlated with a delay to

reinforcement (Fantino et al., 1993). Induced behavior may then be a result of stimuli that signal a delay, rather than a reduction in delay, to reinforcement. Specifically, Falk (1971) argued that induced consummatory behavior might occur after consumption when reinforcement is sparse. One explanation for SB occurring after reinforcement in lean schedules is that it serves an escape-prevention function, keeping the organism near patches of reinforcement (Falk, 1977). As an example, consider fixed schedules are less preferred than variable schedules (Fantino, 1967; Field, Tonneau, Ahearn, & Hineline, 1996), as the reinforcing event itself may act as a signal for a delay to reinforcement in the fixed schedule. Thus, DRT in conjunction with Falk's (1971) account would predict that the stimuli correlated with a delay to reinforcement would also serve to induce adjunctive responding.

The various schedules of wins on slot machines may result in SB during playing, which could partially explain the correlations found between gambling and consumption (e.g., Bussu & Detotto, 2015; Suh, 2012). Specifically, increased consumption might be induced after winning on a machine with infrequent wins, in line with DRT. Therefore, schedules of monetary delivery may be a potential way to study SB in humans.

Schedule-Induced Consumption in Humans

Cherek (1982) studied the effect of schedules of monetary delivery on cigarette self-administration in humans. Three smokers attended 2-hour sessions five days a week, for an unspecified number of weeks. The participants were taught to press a button that would result in monetary payment. Reinforcement for button pressing was on either a FI-30, -60, -120, or -240 seconds. Cigarette smoking was measured by puffs per cigarette, puffs per hour, and number of cigarettes smoked. One participant's smoking followed a bitonic function—an increase, peak, and then decrease based on increasing interval duration. The other two participants' smoking

demonstrated a decrease from 30 to 60 seconds, and evidence of a bitonic function at 120 and 240 seconds, that being an increase in smoking at 120 seconds, and lower levels of smoking at 240 seconds. Cherek (1982) also provided data for smoking within an interval. Smoking occurred the most during the third of an interval immediately following a win.

Doyle and Samson (1985) studied the effects of different FI schedules during simulated slot machine gambling on induced water and alcohol drinking in humans. Over the course of four experiments, Doyle and Samson tested FI-30s and FI-90s wins on simulated slot machines with alcoholic beer, non-alcoholic beer, and water. Their general finding was that participants consumed more in 30 minutes during the FI-90s win schedule, although only water was consumed more at a statistically significant amount.

Doyle and Samson (1988) studied induced alcohol drinking in humans when playing a simulated slot machine. Participants were randomly assigned to either an FI-30 s group or an FI-90 s group. Those in the FI-90 s group consumed more beer, with no notable differences between the sexes. Doyle and Samson (1988) did also provide data for when consumption occurred within an interval. Consumption occurred roughly 20% more in the first quarter of an interval following a win when compared to the fourth quarter of an interval preceding a win.

A main criticism of SB research in humans has been methodological issues (Overskeid, 1992). Overskeid argues that human studies have typically lacked adequate baseline and control conditions, such as massed reinforcer and extinction conditions, for assessing schedule induction. While the evidence of SB in humans is, at best, inconsistent, SB in humans is an area that ought to be explored and with better controls (Falk, 1994). Slot machine gambling provides a convenient mechanism to not only study induced behavior in humans, but also has ecological relevance as gamblers are typically able to consume beverages during gambling. The SB

paradigm then can provide a means to better understand the development and persistence of problem gambling in the context of slot machine gambling.

Summary and Purpose

The gambling literature reviewed presented varying results regarding gambling behavior and consumption. The focus of the gambling research and consumption has been on the discrete effects of an intoxicating or stimulating agent, rather than concurrent consumption and reinforcement schedules. When concurrent gambling and consumption was explored (e.g., Rzeszutek & Witts, 2016), increased gambling persistence occurred within subjects when participants had access to and consumed food or drink. Two participants in the Rzeszutek and Witts study also displayed more gambling persistence in their second session, which was also correlated with more consumption. However, no explanation of the relation could be had from this work, which thus requires additional analysis. One of adjunctive behaviors potential functions of keeping an organism in a low reinforcement environment (Falk, 1977), could be a useful paradigm to examine concurrent gambling and consumption.

Lack of adequate baselines and control conditions has been cited as a methodological weakness in human SB research (Overskeid, 1992; Roper, 1981). Typical methods for demonstrating induction consists of a scheduled condition (i.e., a condition consisting of a FT, VT, FR, or VR, of reinforcer delivery), a massed reinforcer condition, and an extinction condition (Overskeid, 1992; Roper, 1981). The first purpose of this study was to investigate the effect of win schedules on SB in humans via the use of a simulated slot machine, using adequate controls as recommended by Overskeid (1992), as well as extend on Rzeszutek and Witts (2016).

To study win schedules and SB, the first three experiments compared within-subject replicability of SB and between-subject replicability of SB in both response-dependent and

response-independent conditions. Conditions included a FR of wins, an equivalent VR of wins, and EXT of wins (i.e., no wins). This was based on recommendations by Overskeid (1992) with regards to studying SB. While a VR is not as ideal as a massed reinforcer condition (Overskeid, 1992), a VR condition may be more appropriate for studying SB when using slot machines. Ratio schedules were used in place of interval schedules for several reasons. The first reason was software limitations, which would have resulted in less consistent win delivery when trying to simulate an interval schedule. Ratio schedules allowed for more consistent win delivery. Also, because slot machine play typically happens at a steady rate, from the perspective of the player a FI or FR would be identical (i.e., the time between wins would be equivalent). Lastly, there is evidence that ratio schedules can be as effective as interval schedules at producing SB (Burks, 1970; Kupfer, Allen, & Malagodi, 2008). Experiment 3 assessed response-independent conditions as per the recommendations by Thompson and Iwata (2005).

The second purpose of this study was to determine if signalling wins would disrupt or alter the distribution of SB. Experiment 4 associated colored LED lights with relative delays to wins, then altered the order of the light sequence. After participants experienced the fixed light sequence associated with the FR, the light sequence was altered so that colors originally associated with one position within the sequence were changed to another position within the sequence. This change in light sequence ordering occurred halfway through the second session. This was done to determine if changing stimuli associated with delays would result in SB occurring in the presence of those stimuli.

The third purpose of this study was to explore SB and its relation to the enjoyability of the task. The rationale of measuring reported enjoyability was to synthesize predictions based on SB and DRT. Participant reported enjoyability was used as a way to determine participant

preference between schedules, as preference could not be determined by concurrent choice between the different schedules. DRT might predict that sessions with a VR will be more enjoyable, while sessions with a FR will be less enjoyable, assuming an equal number of wins (e.g., FR10 vs VR10). That is, fixed schedules would have a win as more correlated with delays to future wins, whereas in a variable schedule a win would be less correlated with a delay to future wins. The sessions that are less enjoyable should also be the sessions where more SB is found. This is because those sessions should be fixed schedules and thus have wins more correlated with delays to reinforcement.

Chapter 2: General Method

Participants and Setting

Participants were recruited via flyers posted around campus, as well as from announcements to undergraduate classes based on instructor permission. Six participants completed Experiment 1, six participants completed Experiment 2, six participants completed Experiment 3, and six participants completed Experiment 4. All participants were at least 18 years old at the time of the study (M_{age} = 28.25, *SD* = 10.4). Nineteen of the participants had gambled on slot machines prior to the study. Participants were compensated with $12.00 and, if applicable, extra credit after their second session. No participants dropped out of the study.

The study was conducted in an approximately 3.4 m by 4.9 m research room. Two tables that totaled 2.8 m by 0.6 m supported two Dell 20 E2014T touch screen monitors that were 2 m apart from each other. Secondary monitors that displayed the same image as the participant monitors were in a room adjacent to the research room.

Apparatus

One computer housed the simulated slot machine task, programmed using AllJ Slots 2.2 (v.2.2.287). A typical PC keyboard (Experiment 1 and 2) or a custom-built aluminum panel with an arcade button (Experiment 3 and 4) and LED backlight served as the input device to initiate slot machine spins. The simulation played the software's default spin sounds, default win sounds (for a win), and default lose sounds (for any losing spin). The simulation did not produce any noise between spins or when idle. The simulation used a three-reel setup, a black background, a total credits box, and a winner paid box (see Figure 1 for an example). The reel symbols used were cherries, an orange, a black "BAR", a yellow "BAR", a 7, three 7s, and a grape. Speakers were placed behind the monitor so that participants were not easily able to adjust volume levels.

A web camera was hidden under the monitor of the other computer in the experimental room. The camera projected a live feed of the participant's behavior on a monitor in an adjacent room. The inbuilt software of the web camera captured video and audio of the participants during the gambling session. The software Revealer Keylogger was used to log keystrokes of the participant during slot machine play. For Experiment 4 a 1-meter Neopixel light strip with 30 multicolor LEDs was fixed around the monitor of the screen the participant used during a session. The light strip was connected to an Arduino Uno which controlled the light sequence and input to the simulation. The Arduino Uno was also connected to a white LED and an arcade button (see Figure 1). The white LED behind the arcade button would illuminate when the participant was able to progress the sequence via arcade button press. When the white LED was off this would indicate to the participant that pressing the arcade button would not progress the sequence. The period of inactivity was necessary due to the simulated slot machine having spins that varied in duration, while requiring the light sequence in Experiment 4 to be synchronized with the spin sequence.

Materials

Cups were 16 oz. clear plastic cups; bowls 4-cup disposable plastic containers. Four types of food (Lay's Regular Chips, Doritos Nacho Cheddar, Sea Salt Veggie Straws, and Plain Pretzels) and four types of drink (Water, Coca Cola Classic, Lipton Iced Tea, Mountain Dew) were used. The food was contained in prepacked 1-oz. bags while the drinks were contained in 16-oz bottles. A cooler and ice packs were used to cool beverages prior to a session.

A demographics survey, hunger and thirst survey, enjoyment survey, and exit survey were used. The demographics survey was a single page which contains questions about gender, age, income, ethnicity, and previous slot machine experience. The hunger and thirst survey was a

single page which contains questions about the time from the participant's last meal, last drink, the type of food/drink consumed, and self-reported levels of hunger and thirst. An enjoyment survey was a single page with the numbers 1 through 10 on it and instructions for the participant to circle their level of enjoyment in relation to the gambling session they just completed. An exit survey was created after the study had begun. The exit survey consisted of three questions asking the participant what they thought the purpose of the study was, when during gambling did they want to eat/drink, and when during gambling did they want to move/readjust. All surveys used are available in the supplemental document.

Target Behaviors

Amount consumed. Amount of food and drink consumed was calculated by the weight of food or drink including the cup/bowl subtracted by the food or drink remaining including the cup/bowl at the end of a session.

Eating/drinking. Eating and drinking were measured by partial interval recording (PIR) of 5 second intervals. Eating and drinking were measured as food or liquid passing the plane of the lips. Chewing and swallowing are not considered intervals of eating or drinking.

Food/drink touching. Food and drink touching were measured by PIR of 5 second intervals. Any interval that the participant touched the bowl or food was coded as food touching, any interval the participant touches the cup was coded as drink touching. Observers made a note whenever the bowl or cup was not visible on the screen, for example if the participant placed the bowl on their lap.

Grooming. Grooming was measured by PIR of 5 second intervals. Any interval that the participant touched any part their body that was visible in the recording was coded as grooming. However, if a participant leaned on their hand or rested their hand on themselves, only the first

interval was coded as grooming. For leaning or resting to be considered grooming again, there must have been further movement by the hand while contacting a part of the body.

Session enjoyment. Participants were asked to rate their enjoyment of each session on a scale of 1 through 10, with 1 being not enjoyable and 10 being extremely enjoyable.

Interobserver Agreement

Interobserver agreement (IOA) was measured by having a second observer record session data for a minimum of 33% of recordings in each experiment using exact interval-by-interval IOA for each target behavior. A total of 18 of 48 recordings were coded by two observers. Calibration tests were conducted for the scale, Revealer Keylogger, and AllJ software prior to the beginning of the study. The Revealer Keylogger and AllJ Slots software did not produce accurate data, but were still active during the study. Therefore, the data produced by the keylogger and AllJ Slots software were not usable. Calibration tests for the scale were conducted by measuring three cups and three bowls each three times. The scale always produced the same results for each item.

Research assistants (RA) were trained by the primary investigator to act as observers to code recordings. RAs were not informed of the purpose of the study, the condition the participant was in, or any other information that could potentially bias the RAs. Training consisted of RAs tested on their knowledge of definitions, identifying the target behaviors in a 5-minute video created for training purposes, and lastly coding a 25-minute video created by the investigator for training purposes. RAs were required to score 100% for definitions of target behaviors, 100% for identifying target behaviors in the 5-minute video, and an agreement of 90% or higher for coding the 25-minute video. The 25-minute video was edited to have a textual prompt and tone to indicate when an RA was required to pause the video to code the interval. All RAs achieved

100% for definitions and identification, and agreement of 90% for each behavior or above in their first attempt of coding the 25-minute video. RA training agreement scores are available in the supplemental document.

RAs were also required to record the intervals in which a win occurred. This was done by the RA scoring the onset of the win sound. RAs had 100% agreement on the interval of when a win sound occurred. All recordings of participants were edited by adding a tone to indicate when an RA was to pause the recording and code the interval. A numerical indication of the current interval was also added to all recordings of participants. Because participants would sometimes make hand contact with a part of their body but engage in no further movement with their hand while still making contact, a video was created after the study began to differentiate between instances of grooming and not-grooming. For example, a participant may have placed their hand on their arm but that hand remained static for a minute before they moved it again. In those situations, only the intervals with the initial contact and later movement would be coded as grooming, but the intermediate intervals of hand contact without motion would not be coded as grooming. Continued hand contact with motion was considered grooming.

IOA was determined by the exact interval-by-interval method per behavior. That is, agreement of occurrence or non-occurrence for each interval, with total number of agreements divided by the total number of intervals in a recording. The lowest IOA for any behavior was 86.91%, the highest IOA was 100%. Overall mean IOA was 96.46% (*SD* = 3.25). Complete IOA scores for all videos/behaviors are available in the supplemental document.

Data Analysis

Data from each session were analyzed within and between *win cycles*. A win cycle contained a win and the subsequent losses that followed until the next win. For example, the

following sequence contains two win cycles, and both are bracketed; [win, loss, loss, loss, loss, loss, loss] [win, loss, loss, loss, loss, loss, loss]. In this example, there are two cycles of 7 spins. A fixed win cycle will repeat the pattern throughout the session, and here would be termed a 2-FWC 7 (i.e., 2 cycles of an FWC 7). In some sessions, the win cycle was variable, indicated instead as VWC 7. "WC" is used to code win cycles instead of other terms, like "fixed-ratio," as the cycle contains both wins (i.e., putative reinforcers) and losses (i.e., putative punishers or extinction), which do not comport well with ratio-based terminology.

Procedure

Participants came for two 25- to 35-minute sessions, depending on condition/experiment. Session length varied due to either participant responding or technological limitations. Sessions were required to be within 72 hours of each and occur within the same work week. Each session had the four food options and four drink options set out in the room on the cabinet away from the computers.

During a participant's first session, s/he completed the informed consent and a demographics survey. Following this, participants chose one of the food options and one of the drink options that s/he would have access to during the session. The experimenter prepared the food and drink by putting three 1-oz bags of chips into a bowl, and pouring the chosen drink to a predetermined fill line in the disposable cup. While the experimenter was preparing the food and drink, participants completed a hunger and thirst survey. After food and drink were prepared and the hunger and thirst survey was completed, the experimenter read a script informing participants of how to operate the simulated slot machine, the value of wins, and that their monetary compensation was based on performance. Participants were told that each credit was worth $0.005 (half of one cent), and that each win was 50 credits. Participants were also told that they

would begin each session with 450 credits. Starting credits were determined by the minimum number credits that allowed 140 losing spins, while keeping the maximum a participant can earn in sessions with preprogrammed wins below 1100 per session. The credits per win was set to 50 to increase the saliency of a win and its putative reinforcing value for participants. Participants were then able to ask the experimenter any questions they had. Following this, the experimenter performed a check of participant understanding by asking the participant questions regarding operation of the simulation (e.g., operation of the simulation, worth of a win). Participants were then required to place their cellphone and any time keeping devices in a box that was placed on the counter on the opposite side of the room away from the participant. Following this, the experimenter left the room and informed participants that the experimenter would return at the end of the session. When the experimenter returned at the end of the session, the participant completed the enjoyability survey and his/her cellphone and time keeping devices were returned.

During a participant's second session, s/he chose consumables and completed the hunger and thirst survey at the beginning of the session, as well as surrendered any cellphones and time keeping devices. At the end of the session s/he completed the enjoyability survey, had his/her devices returned, and was debriefed and compensated. Debriefing consisted of informing the participant of the hidden camera, target behaviors, and purpose of the study. An exit survey was added for Experiment 3 and 4; therefore, only half of participants completed the exit survey. The exit survey was given to participants after the enjoyability survey but before the debriefing.

In Experiment 1, 2, and 3, there were three different conditions. Condition A was a 20 FWC-7. The first spin produced a win, followed by six losses, followed by a win, followed by six losses, repeating, for a total of 20 cycles. Condition B was a 20 VWC-7. The first spin produced a win, but following losses after wins varied from one loss to 11 losses between wins,

averaging 6 losses per win. Condition C was 140 EXT. A condition would always be identical to itself with regard to reel images and when a win occurred within a sequence. For example, while condition B was the variable reel sequence, the reel sequence used in condition B was the same across sessions.

The reel sequence for all participants in Experiment 4 was the same as condition A used in Experiment 1 (20 FWC-7). There were three light sequences created that corresponded to the reel sequence. Each sequence had LED activations that consisted of moving green, purple, and grey lights (Win) as well as red lights (R), yellow lights (Y), and blue lights (B). Activations followed a pattern based on their sequence relative to the spin. Sequence 1 was as follows: Win, R, R, Y, Y, B, B, Win, R, R, Y, Y, B, B, etc. This sequence persisted for all 20 cycles of the sequence. Sequence 2 had the first 10 cycles identical to sequence 1, but on cycle 11 the sequence changed to: Win, B, B, Y, Y, R, R, Win, B, B, Y, Y, R, R, etc. Sequence 3 was similar to sequence 2 with the exception of the cycle changing to: Win, B, B, R, R, Y, Y, Win, B, B, R, R, Y, Y, etc. After the participant pressed the button, the LED strip would deactivate for three seconds and then reactivate with the next light in the sequence. The LED strip would stay on until the next button press.

From the perspective of participants, the beginning and end of each session were identical with the exception of which script was read to them based on condition. In Experiment 1, participants interacted with the same condition in both sessions. In Experiment 2, participants interacted with different conditions in each session. In Experiment 3, the simulation was response-independent. Participants would initiate the first spin, after which the simulation played on its own for 25 minutes. In Experiment 1, 2, and 3, a session was terminated either when the participant completed the 140 spins or 25 minutes passed. Due to an error in the automated spin

delay calculation, and the decision to end a session at 25 minutes, participants in Experiment 3 experienced 16 wins rather than the full 20.

Experiment 4 had participants complete the same reel sequences across sessions, while changing light sequences between sessions. All participants in Experiment 4 completed light sequence 1 in their first session. The first three participants completed light sequence 2 in their second session, the following three participants completed light sequence 3 in their second session. Sessions in Experiment 4 were terminated either when a participant completed 140 spins or 35 minutes passed. The session length was increased from 25 to 35 minutes in Experiment 4 to ensure that participants would be more likely to complete all 140 spins. This was to compensate for the delay between button press and when the button could be activated again by participants.

Chapter 3: Results

Enjoyability and Consumption

Complete results for all participants' consumption, responses to enjoyability surveys, and hunger and thirst surveys are available in Table 1. In Experiments 1, 2, and 3, enjoyability was lowest for condition C (M = 2.83), but it was relatively similar between condition A (M = 6.08) and condition B (M = 6.58). The overall enjoyability was highest in Experiment 4 (M = 7.91).

All participants consumed at least some food or drink, regardless of reported levels hunger or thirst, or time since last ate or drank. Only in P20's second session was no food or drink consumed. It should be noted that P20 was chewing gum in her second session which could have affected their consumption. Because P2's second session was terminated early, her consumption across sessions was not included in the following results. One participant consumed within 10g/ml of food and drink in their second session compared to their first. Sixteen participants consumed at least 10g/ml more of food or drink in their second session (range = 11g/10ml to 40g/214ml). Four participants at consumed at least 10g/ml less of food or drink in their second session (range = -10g/-35ml to -15g/-334ml). One participant consumed 45g more food but 19ml less drink in their second session. One participant consumed 69g less food but 131ml more drink in their second session.

There was limited evidence of schedule-induced behavior. Figure 2 is one of the best examples of schedule-induced drinking. Generally, when a behavior may have begun to come under schedule induction, it would not persist throughout the session. Figure 3 provides an example of this. However, other general patterns emerged. For example, several participants displayed in either one or both of their sessions the trend of eating occurring during the beginning of the session, and then being replaced with grooming during the ending of the

session. Figure 3 provides an example of this trend in shift of behavior distribution within a session.

Some participants had nearly identical sessions, irrespective of condition, while other participants behaved differently across sessions. Figure 4 is an example of two similar behavioral patterns by a participant across different conditions. Figure 5 is an example of a participant acting in the opposite manner between conditions—that is, eating only in the second half of the first session, but eating only in the first half of the second session. In some cases, a participant would produce the same distribution of behavior between sessions while having increased consumption in their second session while having similar or less intervals of consumption, implying an increase in consumption per bout. Figure 6 provides an example of P21's relative distributions, although in her second session she consumed 38g more food and 24ml of drink.

When all sessions are averaged together, a general trend of food consumption decreasing over the course of a session was observed, with an increase in grooming over time. Fluid consumption appears to remain constant throughout sessions with all sessions averaged. Figure 7 shows the intervals a behavior was engaged in when all sessions are averaged and separated in quarters. It should be noted that individual participant's relative distribution of behavior during session quarters often varied between sessions. In Experiment 4, with the exception P20, participants followed similar distributions of behavior between sessions more often than in Experiment 1, 2, and 3.

Because exit surveys were added halfway through the study, only half of the participants completed them. Participants typically reported that they wanted to eat, drink, move, or readjust when they were not winning. Participants thought that the purpose of the study was the interaction of gambling and consumption. One participant reported wanting to move or readjust

when they were not eating or drinking. All participant graphs and exit survey responses are available in the supplemental document.

Experiment 1

P1 completed two sessions of condition A. P1 groomed consistently throughout each session. P1 ate and drank in both sessions but consumed 67ml more drink in her second session.

P2 completed two sessions of condition A. P2 groomed throughout her first session. P2's second session was terminated around 13 minutes due to a technical issue that caused the monitor in use to stop displaying the simulated slot machine. P2 consumed food and drink in both sessions.

P3 completed two sessions of condition B. P3 groomed more in her second session and ceased consumption roughly half way through the session. She consumed 91ml more drink in her second session.

P4 completed two sessions of condition B. In her second session, she began to engage in grooming, and continued to groom after she stopped eating. P4 consumed 11g more food and 10ml more drink in her second session.

P5 completed two sessions of condition C. In her first session, she stopped eating halfway through the session. In her second session, she ate continuously throughout the session. In her first session, she began to groom more after she stopped eating. In her second session, she did not groom as much as her first. P5 ate 45g more in her second session, but drank 19ml less.

P6 completed two sessions of condition C. In his first session, he only ate during the first third of the session, after which he continuously groomed. In his second session, he only ate within the first four minutes, and had 4 intervals that contained drinking. P6 drank 131ml more

in his second session, but ate 69g less. P6 had the same number of intervals with drinking, which implies an increased amount of drinking per bout.

Experiment 2

P7 completed condition A in her first session and condition B in her second session. P7 had near identical patterns of responding between sessions, with the exception of more intervals of eating in the first session and drinking in the second session. she consumed 118ml more in her second session.

P8 completed condition A in his first session and condition C in his second session. He displayed opposite patterns of behavior with regards to eating between sessions. He ate consistently in the second half of his first session but only ate in the first half of his second session. He otherwise displayed similar patterns of drinking and grooming between sessions. He ate 11g and drank 11ml more in his second session.

P9 completed condition B in her first session and condition A in her second session. P9 engaged in more of all behaviors during her second session. In her second, consumption occurred during in the first half and then ceased. When consumption ended grooming dominated the second half of the session. P9 consumed 20g and 82ml more food and drink during her second session.

P10 completed condition B in her first session and condition C in her second session. She initially displayed very similar patterns of responding for all behaviors in both sessions. In her second session, however, she ceased consumption in the latter portion of the session but continued to engage in grooming. P10 ate 22g more in her second session.

P11 completed condition C in her first session and condition A in her second session. She had nearly identical patterns of responding between sessions. In both sessions consumption

occurred in the first half of the session and was later replaced by grooming. In her second session, she continued to eat longer than in the first session. P11 ate 22g more food in her second session.

P12 completed condition C in her first session and condition B in her second session. She displayed nearly identical patterns of responding between conditions, with the exception of more grooming in her second session. P12 consumed 12ml more drink in her second session.

Experiment 3

P13 completed two response-independent sessions of condition A. She engaged in some bouts of eating in the first session, whereas in the second session she ate constantly. P13 consumed 40g more food and 213ml more drink in her second session.

P14 completed two response-independent sessions of condition A. She displayed similar patterns of grooming and drinking in in both sessions, but ceased eating sooner in her second session. P14 ate 14g less food in her second session, but had reported feeling sick after the first session.

P15 completed two response-independent sessions of condition B. She engaged in more eating and grooming in her second session, with drinking remaining relatively similar between sessions. She ate 21g more food in her second session.

P16 completed two response-independent sessions of condition B. She ate and drank less in her second session, but grooming began to occur continually once eating stopped in her second session. P16 consumed 10g and 114ml less in her second session.

P17 completed two response-independent sessions of condition C. He ate and drank regularly during the first half of both sessions, and continued to consume sporadically in the

latter half of his first session. He began to groom more in the latter half of his first session but groomed less in his second session. P17 drank 27ml more in his second session.

P18 completed two response-independent sessions of condition C. She displayed similar patterns of responding of responding between both sessions, with the exception of ceasing eating earlier in her second session. P18 groomed continuously throughout the latter half of both sessions. Even though P18 stopped eating earlier in her second session, she ate amounts of food that were within 10g between sessions. This implies that bouts of eating had larger amounts of food in the second session. She drank 35ml less in her second session.

Experiment 4

P19 completed light sequence 1 in her first session and light sequence 2 in her second session. Patterns of responding were similar between sessions with the exception of more intervals of eating during her first session. She groomed throughout the session in both sessions. P19 consumed similar amounts of food and drink in both sessions.

P20 completed light sequence 1 in her first session and light sequence 2 in her second session. In her first session, she had a bout of eating in the first half of the session, but continuously drank during the session. Drinking was consistent and occurred nearly between every win. P20 also groomed continuously throughout the session. In her second session, she did not eat or drink at all, but otherwise groomed throughout the entire session. P20's second session is the only time a participant did not eat or drink during a session.

P21 completed light sequence 1 in her first session and light sequence 2 in her second session. She had near identical patterns of responding between both session, and constantly ate and drank throughout both sessions. She had less total intervals of eating and drinking in her second session, but consumed more food and drink during her second session, indicating an

increase in consumption during a bout of eating or drinking. P21 consumed 38g and 24ml more in her second session.

P22 completed light sequence 1 in her first session and light sequence 3 in her second session. P22 had similar patterns of responding between sessions, with the exception of ceasing eating earlier in the second session. P22 ate a similar amount and drank more, even though there were less intervals of eating and similar intervals of drinking. This implies that more was consumed per bout of eating or drinking. P22 drank 66ml more in her second session.

P23 completed light sequence 1 in her first session and light sequence 3 in her second session. She had similar patterns of responding between sessions, with more bouts of eating and drinking in the second session. She would drink following eating. She groomed steadily during both sessions. P23 drank 70ml more in her second session.

P24 completed light sequence 1 in his first session and light sequence 3 in his second session. He displayed similar patterns of responding in both sessions, but had more intervals of drinking in his second session. In both sessions P24 groomed more after her stopped eating. He drank 78ml more in his second session.

Chapter 4: Discussion

The main purpose of this study was to test the development of SB in humans during a simulated gambling task. There was some evidence of SB, but it did not maintain throughout the entirety of a session. P9's second session demonstrated this most clearly, where food touching/eating followed wins during the midpoint of the session, but the pattern of win-consume-pause did not continue. There was also no clear evidence for induced behavior during periods of losses. However, participant responses to the exit survey did seem to support participant motivation to move or eat when they were not winning. Further examination of potential rule-governed behavior should be conducted, as well as the ongoing development of rules during sessions, via protocol analysis (Ericsson & Simon, 1993). Rule-governance may have been interfering with schedule induction, which could explain the results. It should be noted that in some cases participants appeared to consume more in fewer intervals, which does follow the pattern of increased consumption per bout in rats following exposure to a schedule (e.g., Patterson & Boakes, 2012). Therefore, some phenomena similar to induction may have occurred, but this needs further exploration. Unfortunately, the current study's arrangement did not allow for ongoing measurement of changes in mass or volume during a session.

Generally, the hypothesis of enjoyability being correlated with consumption was not supported. Only in a few cases was enjoyability rated lower in the second session, whereas consumption increased in the second session for 16 of 23 participants. The hypothesis of consumption being greater under a FR when compared to a VR was also not supported. However, enjoyability was rated higher when wins were signaled in Experiment 4, which only used a FR schedule. Signaling wins appeared to increase participant ratings of session enjoyment. While persistence at the gambling task was not tested during this study, the increased

consumption is an important finding as Rzeszutek and Witts (2016) found that participants gambled longer when they consumed more, and those participants also consumed more in their second session. This is an important extension to the gambling literature as increased consumption over repeated exposures to gambling could increase gambling persistence. This finding of increased consumption was irrespective of condition, which deserves attention for future research to understand what processes might cause increased consumption during the second session. One of the limiting factors in both the current study and Rzeszutek and Witts was that participants only completed two sessions. Increasing the number of sessions is a logical next step.

Another finding that occurred was that consumption would dominate the first half of the session, whereas grooming would dominate the second half of the session. The reverse, grooming dominating the first half and consumption dominating the second half, did not occur in any session. It could be conceptualized that the session itself was one large interval. Based on Staddon's (1977) description of interim, facultative, and terminal behavior, consumption may be the interim behavior, and grooming may have been the terminal behavior. The increase in grooming may reflect an increased probability of the participant leaving the session, but was unable to due to the rules of the study. The gambling may have been a facultative behavior, something to do fill the time between reinforcer deliveries. In this case, the initial reinforcer was free food and drink, the second reinforcer was termination of the session. While this may be a possibility, participants did not always repeat this pattern in their second session. It also may be that eating, drinking, or grooming could serve as interim or facultative behaviors for different participants. One potential issue with this interpretation is that this pattern was not always found in both sessions for a participant. For example, while P6 demonstrated this pattern in their first

session, they stopped engaging in any of the target behaviors shortly after the beginning of their second session. It may have been that steady state responding had not yet occurred, and that participants were still learning the contingencies in place. Alternatively, changes in participant behavior could have been a result of motivating operations changing during a session. Relative sensitization/habituation to food, drink, and grooming, as well as their relationship to each other, may have affected distribution of behavior within a session. For example, once a participant has habituated to food, they may be more likely to engage in grooming.

The molar versus molecular analysis of data should also be considered. While the original purpose of the study was to examine if SB occurs in humans using a molecular analysis as per Staddon's (1977) definition, the molar or total session analysis provided results that aligned more closely with expected interim, facultative, and terminal behaviors. While the molecular analysis of the data for evidence of SB is still important, the molar analysis could also help to shed light on various issues, such as the development of problem gambling. The way a participant acts over the course of a session may be useful in identifying which participants in the lab are better for gambling research. For example, would the participant who engages in consumption to grooming be as useful as the participant who simply plays without consumption and grooming? That is, would they produce different results? A participant who only plays instead of consuming or grooming may be more representative of the problem gambler and produce more generalizable data for that population. Also, changes in distributions of SB across sessions could help show how a non-problem gambler might become a problem gambler. Because of this, it may be worthwhile to study the factors that either increase or decrease the likelihood of SB during gambling tasks. Further research of these factors could also implicate factors that relate to gambling persistence when individuals are able to engage in adjunctive behaviors such as

grooming or consumption while gambling. To our knowledge, this has been unexplored in the realm of behavior analytic gambling research. During this study participants were unable to accurately measure the passage of time during a session or engage in distractions such as cellphone usage. This could have influenced the distribution of participant behavior. For example, participants may have consumed less if they could use their cellphone, or engaged with their cellphone instead of grooming. The ability for participants to access distractions such as cellphones during studies may affect the outcomes and should be studied.

The coding method of the videos may have been a limitation; however, an exploratory comparison between real-time recording and PIR did not appear to create a meaningful difference in the data analysis. While some behaviors were overestimated as a result of the PIR method, both methods displayed the same trends of when a behavior was occurring during a session. Future research should examine any practical differences between the two methods when used to examine the behaviors within sessions, as well as compare different interval lengths.

This study addressed Overskeid's (1992) recommendation of adequate conditions to establish the occurrence of schedule induction in humans. While there was limited evidence of the stereotypical post-reinforcer (i.e. win) consumption or grooming, there are several possibilities as to why this happened. It could be that wins were not actually reinforcing. While participants were told wins would be equal to $0.25 dollars, this may have not been adequate motivation. Also, levels of sensitization to food, drink, and money, were not controlled for. It may be that the current gambling preparation and putative reinforcer used was the main limitation (see Kollins, Newland, & Critchfield 1997). While it could also be argued that session length and number of sessions required may have been insufficient, there was limited evidence

of schedule induction that some participants displayed in their first session but not their second. The argument that session length might be inadequate conflicts with previous studies that produced results in 30-minute sessions (e.g., Doyle & Samson, 1988; Porter et al. 1982). More research needs to be done with humans and schedule induction, particularly as some authors claim SB's significance in the development in deleterious symptoms of Generalized Anxiety Disorder (Dygdon & Dienes, 2014) and depression (Dygdon & Dienes, 2013). While the current study found evidence that SB can be studied in an analogue gambling setting, additional research should be conducted to determine what behaviors can be induced by a schedule in humans. Factors that affect the distribution of SB within and across sessions should also be examined.

Consumption while gambling is a factor that has been overlooked in the gambling literature. Schedules of wins on a slot machine could result in increases in consumption, which could in turn lead to increased persistence and financial loss during a gambling situation. While the present study sought to examine the relation between schedule induction and gambling on a simulated slot machine, certain important results emerged. Most participants consumed more in their second session, which has important implications for based on current correlations found in the gambling research (e.g., Suh, 2012; Suh et al., 2012) and previous research by Rzeszutek and Witts (2016). Because of the financial and psychological impact of problem gambling, all potentially relevant factors should be experimentally manipulated. Even though the present study had limitations, future research should continue to both examine the interaction between consumption and gambling, as well as SB in humans. If SB has a relation to increased consumption, that could in turn lead to increased persistence. A better understanding of this understudied phenomena in humans could help us to better understand the development of different pathologies and lead to better treatments and interventions.

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Appendix A: Table 1

Table 1.

Enjoyability, hunger/thirst, time since last food/drank, and consumption of all participants by session

	Session 1								Session 2							
	Cond.	Enjoy.	Hunger	Last Ate	Food (g)	Thirst	Last Drank	Drink (ml)	Cond.	Enjoy.	Hunger	Last Ate	Food (g)	Thirst	Last Drank	Drink (ml)
P1	A	7	0	2-3	9	0	<1	142	A	7	0	<1	6 (-3)	1	<1	**209 (+67)**
P2*	A	6	0	<1	13	1	<1	102	A	6	0	<1	9 (-4)	0	<1	*48 (-54)*
P3	B	8	1	<1	36	1	<1	362	B	8	2	>4	39 (3)	2	>3	**453 (+91)**
P4	B	8	1	>3	18	1	<1	171	B	7	1	>3	**29 (+11)**	1	<1	**181 (+10)**
P5	C	4	1	>3	29	2	<1	328	C	6	1	>3	**74 (+45)**	1	<1	*309 (-19)*
P6	C	1	2	>3	86	0	<1	322	C	1	0	2-3	*17 (-69)*	1	1-2	**453 (+131)**
P7	A	7	1	2-3	40	1	<1	334	B	7	1	1-2	32 (-8)	1	<1	**452 (+118)**
P8	A	8	0	<1	59	1	<1	288	C	7	1	<1	**70 (+11)**	0	<1	**299 (+11)**
P9	B	4	0	<1	15	1	<1	129	A	5	2	>3	**35 (+20)**	1	2-3	**211 (+82)**
P10	B	3	1	1-2	27	2	<1	345	C	2	1	1-2	29 (+2)	2	1-2	**453 (+108)**
P11	C	1	1	2-3	63	2	1-2	453	A	5	2	*<1	**85 (+22)**	2	1-2	454 (+1)
P12	C	6	1	2-3	84	1	1-2	399	B	8	2	2-3	83 (-1)	1	1-2	**418 (+19)**
P13	A	6	0	1-2	16	1	<1	128	A	4	1	<1	**56 (+40)**	1	<1	**342 (+214)**
P14	A	6	1	>3	28	1	<1	219	A	6	*	*	*14 (-14)*	*	*	217 (-2)
P15	B	8	1	1-2	16	1	<1	305	B	6	1	<1	**37 (+21)**	1	1-2	300 (-5)
P16	B	6	1	>3	83	1	>3	380	B	6	2	2-3	*73 (-10)*	1	<1	*266 (-114)*
P17	C	1	1	2-3	77	1	>3	426	C	1	1	1-2	75 (-2)	2	2-3	**453 (+27)**
P18	C	3	1	>3	48	1	<1	326	C	1	1	>3	42 (-6)	1	<1	*291 (-35)*
P19	L1	8	1	1-2	83	1	<1	452	L2	10	2	>3	84 (+1)	1	<1	453 (+1)
P20	L1	6	1	<1	15	1	<1	334	L2	6	0	<1	*0 (-15)*	1	<1	*0 (-334)*
P21	L1	10	1	<1	32	1	<1	430	L2	10	1	>3	**70 (+38)**	2	>3	**454 (+24)**
P22	L1	10	1	<1	34	2	<1	331	L3	10	1	<1	32 (-2)	1	<1	**397 (+66)**
P23	L1	8	1	1-2	6	1	<1	163	L3	8	1	<3	12 (+6)	1	<1	**233 (+70)**
P24	L1	6	1	1-2	75	1	<1	376	L3	3	1	>3	79 (+4)	0	<1	**454 (+78)**

Note: Enjoyability and Hunger/Thirst surveys based for each session for each participant. **Bold**=Increase in consumption of 10g/mL or more, *Italics*= Decrease in consumption of 10 g/mL or more. Changes in g or ml between first and second session are in the parentheticals under session 2. Hunger and thirst were 0= "I am not hungry/thirsty at all", 1= "I am somewhat hungry/thirsty", 2= "I am very hungry/thirsty", 3= "I am extremely hungry/thirsty". Last ate and drank is in number of hours. P2's second session was shortened due to a technical issue with the monitor.

Appendix B: Figures

Figure 1. Simulated slot machine and input methods. Left image contains the apparatus used in Experiment 1 and 2. Right image contains the apparatus used in Experiment 3 and 4. The lights seen in the right image were inactive during Experiment 3.

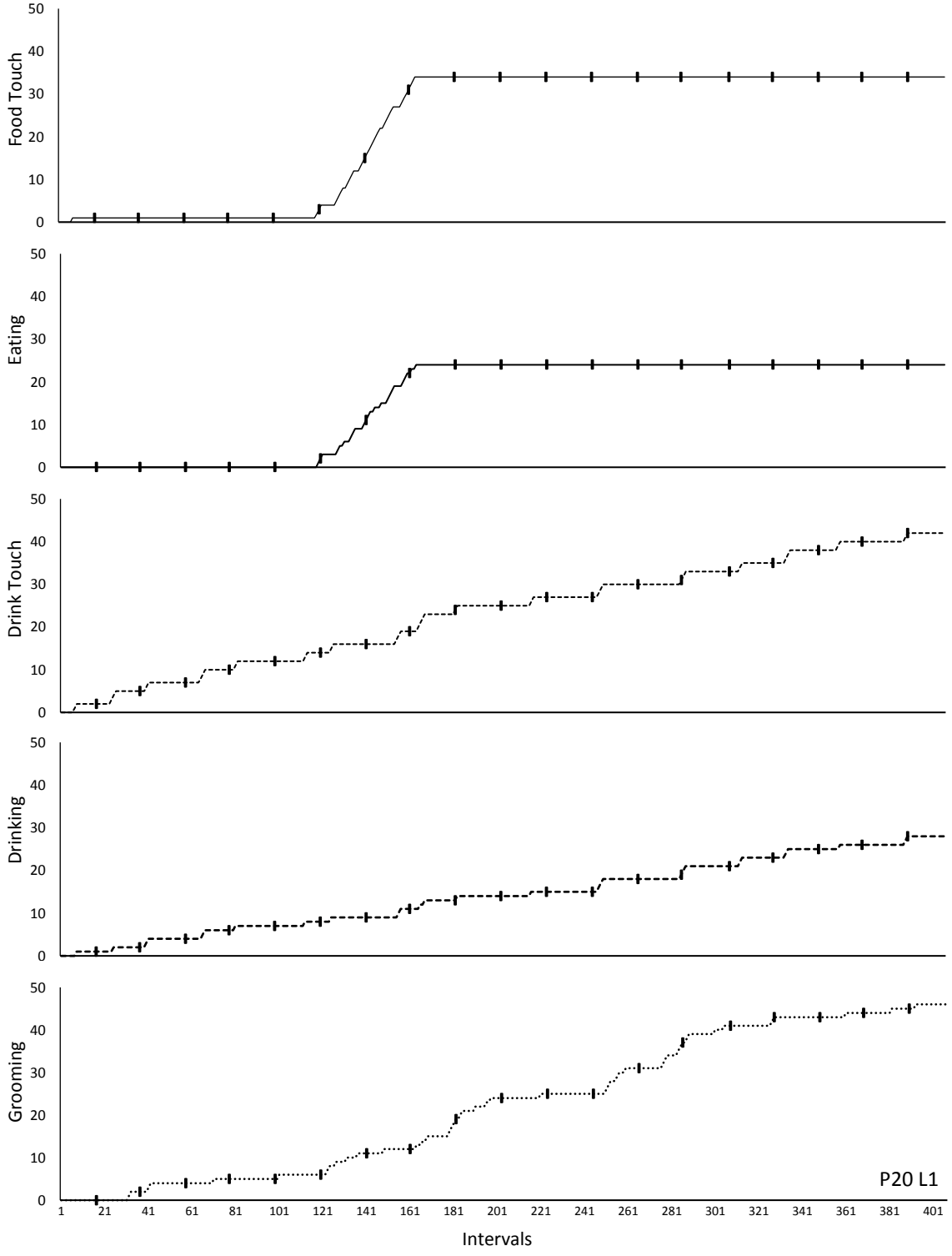

Figure 2. Cumulative record of P20's first session. Hash marks represent intervals containing a win.

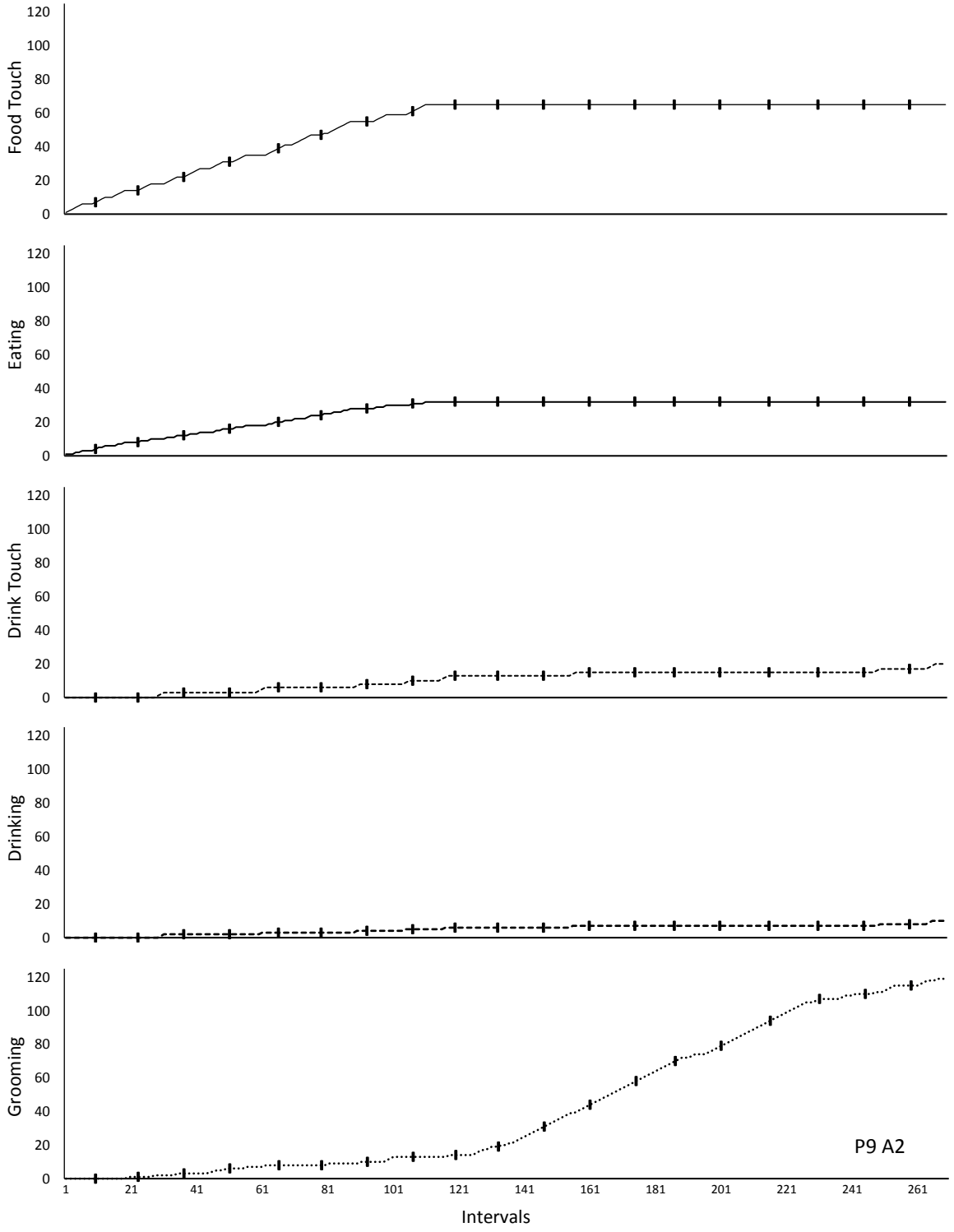

Figure 3. Cumulative record of P9's first session, condition A (fixed wins). Hash marks represent intervals that contained a win.

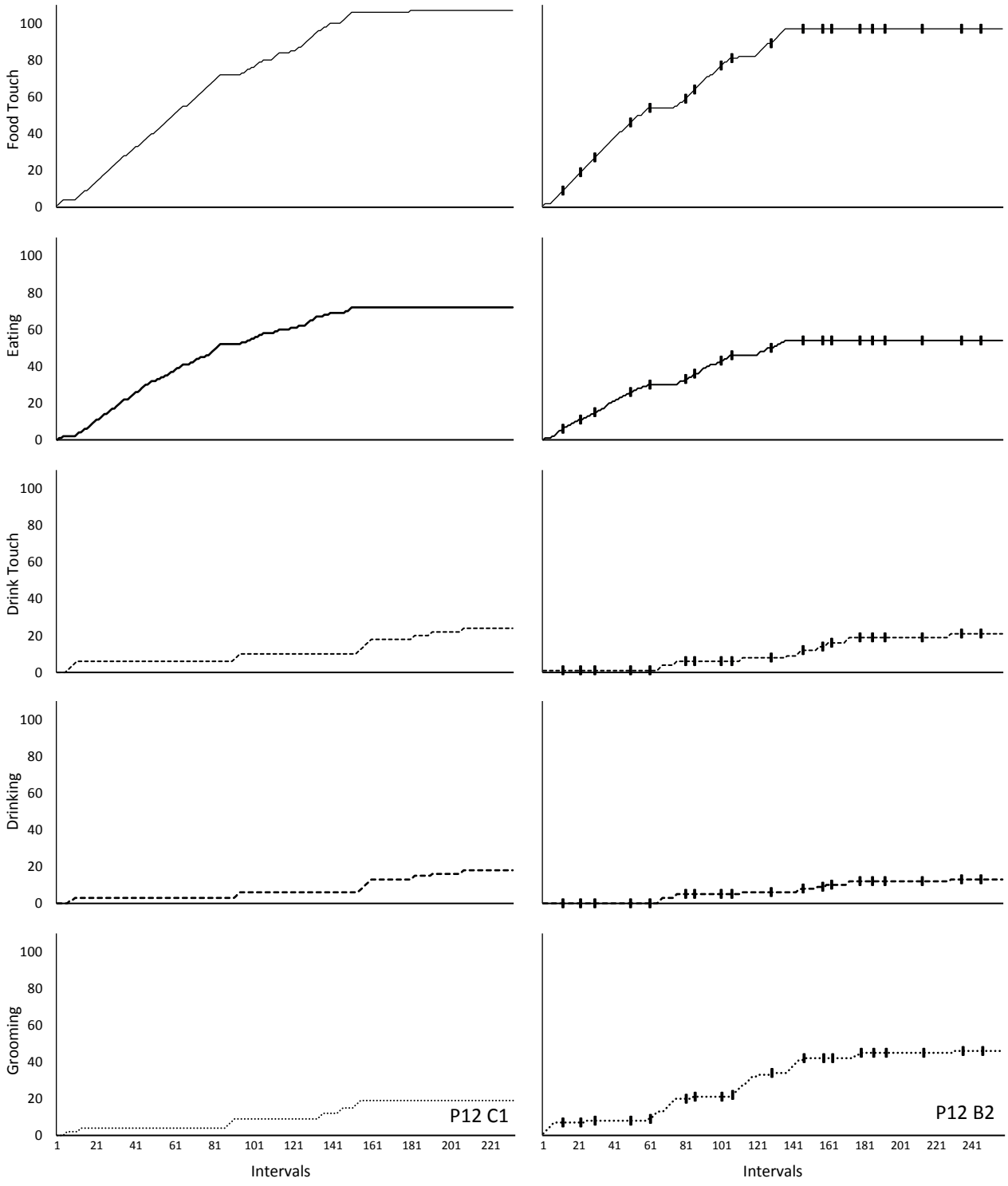

Figure 4. Cumulative records of P12's first session (left) and second session (right). Hash marks represent intervals that contained a win.

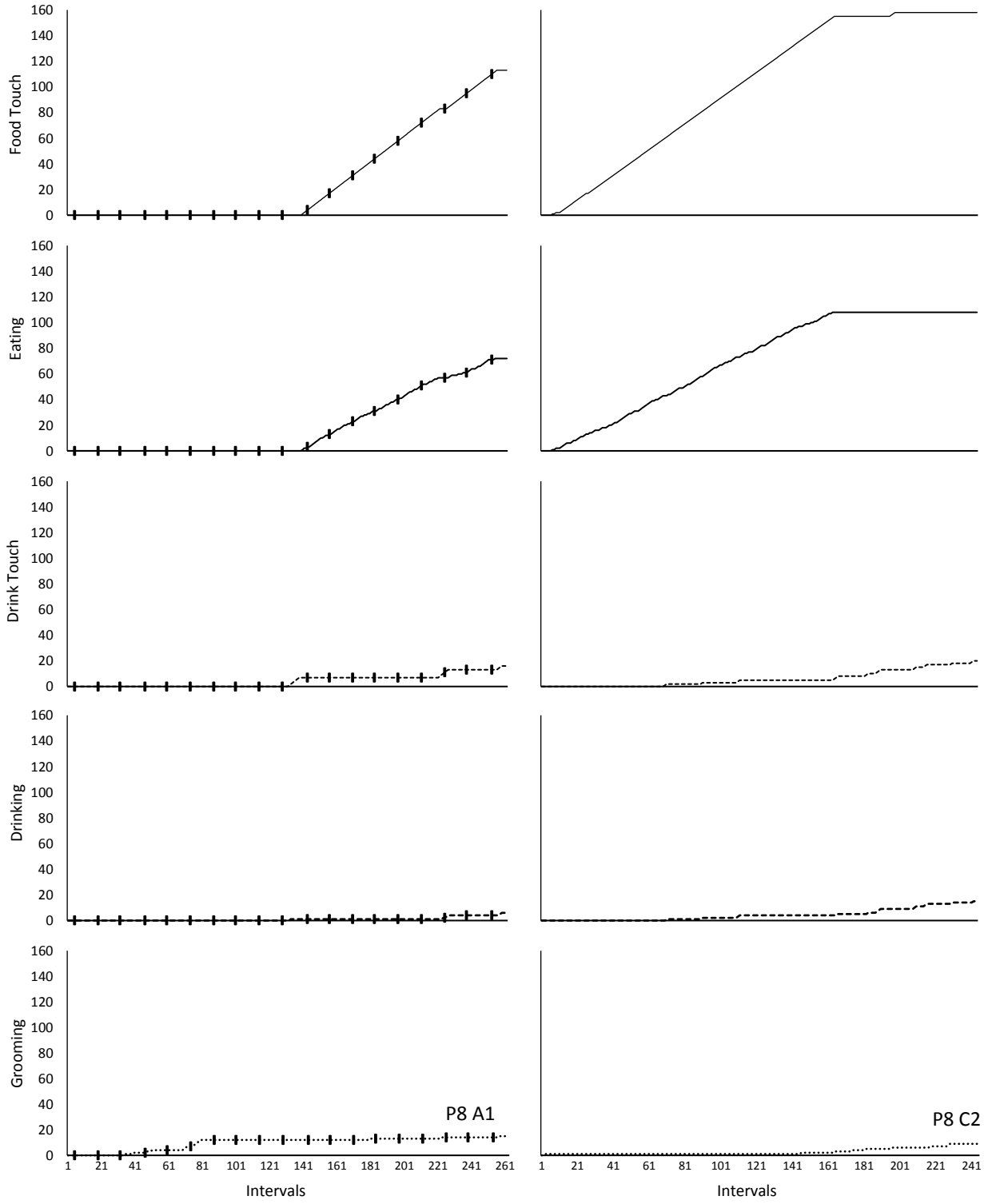

Figure 5. Cumulative records of P8's first session (left) and second session (right). Hash marks represent intervals that contained a win.

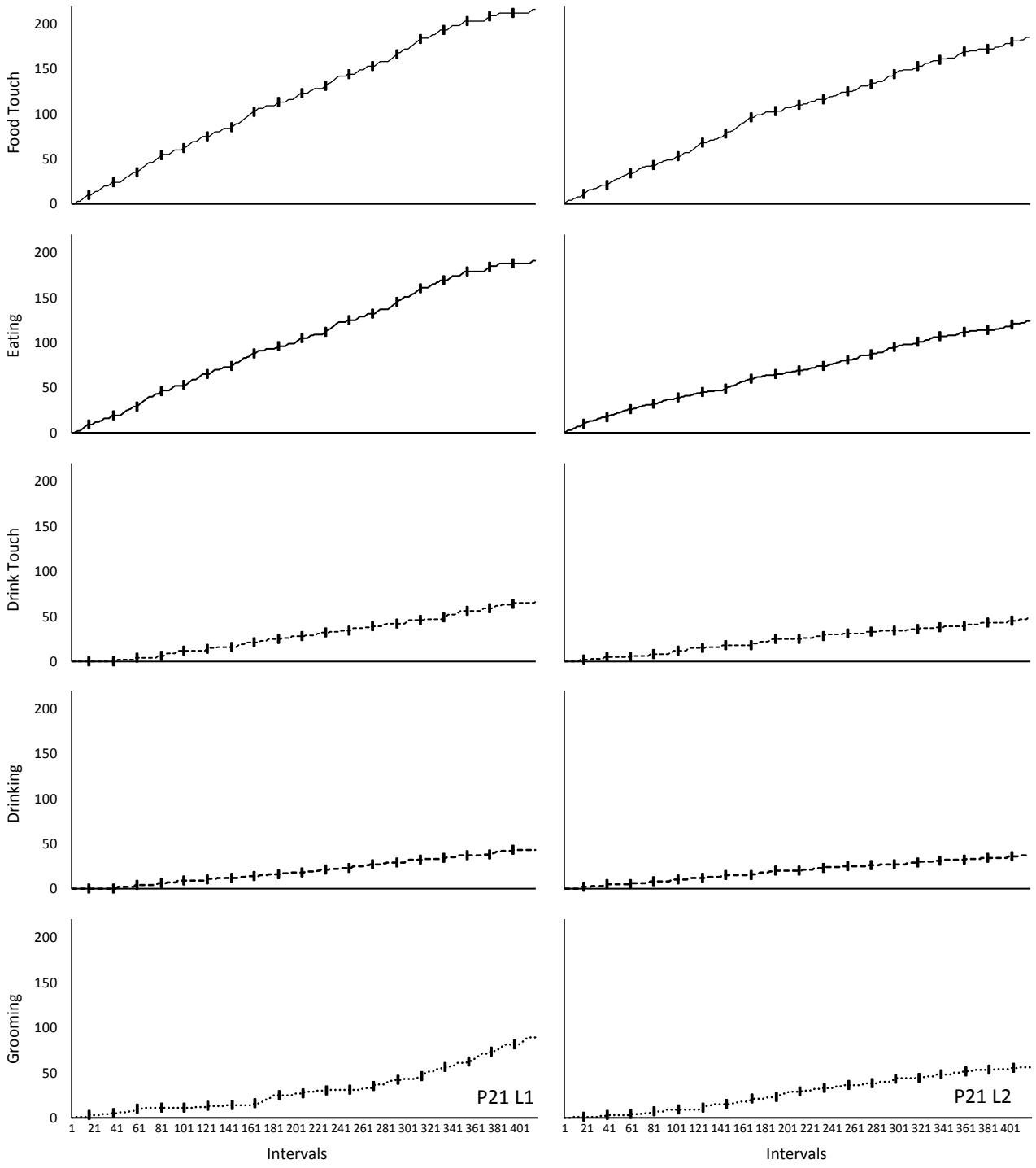

Figure 6. Cumulative records of P12's first session (left) and second session (right). Hash marks represent intervals that contained a win.

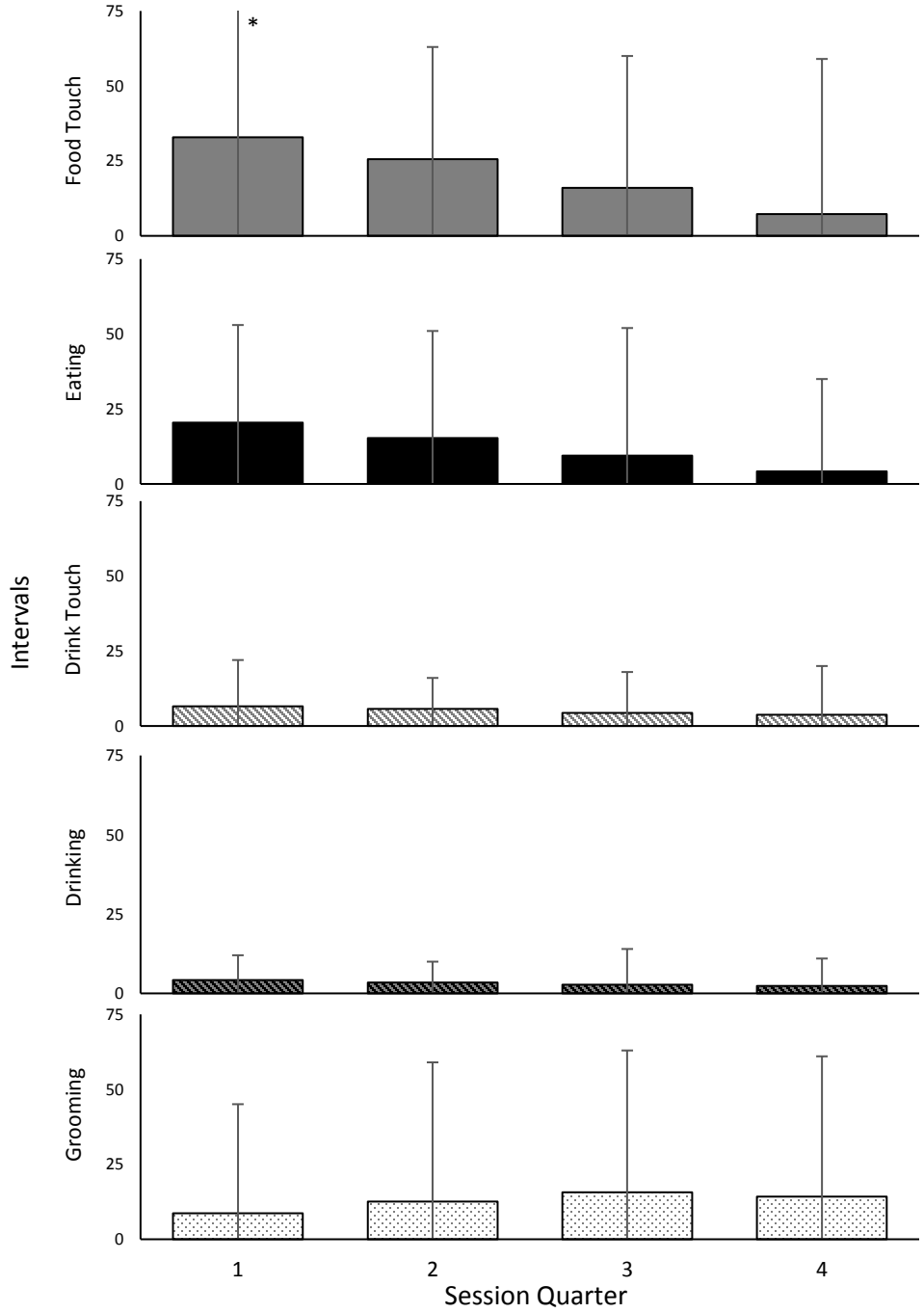

Figure 7. Overall average of all participants' intervals containing the target behaviors when sessions were divided into quarters. Error bars represent range. * Highest intervals with food touch in a session was 87.

Appendix C: Institutional Review Board Approval

ST. CLOUD STATE
EDUCATION FOR LIFE

Institutional Review Board (IRB)

720 4th Avenue South AS 210, St. Cloud, MN 56301-4498

Name: Mark Rzeszutek
Address 915 5th Ave. South
St. Cloud, MN 56301 USA
Email: mjrzeszutek@stcloudstate.edu

IRB PROTOCOL DETERMINATION:
Expedited Review-1

Project Title: Analysis of scheduled-induced consumption and grooming in Human during a simulated slot machine task

Advisor Dr. Benjamin N. Witts

The Institutional Review Board has reviewed your protocol to conduct research involving human subjects. Your project has been: **APPROVED**

Approval #7

Please note the following important information concerning IRB projects:

- The principal investigator assumes the responsibilities for the protection of participants in this project. Any adverse events must be reported to the IRB as soon as possible (ex. research related injuries, harmful outcomes, significant withdrawal of subject population, etc.).

- For expedited or full board review, the principal investigator must submit a Continuing Review/Final Report form in advance of the expiration date indicated on this letter to report conclusion of the research or request an extension.

-Exempt review only requires the submission of a Continuing Review/Final Report form in advance of the expiration date indicated in this letter if an extension of time is needed.

- Approved consent forms display the official IRB stamp which documents approval and expiration dates. If a renewal is requested and approved, new consent forms will be officially stamped and reflect the new approval and expiration dates.

- The principal investigator must seek approval for any changes to the study (ex. research design, consent process, survey/interview instruments, funding source, etc.). The IRB reserves the right to review the research at any time.

If we can be of further assistance, feel free to contact the IRB at 320-308-3290 or email ri@stcloudstate.edu and please reference the SCSU IRB number when corresponding.

IRB Institutional Official:

Dr. Latha Ramakrishnan
Interim Associate Provost for Research
Dean of Graduate Studies

OFFICE USE ONLY

SCSU IRB# 1500 - 2111	**Type:** Expedited Review-1	**Today's Date:** 2/21/2017
1st Year Approval Date: 2/16/2017	**2nd Year Approval Date:**	**3rd Year Approval Date:**
1st Year Expiration Date: 2/15/2018	**2nd Year Expiration Date:**	**3rd Year Expiration Date:**