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## Information

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## Letter from the Editors

Elizabeth Bates, professor of Cognitive Science, passed away on December 13, 2003, after a 13 month battle with pancreatic cancer. She is missed by countless family members, friends, students and colleagues all over the world. Liz has had a profound influence on the editors of Cognitive Science Online, the Cognitive Science Department at UCSD, and cognitive scientists around the world. This issue is dedicated to her memory.



## On Liz Bates

by Ayşe Pinar Saygın

When you learn something, you change. Your brain is no longer the same. So in some sense, we carry with us everything we learn, everyone we learn from. Not as facts, lookup tables. But in the very wiring of our brain, in the fact that we have changed, whether we know it consciously or not.

I first met Liz when I was applying to the Cognitive Science graduate program at UCSD and was visiting the department. I was immediately taken by her energy, intelligence, and enthusiasm for science. After I decided to come to UCSD – needless to say, Liz had something to do with that decision – I started working with her as my primary advisor.

The most valuable things we learn from mentors are often also the most intangible, the hardest to explain. Those they teach us by setting an example, by reacting to everyday situations the way they do, simply by being themselves. And those things cannot be taken away.

Everyone who knew Liz Bates knew what a powerful presence she had everywhere she went. I am sure that applies to the presence she left in everyone whose life she's touched. At least in my case, I know I have been changed by Liz in substantial ways. I am different for having known her.

It's in the way I think about science sometimes, or the way I will react to a student, or the way I will bounce back from criticism, or just the way I see things.... It's in the way I no longer view science as a battle of wits between a single scientist and nature, or something people with thick glasses do holed up in their garage (or I guess in modern times, more likely in front of their computer) but as a massively collaborative, social endeavor. It's in the way I worry about my work and how it is perceived and what the future will bring, but even in the face of hardship, I just keep going, because it is simply what I do and part of me knows it will become fun again very soon. It's in the way I will motivate endlessly every student or colleague who needs a boost, including myself, because someone's sincere "you can do it" is all you need sometimes to trust in yourself. Liz knew that well and now I do too.

For every example like those above which I could articulate, there are a dozen which are too subtle to describe. It is not that I act like Liz, or have become like her in any global sense. Nor is there a Liz “module” in my mind, inserted somehow, or a Liz oracle I consult. It’s something much more distributed perhaps. A little like feeling a breeze which reminds me of her. I think this is how remarkable people teach us things and change us substantially. They work themselves into us.

I miss having Liz as my advisor. But her presence in my work is still so strong; I can look within myself and at all the others she worked with and I can still see reflections of her and that makes it easier. I miss Liz Bates most as a person. She was an amazing source of inspiration, a true cognitive scientist, one of those people born to do research. She was a passionate and generous mother, wife, friend, mentor and colleague and you could never have a dull moment with her.

She used to say, she loved her life, just the way it was and wanted more of it. And in return, those in her life loved her, just the way she was, and wanted more of her, too.

**Ayşe Pınar Saygın**

Department of Cognitive Science, UCSD

## Elizabeth Bates: A scientific obituary

by Frederic Dick, Jeffrey Elman and Joan Stiles

On December 13, 2003, Elizabeth Bates died, after a courageous year-long struggle with pancreatic cancer. In passing away, Liz leaves an enormous hole, both in the field and in the lives of her many friends. But she leaves an enormous legacy as well. Over the course of more than thirty years, Liz established herself as a world leader in a number of fields – child development, language acquisition, aphasia research, cross-linguistic research, and adult psycholinguistics. She was passionate about science and about ideas. Fearless and bold in following these ideas wherever they took her, and unafraid of controversy, Liz inspired many to follow in her footsteps.

One can paint the landscape of a great career in different shades and hues, but for Liz one needs a full pallet of colors, and certainly of intensities. Her contributions to the field of cognitive science were rich and varied, and defy any simple categorization. A summary of just the research initiatives and empirical instruments she produced would fill the space of this brief note. To give a sense of the breadth of her achievement we begin with a list of some of the most tangible products of her career.

*MacArthur Communicative Development Inventory.* This instrument has become one of the most widely used tools in the field for assessing communicative development. There are now versions of the CDI in 35 languages.

*The International Picture Naming Project.* Liz initiated and headed the International Picture Naming project, which has provided the field with a wealth of developmental and adult behavioral data on action and object naming in 7 languages.

*Voxel-Based Lesion-Symptom Mapping.* Liz led the team that developed this important tool for correlating site of lesion in patients with brain damage with degree of behavioral deficits.

*The UCSD Project in Cognitive and Neural Development.* For nearly two decades, Liz directed this multimillion dollar NIH funded program project to study the longitudinal development of language, learning and behavior in children with neurological disorders. It remains a unique and productive international center for the study of these important challenging questions about development.

*International Cross-Linguistic Consortium.* Liz established an international network of researchers that made possible large-scale collaborative research into cross-linguistic comparisons of aphasia and normal language processing.

*Founding member of the UCSD Cognitive Science Department.* Liz was one of the pioneering faculty who established the first Cognitive Science department in the world.

*Founding Co-Director of the Joint Doctoral Program in Language and Communicative Disorders (SDSU/UCSD).* Liz played a key role in the creation of one of the most innovative Ph.D. programs in the country in the area of language and communicative disorders.

*Scholarly record.* In a prolific career over three decades, Liz conducted studies in over 20 languages on four continents. She was author, or co-author, of 10 books and more than 200 articles

As important as each of these has been, and as great an impact each has had on the everyday scientific lives of students and researchers around the world, they cannot be properly understood in isolation. Rather, they need to be placed in the context of the larger legacy that constituted the full breadth of Liz's career achievements – achievements that will continue to influence the course of scientific discourse and practice for many years to come. In an important sense, underlying all of Liz's work is a unified view of language, cognition, and the brain that motivates the work in different areas. But although one can separate Liz's work into areas – development, aphasia, cross-linguistic studies, etc. – this obscures the deep theoretical insights that cut across the various domains.

Liz was a true developmentalist. She understood that what is interesting about development is change – the forces that drive change, the shape of change and the mechanisms that underlie it. She viewed life as dynamic, and development as emergent, deriving from the interaction of the organism with its environment.

Liz was an ardent theorist. Beginning with her early work with Brian McWhinney on the Competition Model and continuing – literally – to the end of her life she developed well-articulated positions on some of the most central issues in Cognitive Science from modularity to embodied cognition to brain plasticity to questions about innateness and the origins of knowledge. She saw behaviors such as language as reflecting important, interesting and novel traits that are unique to humans; but she also understood that even the most complex behaviors are rooted in a shared biological history. She believed that big changes – like the emergence of language – developed out of many small changes. As she often said, “Language is a new machine built out of old parts.” Liz did not believe in a language module in the human brain. Instead she saw functional modularity as an outcome rather than a starting condition.

Liz was the consummate empiricist (her students often referred to her as a data junkie). The many tools and instruments she created—for quantifying dissociations, studying small samples, and interpreting multivariate analyses—bear witness to her passion for data. In many ways, Liz viewed her experimental results as an explorer might see a newly discovered continent— a vast terrain ready to be poked, prodded, and encouraged to reveal its underlying structure.

Finally, Liz was a generous and energetic collaborator. She was a one-woman force for scientific globalization, forging lasting and productive partnerships with linguists and psychologists working in many countries, including Bulgaria, England, Germany, Hungary, India, Italy, Mexico, Russia, Taiwan, and Tanzania. She also built bridges across an extraordinary array of disciplines, with long-time collaborators hailing from

fields as disparate as biology, computer science, medicine, physics, primatology, and statistics.

Liz was able to establish and maintain such wide-ranging and numerous collaborations not only because of her legendary energy and drive, but also - and perhaps most importantly - because of her surpassing generosity of spirit. To so many of us, Liz was muse, confidant, mentor, and friend. And we miss her very much.

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Elizabeth Bates is survived by her husband George and daughter Julia Carnevale. The family requests that in lieu of flowers, contributions be sent to the Elizabeth Bates Graduate Research Fund, c/o Center for Research in Language - MC 0526; University of California, San Diego; La Jolla, California 92093-0526. In keeping with her deep commitment to supporting students, this fund will be used to assist graduate students in their research, emphasizing the many areas in which Professor Bates made pioneering contributions.

# Comparison of Ease of Falsification of Attention Deficit Hyperactivity Disorder Diagnosis Using Standard Behavioral Rating Scales

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## Abstract

The purpose of this study was to explore the ability of college students to falsify a positive Attention Deficit Hyperactivity Disorder (ADHD) diagnosis after reading the DSM-IV-TR criteria for the disorder. Introductory psychology students at UCLA were given one of four commonly used diagnostic batteries and asked to answer as if they were afflicted with the disorder. The four batteries used were the Wender Utah Rating Scale (WURS), the Conners Adult ADHD Self-Report of Symptoms (CAARS), the Brown Adult ADHD Scale (BAAS), and the ADHD Rating Scale (ARS). It is expected that the Conners and Brown scales will be more effective in preventing a falsified diagnosis than the other three measures, but the results indicated that all four batteries were significantly falsifiable. The Wender scale and ARS were found to be somewhat less conducive to diagnosis falsification than the Brown scale. Hyperactivity was found to be the most crucial factor in diagnosis determination of both the ARS and Conners scales. While gender did not seem to be significant in determining the diagnosis for the ARS, the Conners scale, or the Brown scale, it was found to be the primary factor within the Wender scale. The results of this study may have implications in future methods of diagnosis of ADHD for the purpose of qualification for services for students with disabilities.

## 1 Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is defined by the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revised (DSM-IV-TR) as an inability to sustain attention, impulsivity, and hyperactivity (American Psychological Association, 2000). To be diagnosed with ADHD, symptoms of

inattention, hyperactivity and impulsivity must be present by the age of seven. Six or more of these symptoms must have been prevalent for a period of at least six months to a degree where they clinically impair normal functioning in at least two aspects of life, such as school, work, home, or play. The symptoms must not occur exclusively during the course of a pervasive developmental disorder, like Schizophrenia, or another psychotic disorder, and must not be better accounted for by another disorder, such as mood, anxiety, or personality disorders. ADHD symptoms are divided into three subgroups: hyperactive-impulsive, inattentive, and combined. Girls and women are more likely to predominantly fall in the inattentive category, while boys and men tend to be predominantly in the hyperactive-impulsive subgroup. The subgroups do not differ, however, in cognitive, social, or psychosomatic deficits.

Symptoms, however, do tend to differ between the sexes. Women show more sexual misbehavior as they mature as a way of externalizing their symptoms. For this reason, women with ADHD have a higher rate of unwanted pregnancy. Women also demonstrate an increased number of emotional problems with age and are more likely to develop severe depression (Newcorn, Halperin, Jensen, Abikoff, Arnold, Cantwell, Conners, et al., 2001).

ADHD is approximately three times more prevalent among men than in women. Due to a natural tendency for men to be more aggressive than women, men with ADHD tend to show a higher number of conduct problems with age and are more likely to develop a conduct disorder. They have a higher rate of arrests than their female counterparts (Newcorn, et al., 2001).

### **1.1 Causes of ADHD**

The cause of ADHD remains unclear. In 1992, Gilger, Pennington, and DeFries found that there was a genetic predisposition to the disorder. Their twin study found an 81% concordance in monozygotic twins and a 29% concordance in dizygotic twins. This demonstrated that a person had a higher likelihood of acquiring the disorder if a parent and/or sibling suffered from ADHD (Gilger, et al., 1992).

Researchers also looked for brain damage and neurophysiological abnormalities in order to determine the source of the symptoms. Brain damage, defined as structural abnormalities, was only found in only 5 – 10% of the cases, and consequently it was concluded that it could not be the sole cause of the symptoms (Rutter, 1977). However, there were similarities found among patients. MRI studies consistently showed reduced blood flow to the frontal lobes, which are known for their involvement in higher order cognitive functions, such as reasoning and impulse control. The lack of blood flow to these areas could account for the lack of control of executive functions seen in ADHD patients, such as blurting things out without thinking (Zametkin, Liebenauer, & Fitzgerald, 1993).

### **1.2 ADHD and the College Population**

Due to the nature of the symptoms, ADHD affects many aspects of the patient's life. The college population is particularly interesting in this aspect because ADHD affects their lives in both the academic and occupational setting.

ADHD was previously thought to be a disorder of childhood, requiring a diagnosis before the age of 7. It was also thought that the symptoms would disappear with age

and completely vanish by puberty. Yet, it was later observed that approximately 70% of children diagnosed with ADHD continue to exhibit symptoms into adolescence and even adulthood (Heilingenstein & Keeling, 1995).

As patients grow older, symptoms tend to become more internalized and are, therefore, more difficult to diagnose. Common adult symptoms include a sense of underachievement in life as a whole, chronic procrastination, chronic problems with self-esteem, tendency to worry excessively and needlessly, mood swings, and tendency towards addictive behavior, such as sex, drugs, and alcohol (Hallowell, 1995).

Despite this fact, there is very little information available about how truly prevalent or disabling ADHD is in adults. What is known is that the prevalence of college students with previously unrecognized ADHD has increased in recent years. Students would often seek assistance because of unprecedented severe academic difficulties or nonspecific psychological problems. A recent study by Weyandt, Lintermann, and Rice (1995) showed that 7 to 8% of the college population suffered from the disorder. Other studies, however, have reported the prevalence of ADHD as being anywhere between 2 and 8% (Weiss & Murray, 2003; Heilingenstein & Keeling, 1995; Heilingenstein, Guenther, Levy, Savino, & Fulwiler, 1999; Rossini & O'Connor, 1995; Weyandt, Lintermann, & Rice, 1995). While it is true that adolescents with ADHD appear to be at greater risk for low academic achievement, grade retention, substance abuse, peer rejection, social skill deficits, and antisocial behavior, most college students with ADHD appear to have few problems outside of academics and often do not display any symptoms until they are faced with the college level work load.

Students had two major concerns, their grades and their mood. Undergraduates who had been high achievers in high school complained about unprecedented severe academic difficulties and underachievement. It was as if they could just not handle the increased school stress and increased amount of concentration required by the college workload. Thus, the level of work required in college could have created enough stress to cause symptoms of the disorder to rise to clinical levels (Heilingenstein, et al., 1999).

### **1.3 Laws Regarding Disabilities and Services for Students with Disabilities**

The federal government has recently amended existing laws to include learning disabilities, like ADHD, and ensure that these students, like any other disabled student, receives adequate aid and support through the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 (ADA). The main goal of these laws is to guarantee that individuals with disabilities are not excluded from public services, such as schools and libraries (ERIC Clearinghouse on Disabilities and Gifted Education, 1998; Fornadel & Taylor, 1994).

Section 504 of the Rehabilitation Act of 1973 and Title III of the ADA deal with the responsibilities of the public school system towards their learning disabled students and staff (Fornadel & Taylor, 1994). State laws, such as California Assembly Bill 746, have endorsed and elaborated on the specific details of the federal acts.

In accordance to the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990, and respective state laws, offices for students with disabilities in high school and college campuses across the country have designed special programs to assist

students with ADHD and other learning disabilities in having a successful college career. These programs include separate proctoring during alternative test-taking conditions, such as additional time to complete exams, quiet testing areas, technology resource rooms, priority enrollment and housing, accommodations for degree-related internships and off-campus field experiences, tutoring, and the opportunity to meet with instructors to review early drafts of an assigned essay (UC Regents Handbook, 2000; CSU-LB, 1989; UTD, 2000). These services are of great help to students with learning disabilities, but would be equally helpful to students who are not disabled. These services, in addition to the possibility of attaining prescription medication, may present a motive for students to attempt to fake learning disabilities in order to take advantage of the services provided. This would be an area potentially interesting for research.

Due to the fact that reasonable accommodations in all programs to students with disabilities, including students with ADHD are required by federal, state, and university laws, universities require certain documentation for qualification into their disability programs. In order to qualify for these services, students must provide current assessment of their condition, which may be accomplished through questionnaires, which permit the student to describe current concerns and past problems, or interviews with or questionnaires filled out by significant people in the student's life. Students must also provide complete developmental, educational, and medical histories. Lastly, a summary of assessment findings which explains how and why the condition is related to the problems the student has been encountering in academic settings must also be presented (UC Regents Guidelines, 2000).

Similarly, undergraduate and graduate school admission testing companies, like the Educational Testing Service (ETS), responsible for the Medical College Admissions Test (MCAT), Law School Admissions Test (LSAT), Graduate Records Examination (GRE), Scholastic Aptitude Test (SAT), and American College Testing (ACT), have also provided students with disabilities with different options to facilitate testing. These alternate testing conditions include, but are not limited to: a separate testing room, additional testing time and rest time between sections, tests on audiocassette (American Association of Medical Colleges, 2000; Law School Admissions Council, 2000; Graduate Records Exam, 2000; The College Board, 2000; Educational Testing Service, 2000). Commentators have often wondered about the fairness of so many services being offered regarding the integrity of the tests. They argue that in life after school will not provide the countless services offered to them in the admission process and during their college career.

These alternative testing conditions can be arranged by submitting a letter or form to the testing company along with the registration form specifying the requested accommodations. The request for alternative accommodations must be very specific, including the amount of additional time requested and the reasons why such accommodations are necessary due to the nature of the disorder. The letter must be accompanied by a letter from a qualified physician or other specialist documenting a current diagnosis of the disability, within five years, the treatment provided, and their explanation of the need for the requested accommodations. For the diagnosis of ADHD, relevant batteries, such as the Wender Utah Rating Scale (WURS), Conners Adult ADHD Rating Scale: Self-Report or Symptoms (CAARS:L:S), ADHD Rating Scale (ARS), or Brown Adult ADHD Scale (BAAS), should be provided to as supporting evidence of attention problems.

#### 1.4 Behavioral Rating Scales Used in ADHD Diagnosis

Behavioral rating scales, defined as questionnaires used to quantify clinically relevant behaviors, such as the aforementioned batteries, serve to quantify the symptoms needed for a diagnosis. These rating scales play an especially important role in the diagnostic assessment of ADHD. While behavioral rating scales, especially self-report scales which are susceptible to self bias, have definite limitations, they also have clear advantages since they are norm-referenced, psychometrically sound, ecologically valid, and practical to use (Power & Ikeda, 1996). These scales also provide unique information in evaluating problems associated with ADHD from the perspective of both an observer, such as in parent or teacher reports, or from the interviewee, from self-reports.

Self-report scales become more useful with age. This is due to the fact that overt restlessness tends to diminish with age allowing for a higher degree of impulsivity. Increased levels in internal symptomatology appear with age. Females demonstrate an increased amount of internal and emotional problems, while males show higher numbers of conduct problems. Lowered self-esteem is a particularly important secondary symptom of ADHD in adolescents (Conners, Wells, Parker, Sitarenios, Diamond, & Powell, 1997). These symptoms are virtually undetectable in observer reported scales. A problem arises in self-report scales, however, due to the fact that ADHD patients tend to have a distorted self-view because of a sense of underachievement in life.

*Wender Utah Rating Scale (WURS):* The Wender Utah Rating Scale (WURS) was among the first scales to be used in ADHD diagnosis. It was developed by Ward, Wender, and Reimherr, in 1993, in an attempt to overcome the problem of retrospectively diagnosing ADHD. The Utah Criteria Method used in this scale requires that hyperactivity be present in both childhood and adulthood for a diagnosis (Rossini & O'Connor, 1995). This not only immediately eliminates those in the inattentive subgroup, but also those individuals who did not exhibit any clinically significant symptoms until they arrived in college. It was modeled after the pediatric interval-level scales used to diagnose ADHD in young children. The purpose of WURS is to quantify retrospective self-reports of childhood hyperactive, inattentive, and distractible symptoms (Rossini & O'Connor, 1995). The original study correctly identified 86% of the patients with ADHD, 99% of the normal subjects, and 81% of depressed patients (Ward, et al., 1993). In a validity test by McCann, Schelle, Ward, Roy-Byrne, Anton, Beck, et al. (2000), however, only 57.5% of those who did not have ADHD and 72.1% among those who did were correctly classified. This suggests that while the WURS is sensitive to ADHD, it misdiagnoses approximately half of those who are not truly affected by the disorder. The prevalence of false positives may also aid those who would fake ADHD in order to take advantage of the services provided to students with disabilities, particularly the additional examination time.

*ADHD Rating Scale IV (ARS):* The ADHD Rating Scale IV (ARS), developed by DuPaul, Power, Anastopoulos, and Reid in 1998, attempts to identify patients in all three pertinent subgroups of the disorder: attention, impulsivity, and hyperactivity. The scale was developed in both a self-report and teacher-report version. The teacher-report version is commonly used to examine gender differences among ADHD patients across different ethnic groups (Reid, Riccio, Kessler, DuPaul, Power, Anastopoulos, et al., 2000). Like the WURS, the format of this particular scale is also consistent with ADHD rating scales used for diagnosis in children. The scale's

validity and reliability were assessed in a 1995 study by Weyandt and colleagues who found that the construct validity, internal consistency, and test-retest reliability was good and could be useful in accurate diagnosis and determination of appropriate treatment.

*Brown Adult ADHD Scale (BAAS):* The Brown Adult ADHD Scale (BAAS) is yet another self-report instrument, developed in 1996 by Thomas E. Brown to measure ADHD in adolescents and adults (Brown, 1996). It is predominantly used to diagnose ADD, which is harder to identify than the other subgroups of ADHD (Heiligenstein & Keeling, 1995). This scale reveals impairments in five clusters of executive functions, usually associated with the frontal lobe, which are usually associated with ADHD. The impairment of executive function could explain why some ADHD symptoms do not appear until faced with academic or other complex intellectual demands, such as the increased difficulty and amount of schoolwork in college (Kubose, 2000).

*Conners Adult ADHD Rating Scale: Self-Report of Symptoms (CAARS):* The most recently developed behavior rating scale for ADHD diagnosis is the Conners Adult ADHD Rating Scale: Self-Report of Symptoms (CAARS) developed by Conners, Erhardt, Epstein, Parker, Sitarenios, and Sparrow in 1999. The purpose of this scale was to create a well-standardized adult behavior rating scale, such as those available for childhood assessment. The current literature identifies nine aspects of adult ADHD functioning that provided the initial hypothesis regarding factor structure and scale items. This self-report scale has high sensitivity and specificity, having an overall diagnostic efficiency of 83% (Conners, Erhardt, Epstein, Parker, Sitarenios, & Sparrow, 1999). Originally, this scale was developed to compliment parent and teacher rating scales as children entered adolescence due to the facts that middle school teachers were less able to observe each child individually and that adolescents begin to spend less and less time at home under parental supervision. This scale not only covers the primary symptoms addressed in parent and teacher rating scales, but also an extensive range of family, cognitive, self-esteem, mood, and conduct problems (Conners, Wells, Parker, Sitarenios, Diamond, & Powell, 1997).

While the literature and psychological tests concerning child ADHD are extensive, the study of adolescent and adult ADHD remains a relatively new and unexplored area of psychopathology. Researchers have yet to fully explore factors exclusive to the older ADHD populations (Downey, Stelson, Pomerleau, & Giordani, 1997). Due to this, behavioral rating scales used for adolescents and adults are not as refined and well documented as those used to assess in children.

The available tests have all been tested for construct validity, internal consistency, and test-retest reliability. They have not, however, been compared to each other. It is important for specialists to be able to determine the best way to diagnose and provide treatment for individuals with ADHD. The authors of the batteries have also failed to take into consideration the possibility that people may attempt to feign ADHD in order to take advantage of the services offered to students with disabilities through the various schools and testing companies. Studies in this area would be helpful in preventing exploitation of disabled student services.

The purpose of this study was to compare the reliability of these four commonly used diagnostic batteries when the person filling them out was deliberately attempting to feign a positive ADHD diagnosis.

Due to the fact that the Conners and Brown scales are more recent and were developed especially for the adult populations, it was hypothesized that these two scales would be more effective in preventing a falsified diagnosis than the ARS or Wender Scales.

## **2 Methods**

### **2.1 Participants**

Participants were 80 members (49 female, 31 male, mean age 19.29) of the Psychology 10 subject pool of the University of California, Los Angeles. The participants volunteered as a way to fulfill the six-hour research requirement for the Psychology 10 course. Participation was limited to those subjects who had never been previously diagnosed with ADHD.

### **2.2 Design**

The experiment had a between-subjects design. It was comprised of one independent variable, the diagnostic battery completed, consisting of four levels. Each of these levels corresponded to one of the four diagnostic batteries used. The dependent variable, diagnosis result, was measured by whether or not the test was scored positive or negative for an ADHD diagnosis. Subjects were randomly assigned to one of the four batteries. There were only 20 copies of each battery available to ensure that each condition had an equal number of participants.

### **2.3 Materials and Apparatus**

All of the participants were first given a copy of the ADHD criteria from the DSM-IV-TR (American Psychological Association, 2000).

Four commonly used ADHD diagnostic batteries were used to determine the ease of falsification of a positive diagnosis for the disorder. The batteries used were the Wender Utah Rating Scale (WURS), the Brown Adult ADHD Scale (BAAS), the Conners Adult ADHD Rating Scale: Self-Report of Symptoms (CAARS:S:L), and the ADHD Rating Scale (ARS). Each of the four batteries was scored using its particular method.

The Wender Utah Rating Scale (WURS) quantified retrospective self-reports of childhood symptoms through 61 items scored using a five-point severity scale (zero to four). The test is divided into three sections concerning childhood symptoms, childhood medical history, and childhood educational history. The final score is made up of each section's subscore. A total score above 112 is considered a positive diagnosis.

The ADHD Rating Scale (ARS) consisted of 25 items that pertained to the three subgroups, attention, impulsivity, and hyperactivity, scored using a four point (zero to three) scale. In order to compute the attention subscore, the answers for the odd questions are added up. The total for the even questions makes up the hyperactivity/impulsivity subscore. The final score is obtained by adding the attention and hyperactivity/impulsivity subscores. A positive diagnosis is given to females scoring above a 22 and to males scoring above a 23.

The Brown Adult ADHD Scale (BAAS) was a 40 item self-reporting instrument scored on a four-point frequency scale (one to four), which focused on the difficulty of initiating and maintaining optimal arousal levels. This scale reveals impairments in the five clusters of executive functioning of the frontal lobe, which are activation, attention, effort, affect, and memory. Using the Quick Score sheets provided by The Psychological Corporation, the scores for the individual questions were placed in the appropriate cluster. A total score of 55 and above was considered a positive diagnosis. For the purpose of this experiment, a score between 40 and 55 was considered a negative diagnosis although scores in this area are normally considered as “probable, but not certain.”

The Conners Adult ADHD Rating Scale: Self-Report of Symptoms (CAARS:S:L) was a highly specific 64 item self-report, which is scored using a four point Likert Scale (one to four) presented in both intensity and frequency. The total score consists of eight subscores. These are inattention/memory problems, hyperactivity/restlessness, impulsivity/emotional liability, problems with self-concept, DSM-IV inattentive symptoms, DSM-IV hyperactive/impulsive symptoms, DSM-IV ADHD symptoms total, and ADHD index. Scores for the individual questions were placed in each category using the Quick Score sheets provided by Multi-Health Systems, Inc. The diagnosis was considered positive if the ADHD index score was above a 13 for males and an 11 for females.

## 2.4 Procedure

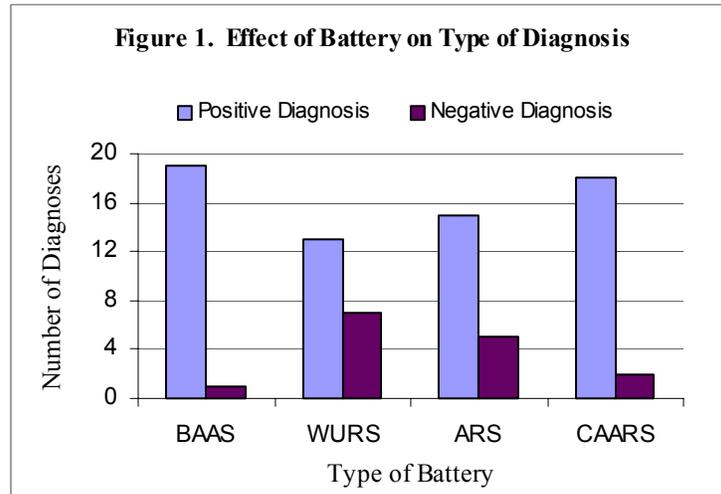
Each testing session consisted of up to eight participants at a time. The experimenter read a carefully outlined instruction sheet aloud to the participants at the beginning of the testing session. All of the participants were first shown a list of ADHD symptoms from the DSM-IV-TR and asked to remember as many of the disorder’s characteristics as possible. They were given 5 minutes to study the criteria. Participants were then randomly assigned to one of four commonly used batteries and told to complete them while pretending to be affected with the disorder. Each participant was given 55 minutes to complete this part of the task. At the end of the hour, the experimenter read a carefully outlined disclosure sheet informing the participants about the purpose of the study.

Each battery was scored using its particular method, and the number of positive and negative diagnoses was counted. The data was analyzed using an individual Z-test analysis of proportions, a comprehensive Chi-Square test for the effects of the battery, a Chi-Square test for the effects of gender, and a regression analysis to determine the individual factors that allowed for diagnosis falsification in each questionnaire.

## 3 Results

The number of positive and negative diagnoses for the ADHD Rating Scale (positive = 15, negative = 5), Brown Adult ADHD Scale (positive = 19, negative = 1), Conners Adult ADHD Rating Scale (positive = 18, negative = 2), and Wender Utah Rating Scale (positive = 13, negative = 7) are illustrated in Figure 1. To test the significance of these ratios, the data for each battery was individually analyzed using a Z-test analysis of proportions, with  $\alpha = .05$ . This analysis revealed that the ADHD Rating Scale,  $z(20) = 6.91, p < .001$ , the Brown Adult ADHD Scale,  $z(20) = 17.89, p < .001$ , the Conners Adult ADHD Rating Scale,  $z(20) = 12.28, p < .001$ , and the Wender

Utah Rating Scale,  $z(20) = 5.28, p < .001$ , were all significantly easy to fake. In other words, these scores are significantly different from the expected 100% negative diagnoses that should have been obtained by this particular population.



**Figure 1.** Number of positive and negative diagnosis for each type of battery. A total of 65 positive and 15 negative diagnoses were made.

To determine if one battery was easier to falsify than the others, the data was then analyzed using a four by two Chi-Square, with  $\alpha = .05$ . This analysis showed that the Wender Utah Rating Scale was significantly more effective in preventing a falsified diagnosis than the Brown Adult ADHD Scale and Conners Adult ADHD Rating Scale,  $\chi^2(3, N = 80) = 7.47, p < .05, \chi^2(1, N = 40) = 5.63, p < .025, \chi^2(1, N = 40) = 3.85, p < .05$ . Further analysis demonstrated a significant difference between the ADHD Rating Scale and the Brown Adult ADHD Scale as well,  $\chi^2(1, N = 40) = 3.84, p < .05$ . There was no significance in the ease of falsification between the ADHD Rating Scale and the Conners Adult ADHD Rating Scale,  $\chi^2(1, N = 40) = 1.56, ns$ , the ADHD Rating Scale and the Wender Utah Rating Scale,  $\chi^2(1, N = 40) = .48, ns$ , or the Conners Adult ADHD Rating Scale and the Brown Adult ADHD Scale,  $\chi^2(1, N = 40) = .36, ns$ .

As all scales were made up of various subscales pertaining to the different symptoms, a regression analysis was done on all four batteries individually in order to identify the factors that weigh in more heavily into the determination of diagnosis, with  $\alpha = .05$ , which will allow for exploration of the areas more likely to be used in diagnosis falsification. Analysis of the ADHD Rating Scale showed that hyperactivity accounted for 47% of the variance in the diagnosis,  $T = 4.02$ , and attention accounted for 34% of the variance,  $T = 3.04$ . Gender did not significantly account for any of the diagnosis variance.

Analysis of the Wender Utah Rating Scale illustrated that section I,  $T = 2.13$ , and section III,  $T = 5.33$ , were better determinants of a positive diagnosis than section II. The factor that accounted for the most variance in diagnosis was gender,  $T = -2.71$ .

Males were shown to have a higher probability of attaining a positive diagnosis than females.

When the Conners Adult ADHD Rating Scale was analyzed, it was shown that 83% of the variance was due to hyperactivity,  $T = 3.49$ , DSM-inattention symptoms,  $T = 2.90$ , and the ADHD index score,  $T = 5.06$ . Effort,  $T = 4.11$ , accounted for 50% of the diagnosis variance in the Brown Adult ADHD Scale. The results for these two scales are of little significance due to a very small number of negative diagnoses.

The data was also analyzed to see if one gender was better at falsifying a diagnosis than the other. The percentage of females (positive = 83.67%, negative = 16.33%) and males (positive = 80.65%, negative = 19.35%) was analyzed using a Chi-Square analysis, with  $\alpha = .05$ , which showed that the slight difference between the genders was not significant,  $\chi^2(1, N = 80) = .12$ , ns.

#### 4 Discussion

The results reveal a strikingly high ability of college students to falsify a positive ADHD diagnosis by way of a self-report battery: 75% of students taking the ADHD Rating Scale, 95% of students taking the Brown Adult ADHD Scale, 90% of students taking the Conners Adult ADHD Rating Scale, and 65% of students taking the Wender Utah Rating Scale. These findings are remarkably different from the 7 to 8% of the college population that has been reported previously to be affected by the disorder (Weyandt, et al., 1995). These results also reveal that all four batteries are significantly easy to fake. While the psychological tests used for child diagnosis are refined and well documented, the ease of diagnosis falsification of batteries developed for adults is a sign that further improvement of these scales is needed and a reliable adult scale has yet to be produced.

One purpose of this study was to compare the reliability of these four commonly used adult diagnostic batteries when subjects were deliberately attempting to feign a positive ADHD diagnosis. It was found that the Wender Utah Rating Scale is significantly more effective in preventing falsification of a diagnosis than the Brown Adult ADHD Scale. The ADHD Rating Scale also was found to be better than the Brown Adult ADHD Scale at preventing diagnosis falsification. It appears, then, that the batteries that were developed to be more specific for adult diagnosis are become more easily falsifiable as the incidence of internal symptoms become more prevalent. These symptoms may prove to be more difficult to quantify than the overt behaviors seen in children, even with a self-report battery.

The regression analysis for the ADHD Rating Scale revealed that the hyperactivity component played a larger role in determining a diagnosis than the inattention component. All other factors played insignificant roles in diagnosis determination. The importance of hyperactivity symptoms was further supported in the Conners Adult ADHD Rating Scale regression analysis, although there was a low number of negative diagnoses. This could be due to the fact that hyperactivity symptoms are more commonly associated with ADHD than are inattention symptoms, and they, therefore, would be of greater focus when creating and falsifying a behavioral rating scale.

While gender did not seem to influence the type of diagnosis received in the ADHD Rating Scale, the Brown Adult ADHD Scale, or the Conners Adult ADHD Rating

Scale, it is interesting to note that it was the primary factor in determining the diagnosis in the Wender Utah Rating Scale. Due to the fact that ADHD is three times more prevalent in males, it is a possibility that the battery was created with a slight bias toward common male responses.

The present findings have serious implications in the way college students are diagnosed. It has been found that treatment of ADHD is multidimensional. Academic support services facilitate adaptation to the college workload. Students with ADHD tend to benefit from services such as extended exam time, note-taking assistance, research assistance, and access to a technology research room (Heilingenstein & Keeling, 1995). These services are also desirable to students who are not affected by ADHD. In fact, it has been hypothesized that a possible cause for the sudden increase of ADHD cases in the college population could be due to the attractiveness of these services, particularly the additional time to complete class and admissions exams. The actual likelihood of the desire to falsify a diagnosis for this purpose would be an interesting area of future research.

Yet another popular thought on the possible cause of increase in adolescent ADHD is the popular prescription of the mild stimulant, methylphenidate, or more commonly known as Ritalin. Ritalin is the most widely prescribed drug for treatment of ADHD symptoms. Unfortunately, Ritalin is also among the top ten controlled pharmaceuticals most frequently reported stolen. Between May 1995 and January 1999, the DEA reported nearly 2,000 cases of Ritalin theft. The use of Ritalin as a recreational drug is not uncommon. According to a 1997 survey conducted at Indiana University, 7% of high school students surveyed reported using the drug recreationally at least once in the previous year, and 2.5% reported using it monthly or more often (Ziegler, 2000). Aside from the euphoric effects of the drug, students also use Ritalin as a study aid. It is widely known that the biological effects of Ritalin, increased blood flow to the frontal lobes, can help a student stay awake and maximize concentration, whether they suffer from ADHD or not (Diller, 2000).

The combination of academic support and Ritalin availability could provide enough motivation to cause students to attempt to falsify a positive ADHD diagnosis in order to take advantage of services offered to students with learning disabilities. This fact presents an alarming thought to those individuals who truly suffer from the disorder.

The present study raises several questions that should be addressed in further research. Because these diagnostic batteries have never been compared to each other, it would be helpful to have comparable data for a similarly sized sample of students that answer the questionnaires without deliberately trying to fake a diagnosis. A comparison of the two groups would give a better impression of the true misdiagnosis frequencies and ease of falsification of each battery.

The present study suggests that in order to ensure that services are only offered to those who truly require of them, the score obtained from the behavioral scale should be interpreted with more caution. Perhaps, a second form of diagnostic method should accompany the rating scale score in order to avoid the problem of students taking advantage of medication and school programs. The use of an interview by an expert should become mandatory, and not just an option for those who need to verbalize their symptoms for access to school services. Because symptoms of ADHD are individualized, it is important to know the extent of impairment caused by the symptoms. The results of the diagnostic batteries do not reveal these details, and therefore, do not indicate the appropriate treatment that is required by each patient.

The use of a second diagnostic method, like interview with an expert, will not only indicate the services needed for patients to achieve their full potential, but it will also diminish the rate of misdiagnosis and diagnosis falsification.

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### References

- American Association of Medical Colleges (AAMC). (2000, Sep.) MCAT frequently asked questions. *AAMC*. [On-line]. Directory: <http://www.aamc.org/stuapps/admiss/mcat/mcatfaqs.htm>
- American Psychological Association. (2000). Diagnostic and statistical manual of mental disorders (4<sup>th</sup> ed. Rev.). Washington, DC: APA.
- Arcia, E. & Conners, C.K. (1998). Gender differences in ADHD? *Journal of Developmental and Behavioral Pediatrics, 19*, 77 – 83.
- Baughman, F.A. (1998). The totality of the ADD/ADHD fraud. *ADHD Essays*. [On-line]. Directory: <http://home.att.net/~Fred-Alder/Es5.html>
- Brown, T.E. & Gammon, G.D. (1992). Attention-Activation Disorder in hi-IQ underachievers, ABS, Proceedings of American Psychiatric Association 145<sup>th</sup> Annual Meeting. Washington, DC.
- Brown, T.E. (1996). *Brown ADD Scales*. San Antonio, TX: The Psychological Corporation, Harcourt Brace & Company.
- Brown, T.E. (1995). Differential diagnosis of ADD versus ADHD in adults. In: Kathleen G. Nadeau, Ed. *A Comprehensive Guide to Attention Deficit Disorder in Adults: Research, Diagnosis, and Treatment*. Philadelphia, PA: Brunner/Mazel, Inc.
- California State University, Long Beach, Office of the Chancellor (CSU-LB). (1989). *Policy for the Provision of Services to Students with Disabilities*. [Brochure].
- Carey, W.B. (2001). Is Attention Deficit Hyperactivity Disorder a valid disorder? *Attention Deficit Disorder*. [On-line]. Directory: <http://add.about.com/health/add/library/weekly/aa119b.htm>
- Conners, C.K. (2000). Attention Deficit Hyperactivity Disorder: Historical development and overview. *Journal of Attention Disorders, 3*, 173 – 191.
- Conners, C.K., Erhardt, D., Epstein, J.N., Parker, J.D.A, Sitarenios, G. & Sparrow, E. (1999). Self-Ratings of ADHD symptoms in adults: I. Factor structure and normative data. *Journal of Attention Disorders, 3*, 141 – 151.
- Conners, C.K., Erhardt, D. & Sparrow, E. (1998). *Conners' Adult ADHD Rating Scales (CAARS): ADHD Across the Life Span*. Toronto, ON: Multi-Health Systems, Inc.

- Conners, C.K. & Jett, J.L. (1999). *Attention Deficit Hyperactivity Disorder (in adults and children)*. Kansas City, MO: Compact Clinicals.
- Conners, C.K. Wells, K.C., Parker, J.D.A., Sitarenios, G. Diamond, J.M. & Powell, J. (1997). A new self-report scale for assessment of adolescent psychopathology: Factor structure, reliability, validity, and diagnostic sensitivity. *Journal of Abnormal Child Psychology*, 25, 487 – 497.
- Diller, L.H. (2000). Extreme Ritalin. *Salon.com* [On-line] Directory: <http://www.salon.com/health/feature/2000/03/31/ritalin/print.html>
- Downey, K.K. Stelson, F.W., Pomerleau, O.F. & Giordani, B. (1997). Adult Attention Deficit Hyperactivity Disorder: Psychological tests profiles in a clinical population. *Journal of Nervous and Mental Disease*, 185, 32 – 38.
- DuPaul, G.J., Power, T.J., Anastopoulos, A.D., & Reid, R. (1998). *ADHD Rating Scale IV: Checklists, Norms, and Clinical Interpretation*. New York, NY: The Guilford Press.
- DuPaul, G.J., Power, T.J., McGoey, K.E., Ikeda, M.J., & Anastopoulos, A.D. (1998). Reliability and validity of parent and teacher ratings of Attention Deficit Hyperactivity Disorder symptoms. *Journal of Psychoeducational Assessment*, 16, 55 – 68.
- Educational Testing Service. (2000, June). Information about testing accommodations. *Ets.org*. [On-line]. Directory: [www.ets.org](http://www.ets.org)
- Erhardt, D., Epstein, J.N., Conners, C.K., Parker, J.D.A. & Sitarenios, G. (1999). Self-Ratings of ADHD symptoms in adults: II. Reliability, validity, and diagnostic sensitivity. *Journal of Attention Disorders*, 3, 153 – 158.
- Fornadel, W.M. & Taylor, A.L. (1994). Americans with Disabilities Act of 1990: Organization, compliance, and concern in higher education. *ERIC Clearinghouse on Disabilities and Gifted Education*. [On-line]. Directory: <http://ericae.net/ericdb/ED373627.htm>
- Gilger, J.W., Pennington, B.F. & DeFries, J.C. (1992). A twin study of etiology of comorbidity: Attention Deficit Hyperactivity Disorder and Dyslexia. *Journal of the American Academy of Child and Adolescent Psychiatry*, 31, 343 – 348.
- Graduate Records Examinations. (2000, Oct.). Registration procedures for test takers with disabilities. *GRE.org*. [On-line]. Directory: [www.gre.org/disatest.htm](http://www.gre.org/disatest.htm)
- Hallowell, E.M. (1995). *Psychotherapy of adult attention deficit disorder*. In: Kathleen G. Nadeau, Ed. A comprehensive guide to attention deficit disorder in adults: Research, diagnosis, and treatment. Brunner/Mazel, Inc: Philadelphia, PA, 146-167.
- Heilingenstein, E. (2000). College students and the diagnosis of Attention Deficit Hyperactivity Disorder. *Journal of American College Health*, 49, 47-48.
- Heilingenstein, E., Guenther, G. Levy, A., Savino, F. & Fulwiler, F. (1999). Psychological and academic functioning in college students with Attention

- Deficit Hyperactivity Disorder. *Journal of American College Health*, 47, 181 – 185.
- Heilingenstein, E. & Keeling, R.P. (1995). Presentation of unrecognized Attention Deficit Hyperactivity Disorder in college students. *Journal of American College Health*, 43, 226 – 228.
- Kendall, P.C. & Hammen, C. (1998). *Abnormal Psychology: Understanding Human Problems*. Boston, MA: Houghton Mifflin Company.
- Kubose, S. (2000). Challenges and controversies in diagnosing adult ADHD, Symposium Report, 46<sup>th</sup> Annual Meeting of the American Academy of Child and Adolescent Psychiatry, Chicago.
- Law School Admissions Council (LSAC). (2000). Accommodated testing. *LSAC*. [On-line]. Directory: [www.lsac.org/accommodated-testing.asp](http://www.lsac.org/accommodated-testing.asp).
- McCann, B.S., Schelle, L., Ward, N. Roy-Byrne. P., Anton., R.F., Beck, C.T., et al. (2000). Discriminant validity of the Wender Utah Rating Scale for Attention Deficit Hyperactivity Disorder in Adults. *Journal of Neuropsychiatry and Clinical Neuroscience*, 12, 240 – 245.
- Newcorn, J.H., Halperin, J.M., Jensen, P.S., Abikoff, H.B., Arnold, E., Cantwell, D.P., et al. (2001). Symptom profiles in children with ADHD: Effects of comorbidity and gender. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40, 137 – 146.
- O’Leary, K.D. (1980). Pills or skills for hyperactive children. *Journal of Applied Behavioral Analysis*, 13, 191 – 204.
- Power, T.J. & Ikeda, M.J. (1996). The clinical utility of behavior rating scales: Comments on the diagnostic assessment of ADHD. *Journal of School Psychology*, 34, 379 – 385.
- Rehabilitation Act of 1973, As Amended Through 1998. (1998). *ERIC Clearinghouse on Disabilities and Gifted Education*. [On-line]. Directory: <http://ericec.org/sect504.htm>
- Reid, R., Riccio, C.A., Kessler, R.H., DuPaul, G.J., Power, T.J., Anastopoulos, A.D., et al. (2000). Gender and ethnic differences in ADHD as assessed by Behavior Ratings. *Journal of Emotional and Behavioral Disorders*, 8, 38 – 48.
- Regents of University of California. (2000, Sep). OSD Student Handbook. *The University of California – Office of Students with Disabilities*. [On-line]. Directory: <http://128.97.143.3/osd/docs/Handbooks/OSDStudent.htm>
- Regents of University of California. (2000, Sep). Guidelines for the assessment and accommodation of students with Attention Deficit Disorder. *The University of California – Office of Students with Disabilities*. [On-line]. Directory: <http://128.97.143.3/osd/docs/Guidelines/ucdssadd.htm>
- Rossini, E.D. & O’Connor, M.A. (1995). Retrospective self-reported symptoms of Attention Deficit Hyperactivity Disorder reliability of the Wender Utah Rating Scale. *Psychological Reports*, 77, 751 – 754.

- Rutter, M. (1977). Brain damage syndromes in childhood: Concepts and findings. *Journal of Child Psychology and Psychiatry*, 139, 21 – 33.
- Sturme, P., Reed, J., Corbett, J. (1991). Psychometric assessment of psychiatric disorders in people with learning difficulties (mental handicap): A review of measures. *Psychological Medicine*, 21, 143 – 155.
- The College Board. (2000, Dec.). SAT services for students with disabilities. *The College Board*. [On-line]. Directory:  
<http://www.collegeboard.org/sat/html/students/reg003.html>
- University of Texas, Dallas (UTD). (2000). *UTD Administrative Policies and Procedures Manual*, D11 – 1950. [Brochure].
- Ward, M.F., Wender, P.H., & Reimherr, F.W. (1993). The Wender Utah Rating Scale: An aid in the retrospective diagnosis of childhood Attention Deficit Hyperactivity Disorder. *American Journal of Psychiatry*, 150, 885 – 889.
- Weiss, M., Murray, C., Weiss, G. (2002). Adults with attention-deficit/hyperactivity disorder: Current concepts. *Journal of Psychiatric Practice*, 8, 99 – 111.
- Wender, P.H., Reimherr, F.W. & Wood, D.R. (1981). Attention Deficit Disorder in adults: A replication study of diagnosis and treatment. *Archives of General Psychiatry*, 38, 449 – 456.
- Wender, P.H., Ward, M.F., Reimherr, F.W., & Marchant, B.K. (2000). ADHD in adults. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 543.
- Wender, P.H. (1995). *Attention Deficit Hyperactivity Disorder in Adults*. New York: Oxford University Press.
- Wender, P.H. (1998). Attention Deficit Hyperactivity Disorder in adults. *Psychiatric Clinics of North America*, 21, 761 – 774.
- Weyandt, L.L., Lintermann, I. & Rice, J.A. (1995). Reported prevalence of Attention Difficulties in a general sample of college students. *Journal of Psychopathology and Behavioral Assessment*, 17, 293 – 304.
- Zametkin, A.J., Liebenauer, L. L. & Fitzgerald, G. A. (1993). Brain metabolism in teenagers with Attention Deficit Hyperactivity Disorder. *Archives of General Psychiatry*, 50, 333 – 340.
- Ziegler, N. (2000). Recreational Ritalin. *The Associated Press*. [On-line]. Directory:  
<http://abcnews.go.com/sections/living/DailyNews/ritalin0505.html>

## **The man, the key, or the car: Who or what is parked out back?**

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### **Abstract**

Nunberg (1995) has identified two types of metonymic constructions with different linguistic properties: predicate transfer and deferred indexical reference. In this paper, we describe these types of metonymies within the context of cognitive grammar (Langacker, 1999), mental space theory (Fauconnier, 1994), and blending theory (Fauconnier & Turner, 2002). Using concepts from cognitive grammar, we show how principles of cognitive salience and mental access explain the different types of metonymic relations. We argue that different types of mental access produce different types of integration in blended spaces.

### **1 Introduction**

It is quite common in everyday language to hear sentences like (1) "I am parked out back" or (2) "He has a Picasso in his den". We can also easily imagine a situation where a waitress, speaking about a customer, says: (3) "The ham sandwich is at table 7" or a situation where a customer hands his key to an attendant at a parking lot and says: (4) "This is parked out back". All these expressions, (1)-(4), employ the mechanism of metonymy.

Below we briefly review the treatment of metonymy in cognitive linguistics, contrasting it with the more referential treatment given by Nunberg (1995). Adapting conceptual integration or conceptual blending theory (Fauconnier and Turner: 1996, 1998, 2002; Turner and Fauconnier, 1999), we suggest that metonymy involves conceptual blending between the concept evoked by the trigger term (such as "Picasso" in (2)), and that evoked by the intended target (the particular piece of art referred to in the den in (2)). Following Langacker (1999), we suggest that metonymy is a reference point construction and note that certain kinds of metonymies rely more heavily on context for their efficacy, and that this context-dependence is marked by definitive linguistic properties, and may affect the extent of trigger-target blending that occurs in a given metonymic expression.

## 2 Metonymy as a Referential Phenomenon

Though recognized as an important phenomenon, metonymy has typically taken a back seat, so to speak, to her big sister metaphor. While the cognitive import of metaphor has long been appreciated (Lakoff & Johnson, 1980), metonymy has typically been viewed chiefly as a referential phenomenon in which one entity is used in order to refer to another entity. Lakoff & Turner (1989), for example, underline that in metaphor a whole schematic structure – the source domain – is mapped onto another, the target domain. Metonymy, on the other hand, involves only one conceptual domain (mapping occurs within a single domain, not across domains) and is used primarily for reference. “Via metonymy, one can refer to one entity in a schema by referring to another entity in the same schema” (Lakoff & Turner, 1989: 103).

This point can be illustrated by Lakoff & Johnson’s (1980) examples repeated here in (5) and (6).

(5) Inflation robbed me of my savings.

(6) The ham sandwich is waiting for his check.

Although the metaphoric use of *inflation* in (5) involves the attribution of human qualities to an abstract entity, it does not involve reference to a person. In contrast, Lakoff & Johnson suggest that *ham sandwich* in (6) actually refers to the person who ordered the ham sandwich, but does not involve the attribution of human qualities to the sandwich. For Lakoff & Johnson, then, the defining characteristic of metonymy is referential, as metonymy fundamentally involves the use of one entity to refer to another, related entity.

Even though Lakoff & Johnson conceive of metaphor as having primarily a function of understanding (a way of conceiving of one thing in terms of another) and metonymy as having primarily a referential function (it allows us to use one entity to stand for another), they also point out that metonymy is not merely a referential device, but provides understanding (Lakoff & Johnson, 1980: 36). To explain their position, they provide a very insightful analysis of some examples of metonymy:

Metonymic concepts allow us to conceptualize one thing by means of its relation to something else. When we think of *a Picasso*, we are not just thinking of a work of art alone, in and of itself. We think of it in terms of its relation to the artist, that is, his conception of art, his technique, his role in art history, etc. We act with reverence toward *a Picasso*, even a sketch he made as a teen-ager, because of its relation to the artist. This is a way in which the PRODUCER FOR PRODUCT metonymy affects both our thought and our action. Similarly, when a waitress says “The ham sandwich wants his check,” she is not interested in the person as a person but only as a customer, which is why the use of such a sentence is dehumanizing. Nixon himself may not have dropped the bombs on Hanoi, but via the CONTROLLER FOR CONTROLLED metonymy we not only say “Nixon bombed Hanoi” but also think of him as doing the bombing and hold him responsible for it. Again this is possible because of the nature of the metonymic relationship in the CONTROLLER FOR CONTROLLED metonymy, where responsibility is what is focused on (Lakoff & Johnson, 1980: 39).

We quoted this passage at length *because* it highlights the emergence of new meaning that metonymical expressions produce. However, even though Lakoff & Johnson, by looking at specific examples, acknowledge that the function of metonymy is not only referential, their model, which is based on mappings between two domains, cannot adequately explain this phenomenon. We believe that the conceptual dimensions of metonymy *are* best captured by conceptual integration or blending theory.

### 3 Picasso, Nixon, and Emergent Meaning

Conceptual integration operates over mental spaces as inputs and makes use of a four-space model. These spaces include two input spaces plus a generic space, representing conceptual structure that is shared by both inputs, and the blended space, where material from the inputs combines and interacts. The blend inherits partial structure from the input spaces, and has emergent structure of its own through processes of pattern completion and elaboration, a form of mental simulation. Blending is an on-line, real-time process that creates new meaning through the juxtaposition of familiar material. Inferences, arguments, and ideas developed in the blend can lead us to modify the initial inputs and to change our view of the corresponding situations.

Blending theory suggests metonymy is more than a referential phenomenon, but rather a creative mechanism for meaning construction that can provide novel insights into the discourse situation. Consider the three metonymic expressions (7)-(9) from the previous quote (Lakoff & Johnson, 1980).

(7) The ham sandwich wants his check.

(8) He's got a Picasso in his den.

(9) Nixon bombed Hanoi.

The conceptual integration network to represent (8) involves two input spaces: a Pablo Picasso space, and a Picasso's art space. In each mental space there are elements that represent each of the discourse entities. In the Pablo Picasso space, an element is set up to represent "Picasso as artist". Furthermore, this element can be connected to various sub-elements in background knowledge, like Picasso's conception of art, his technique, his role in art history, etc. In the Picasso's art space, there is an element that represents the particular work of art referred to in (8). The network is further built by the establishment of particular mappings between cognitive models in different spaces: there is a mapping between Picasso as artist from the mental space of Pablo Picasso and the element that represents the work of art in the mental space of Picasso's art. This particular mapping produces the metonymic relationship whereby the producer is connected with his product and licenses the metonymic reference through the producer to the product.

However, in order to explain the complete meaning of the expression in (8), we have to refer to the third mental space, the blended space, in which elements from the inputs are combined to yield emergent structure (Figure 1). The elements from both spaces are selectively projected to the blended space. Even though there might be other elements in the input spaces, such as Picasso as member of Communist party in the Pablo Picasso's mental space or *Guernica* in the Picasso's art space, those elements are not projected to the blended space. The emergent meaning, built through the amalgam of Picasso's conception of art, his technique, his role in art history

(derived from the element Picasso as artist in the input space 1) and the work of art (projected from the input space 2), produces the idea of importance of this particular work of art through its relationship to the artist. So the meaning of “a Picasso” in (8) is not just its referent – the work of art in and of itself as in the second input – but the conception of the work of art in terms of the artist. The cause (the artist) and the effect (the work of art) have been compressed in the blend so that our reaction to the piece is intimately intertwined with our reverence for the artist.

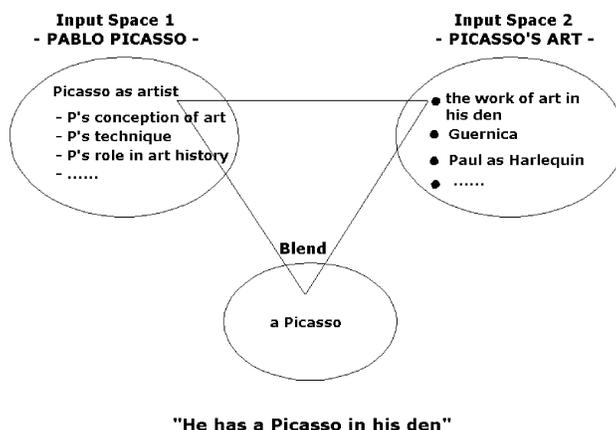


Figure 1

The metonymy in (9) can be analyzed in very similar fashion. In this expression, we have Nixon as input space 1 and US Air Force as input space 2. Nixon as US president from input space 1 is connected with the US Air Force in input space 2. The blended space allows us to say that not only did the US Air Force bomb Hanoi, but that Nixon was personally responsible for it. At the same time, because this is a metonymy, we are not fooled into inferring that Nixon himself dropped the bombs on Hanoi – even though we are dealing with a compressed item, we can decompress it and retrieve the initial inputs to the blend. In this case, the metonymy provides us with a compression at human scale: while we have a hard time understanding how to attribute responsibility to a corporate entity such as the U.S. Air Force, responsibility frames attach readily to individuals. To account for this amalgam of meaning, constructed with selected elements from two mental spaces, we necessarily need a model with an additional mental space that contains emergent structure of its own.

Analysis of metonymy in blending theory thus echoes recent research in metonymy that suggests the inadequacy of viewing metonymy strictly as a referential phenomenon (Panther & Radden, 1999; Barcelona, 2000). Metonymy cannot be explained only in terms of referential function, since its mechanism allows us to do more than just use one entity to stand for another. The question that we face now is one pertaining to the generalizability of the model. Do all metonymies function according to the same principles? (What about the expressions in our initial examples (3) and (4) – do they follow the principles that govern examples (1) and (2)?) And, if not, is the blending model applicable to all types of metonymies? In order to start answering those questions, we will first briefly review Geoffrey Nunberg's distinction between different types of metonymies.

#### 4 Deferred Indexical Reference vs. Predicate Transfer (and Occurrent Metonymy)

Nunberg (1995) describes metonymy as a "transfer of meaning," defined as an "ensemble of productive linguistic processes that enable us to use the same expression to refer to what are intuitively distinct sorts or categories of things" (Nunberg, 1995:1). In his opinion, transfer cannot be adequately explained in terms of the conceptual relationship that metonymy exploits: transfers are linguistic processes. In order to stress the difference between rhetorical figures (such as metonymy) and the linguistic mechanisms (such as transfer of meaning), Nunberg distinguishes between two different kinds of transfer: *deferred ostension* or *deferred indexical reference* and *predicate transfer*. To comprehend the difference between these two kinds of transfers, consider again the situation in which a customer hands his key to an attendant at a parking lot and says either (1) or (4).

(1) I am parked out back.

(4) This is parked out back.

According to Nunberg, (1) and (4) exploit the same metonymic conceptual relations, but are governed by two different linguistic mechanisms. Nunberg suggests that (1) is a case of *predicate transfer*, while (4) is a phenomenon he calls *deferred indexical reference*. The chief difference between these two sorts of metonymies is that in predicate transfer, the subject of the sentence refers to the stated NP, or *trigger*, ("I" in (1)); while in deferred indexical reference, the subject of the sentence refers to the *target*, or intended referent (the car). As evidence for his claim, Nunberg notes that the two sorts of metonymies also differ with respect to other linguistic properties in a way that suggests a closer (linguistic) alignment of predicate transfer metonymies with the metonymic trigger term, and deferred indexical reference with the intended target. Referential differences are thus manifested by a number of grammatical differences, including the gender marking of the metonymic term's modifiers, the sorts of predicates that can be conjoined, and the possibility of replacing the metonymic term with a definite description.

For example, in languages that mark words for grammatical gender, gender marking is appropriate for the trigger in predicate transfer metonymies, and for the target in deferred indexical reference. Thus in an Italian translation of (1), a male speaker can say "*Io sono parcheggiato dietro.*" In this sentence the word *parcheggiato*, (parked), is a masculine adjective appropriate for the subject of the sentence (male speaker), even though the Italian word for car (*la macchina*) is feminine. In contrast, with deferred indexical reference, the gender marking on the predicate is appropriate for the target referent. In Italian, a customer holding up a key and referring to his truck can say: "*Questo è parcheggiato in dietro.*" Even though, the Italian word for key (*la chiave*) is feminine, the adjective is masculine (*parcheggiato* vs. *\*parcheggiata*) because it is appropriate for the word truck (*il camion*), which is masculine.

Similarly, with predicate transfer, we can conjoin another predicate that describes the trigger, as in (11), but not always one that describes the target, as in (12).

(11) I am parked out back and have been waiting for 15 minutes.

(12) \*I am parked out back and may not start.

By contrast, in deferred indexical reference, we can conjoin another predicate that describes the car, as in (13), but not the key, as in (14).

(13) This is parked out back and may not start.

(14) ??This fits only the left front door and is parked out back.

Similarly, the metonymic NP can be replaced with a description of the trigger in predicate transfer in (15), but not in the deferred indexical reference in (16).

(15) The man with the cigar is parked out back.

(16) \*The key I'm holding is parked out back.

Nunberg also discusses *occurrent metonymies*, as in (3) and the very similar case in (7), in which metonymic reference is possible only in a restricted range of situations. For example, *ham sandwich* is a useful identifier in the context of the restaurant, but not outside of it. Although he notes that *occurrent metonymy* depends on the availability of specialized context, Nunberg includes *occurrent metonymy* in the category of predicate transfer.

However, linguistically, *occurrent metonymies* behave more like deferred indexical reference than predicate transfer. As in indexical reference, in *occurrent metonymies* gender is appropriate for the target referent, not the trigger. For example, if the client who ordered a ham sandwich is a woman, we can say in Italian:

(17) Il panino al prosciutto se ne andata/\*andato senza pagare.

In this example, even though the word for sandwich is masculine, *il panino*, the predicate is feminine, agreeing with the target. Further, as in deferred indexical reference, *occurrent metonymies* conjoin with other predicates that apply to the target (as in (18)), but not the trigger (as in (19)).

(18) The ham sandwich wants his check and is really getting annoyed.

(19) \*The ham sandwich wants his check and has too much mustard on it.

But, like predicate transfer, the metonym in an *occurrent metonymy* can be replaced with an alternative description of the trigger. For example, if the ham sandwich is referred to on the menu as *The Porky Special*, one could substitute "*The Porky Special*" for "The ham sandwich" in (3) and (7). *Ocurrent metonymies* can thus be seen as differing somewhat from both cases of deferred indexical reference and from predicate transfer.

In summary, Nunberg's analysis highlights three different types of metonymies: deferred indexical reference, predicate transfer, and *occurrent metonymies*. However, Nunberg argues that the description of the mechanisms of transfers of meaning is fundamentally a *linguistic* problem and that the difference between these examples does not depend on the kind of relations these examples exploit. In all the cases there are correspondences between the things in one domain (cars, trucks, sandwiches, etc.) and the things in another domain (keys, drivers, restaurant customers, etc.). According to Nunberg, conceptual analysis cannot provide any adequate explanation of these phenomena.

... unlike rhetorical classifications like metaphor and metonymy, the various mechanisms of transfer can't be distinguished simply by

pointing at the types of correspondences they exploit. And, for this reason, the description of these mechanisms is fundamentally a linguistic problem, rather than a problem of conceptual analysis. That is, there is nothing we can learn about keys, drivers, or cars that will help us to explain the differences between examples like (1) ["This is parked out back,"] and (2) ["I am parked out back,"] (Nunberg, 1995: 3).

Below we consider whether the linguistic differences Nunberg illustrates mark conceptual differences in meaning evoked by various sorts of metonymic expressions.

## 5 Cognitive Reference Points

We believe that one difference between Nunberg's different cases of metonymy is motivated by cognitive principles of *relative salience*. Cognitively salient items can be defined as *cognitive reference points* (Langacker, 1991). The basic idea is that central highly prominent items act as cognitive reference points to evoke other less salient ones. A conceptualizer (the speaker or addressee) enters into mental contact with an entity against the background provided by other elements in the conception. A reference point is an element that is prominent in the discourse and consequently sets up the contexts within which the conceptualizer can enter in the contact with other less prominent entities in the discourse. These entities can be said to be in the dominion of the reference point and their construal depends on their association with the reference point.

Moreover, Langacker argues that metonymy is basically a reference point phenomenon (1999). The entity that is normally designated by a metonymic expression serves as a reference point affording mental access to the desired target (i.e. the entity actually being referred to), and directing the addressee's attention to it. For example, in the predicate transfer metonymy in (1), the owner of the car plays the role of the reference point, while in the deferred reference metonymy (4), the keys are the reference point. In both examples, the target of attention is the car. We mentally access the car through either the owner in (1), or the key in (4). The owner and the key, by being sufficiently salient, can direct our attention towards the intended target and hence play the role of cognitive reference points.

Among the factors that can make an entity suitable to serve as a metonymic reference point are certain *principles of cognitive salience*. For example, human entities are more salient than nonhuman (20), wholes are more salient than parts (21), concrete entities are more salient than abstract ones (22), and visible entities are more salient than invisible ones (23) (Langacker, 1999: 199).

(20) Schwarzkopf defeated Iraq.

(21) The car needs washing.

(22) Having one's hands on something (for controlling something)

(23) Save one's skin (for save one's life).

(Radden & Kovecses, 1999)

Consequently, we suggest that the difference between examples (1) and (4), can be better understood by adapting Langacker's proposal of the reference point phenomenon. While in the case of predicate transfer we are following principles of cognitive salience where the reference point is a human being, (the owner) who is more salient than non-human entities (the car). On the other hand, the cases of deferred indexical reference, and occurrent metonymy, involve what Langacker calls a *skewed salience relationship*, in which specific circumstances induce the skewing of salience relationships. In cases of deferred indexical reference, the salience of items in the immediate context can override the default hierarchy that obtains under neutral conditions. In (1), for example, we might consider the car to be more salient than its key outside of a particular context. However, in this specific circumstance, the key, because of its immediate presence, assumes a more salient role that enables it to serve as the reference point for the metonymic expression. Similarly, occurrent metonymies are effective precisely because of the particularized salience relationships in the context. For example, in a restaurant setting, waiters usually know almost nothing about the restaurant clients, except for the food they ordered. Consequently, when they have to mention a particular client, the food ordered suggests itself as an obvious reference point.

The principles of cognitive salience point to the fact that the way in which we build metonymical expression is not arbitrary but linked to the way in which we perceive and conceptualize the world<sup>1</sup>. While examples of predicate transfer follow the principles of cognitive salience, occurrent metonymies and indexical reference do not. However, they are constrained by specific circumstances. For, example, the metonymy in (4) is constrained by the fact that we cannot just arbitrarily substitute keys from this example with any other part of the car, such as the carburetor. But, in different circumstances, such as with a mechanic in the garage, we might be able to point to the carburetor in order to refer to the car it belongs to.

This is linked to the further point that, semantically, in the context of the example (1), the function of the key isn't simply a referential one. Consider (4) in the sense of its paraphrase:

(24) The car is parked out back.

Both (4 and 24) describe the same type of situation and have the same truth conditions. Yet their interpretations are not quite the same. In (4) what is conveyed is not only that the car is in some location, but that the key is of particular importance for the action of the parking lot attendant (for similar discussion of the sentence "I am bugged" vs. "The place I am staying is bugged" see Warren, 1999). In addition to serving as a pointer to the car, the key is brought to the attention of the parking attendant in order to highlight the action that the parking lot attendant needs to perform: unlock the car, start it, and drive it to the entrance. Hence the owner is speaking neither only about the car, nor only about the key, but about both of those entities as relevant for that particular situation and for the actions that need to be performed.

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<sup>1</sup> The other point that highlights the fact that the metonymical expressions are not arbitrary is the systematicity of such concepts. Metonymies should not be conceived as isolated instances. The idea that the specific examples of metonymies are instances of certain general metonymic concepts in terms of which we organize our thoughts and action has been pointed out by Lakoff and Johnson, 1980 and Radden & Kovecses, 1999, among others.

This difference in meaning between sentence (4) and (24), where (24) is characterized by additional emergent meaning, indicates that an adequate analysis of deferred indexical reference metonymies requires a conceptual integration network that contains a blended space. As already stated, we believe that the existence of this emergent meaning is pivotal for the explanation of the way in which metonymy functions and should be analyzed by referring to the theory of conceptual integration.

## 6 Blending and Predicate Transfer

In the initial parts of the text, we analyzed Lakoff & Johnson's examples (8) and (9) in terms of conceptual blending. The emergent meaning that these examples present can be accounted for in terms of blending theory. After the illustration of Langacker's proposal of conceiving metonymy as a reference point phenomenon, we see that the metonymies from (8) and (9) both follow Langacker's principle of cognitive salience - human entities are more salient than nonhuman. A conceptualizer enters mentally into contact with Picasso/Nixon against the background provided by other elements in the conception - Picasso's art/US Air Force space. Picasso as artist/Nixon as US president are prominent within the discourse and so serve to set up the contexts within which the conceptualizer can enter in the contact with other entities less prominent in the discourse - a particular piece of Picasso's art work/specific members of US Air Force directly involved in bombing Hanoi. The construal of the entities referred to depends on their association with the reference point entity (Picasso as artist/Nixon as US president). This construal of new meaning is relative to the conceptual processing in the blended space.

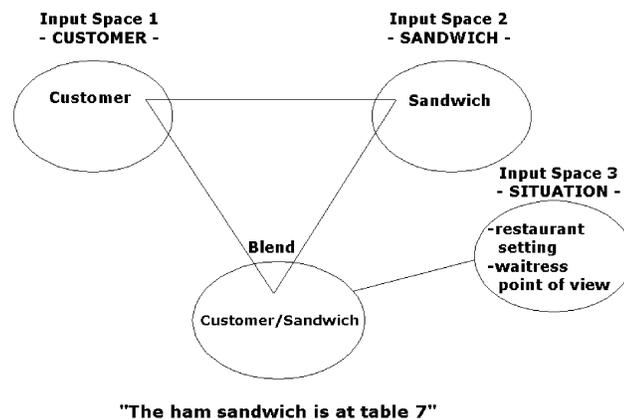


Figure 2

Because these metonymies (8 and 9) follow the principle of cognitive salience - human entities are more salient than nonhuman - they belong to Nunberg's category of predicate transfer. Thus, their conceptual integration networks are very similar to the conceptual integration network built for sentence (1) (Figure 2). The blended space for example (1) contains selected aspects of structure from each input space: a man (say Mr. McDowell) as the owner of the car from the input space 1 and a car (say a black Mercedes) from input space 2. The emergent meaning in the blended space

provides the construal of the black Mercedes as the car that Mr. McDowell owns and the construal of Mr. McDowell as the owner of the car.

The new structure present in the blended space can influence the original inputs in many interesting ways. For example, our culture does not lack stereotypes where owners of cars are conceived with respect to their cars; and the properties of the car, such as being powerful or sporty, are often attributed to its owner. It is also quite common to speak of cars as animate beings, as when we speak of two cars as “racing,” or refer to a car on the highway as being “aggressive.”

Because the blended space provides such a strong compression between the owner and the car, we are able to produce many fantastic conceptualizations whose entrenchment renders them virtually invisible. For example, an owner of a car involved in an accident can say:

(25) I was hit in the fender.

In fact, he can assert the same utterance in a situation where he wasn't the one driving his car or he wasn't even present at the time of accident. In this case the conceptualizing is not in terms of mappings between the owner's body and the car; what we are dealing here with is something quite strange like one distributed entity which blends together the owner and the car. This new entity lives only in the blend and has properties which can occasionally contradict the initial input spaces.

Similarly, we can imagine somebody saying:

(26) I need to walk to where I am parked.

In this case we are dealing with an entity present in two different spatial locations at the same time. This is possible because the first and the second "I" in the sentence are not identical: the same lexical item is used to refer to different mental spaces. The first "I" is the "I" from the input space, while the second "I" is the "I" from the blended space that contains emergent structure on its own (the "carman"). This second "I" does not refer only to the speaker, as its standard definition states, but acquires new emergent meaning and has no well defined entity in the world to which it refers.

In the “carman” blend, the blended space can draw more heavily from the car input space (input 2), like in (25), or from the human input space (input 1,) like in (26), where one can say, when observing two cars chasing each other on the highway:

(27) That red Mercedes seems to be angry with that old Toyota.

Again, in this case we are not necessarily attributing human entities to a car as we were not attributing car's properties to a man in (26), but we are speaking about a hybrid carman entity. In a similar way we can also imagine a situation where we in just one sentence switch from the conceptualization where the blended space draws more heavily from the human input to a conceptualization that draws predominantly from the car input, as in (28a):

(28a) Look, that red Mercedes is so aggressive -- that's probably why its fender is dented.

A variation of this sentence is exemplified in (28b), where by substituting the pronoun "its" with the pronoun "his" the switch from drawing heavily from the input space 1 (human) to drawing heavily from the input space 2 (car) is no longer present:

(28b) Look, that red Mercedes is so aggressive -- that's probably why his fender is dented.

The fact that the blended space includes partial structure from each of the inputs as well as emergent structure of its own is well illustrated in the Coulson & Oakley "Coke" metonymy example (2003). Coulson & Oakley have provided a blending analysis of the expression "Coke flows past forecasts: soft drink company posts gains", where the predication "flows past forecasts" is an appropriate metaphoric predication for the Coca Cola corporation's profit and, at the same time, an appropriate literal predication for the signature product of that corporation. Hence, the metonymy produces an emergent meaning in the blended space where "Coke" is construed simultaneously as a corporation and as the soft drink that corporation produces. All this and similar cognitive acrobatics are possible because of the structure built in the blended space.

## 7 Disposable Blends

What about example (3&7)? Lakoff & Johnson (1980) point out its similarity with other examples of metonymy: this metonymy, by accessing the person through the ham sandwich, construes that person as a customer who ordered the ham sandwich. The conceptual integration network contains a person input space and the ham sandwich input space; the blended space contains the restaurant customer who ordered a ham sandwich. However, as examples (17)-(19) show, this expression of occurrent metonymy behaves a lot like indexical reference (although they are not completely identical). Occurrent metonymy and indexical reference work by skewing principles of cognitive salience: in both (4) and (3&7) a conceptualizer is mentally accessing cognitively less salient elements through cognitively more salient elements. This condition is reflected at the linguistic level where language marks the fact that the predicate does not agree with the trigger NP, but rather its intended target. How can a conceptual integration network account for this phenomenon?

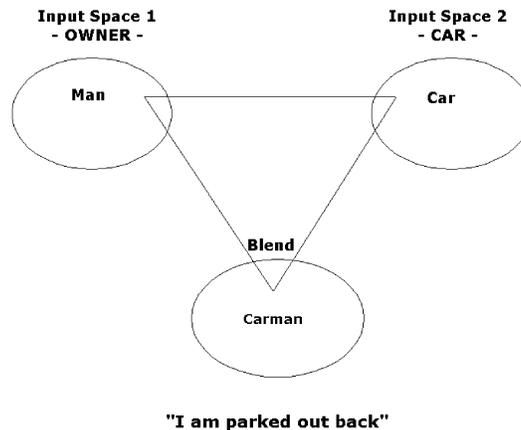


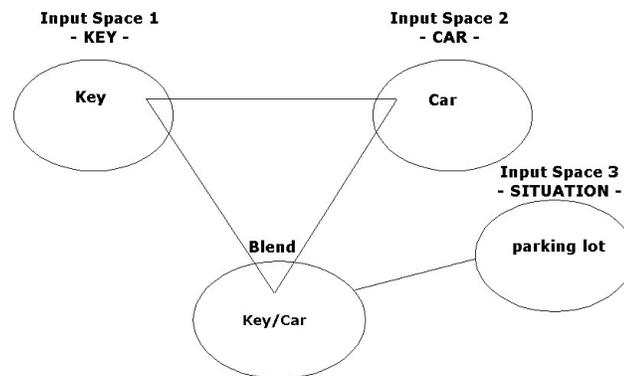
Figure 3

It might be tempting to propose that in the case of occurrent metonymies and indexical reference there is no need to postulate a third blended space: the explanation

for these metonymies can be given in terms of mappings between input spaces. In (3&7) the expression "ham sandwich" is used to refer to the restaurant customer who ordered a ham sandwich, and in (2) the expression "keys" is used to direct our attention towards the car. This proposal is consistent with the fact that the occurrent metonymy and deferred indexical reference tend not to get entrenched in the language. It seems as if they do not build a mental space that can then be extended to other circumstances.

However, as previously discussed, in (4) the trigger NP (the key) not only points to the car, but also alerts the parking attendant to the action he needs to perform. Similarly, the trigger NP of (17) (the ham sandwich) is not only used to refer to a particular person, but for the restaurant waiter, it construes that person as a customer who ordered the ham sandwich. It is this additional construal that suggests the need for a blended space in which such emergent structure might arise. Then how are these cases distinct from predicate transfer?

One thing that distinguishes indexical reference and occurrent metonymies from predicate transfer is the fact that they are very dependent on the particular situation of utterance. In order to understand these kinds of expression we either have to participate in the particular situation in which they arise, or be able to mentally conceptualize the scenario and assume the point of view of the speaker. Occurrent metonymies reflect the fact that situational factors affect the focus of our attention, as well as our ability to modify our linguistic expressions accordingly. For example, a waitress will usually refer to somebody in terms of what they ordered while in the restaurant setting (Figure 3), but will not refer in those terms to the person in some other setting (as agreed by Nunberg). Similarly, other clients in the restaurant will not speak of people in terms of what they ordered since those properties result as salient to them. For example, two women will probably not refer to the man who is sitting at the next table as "ham sandwich", but rather as "pink shirt" or "pony tail."



"This is parked out back"

Figure 4

Similarly, the deictic nature of deferred indexical reference metonymies relies heavily on the representation of the immediate context (Figure 4) (referred to as "Base Space" by Per Aage Brandt). Thus the same context-dependence that allows the principles of

cognitive salience to be overruled in deferred indexical reference and occurrent metonymies is what makes linguistic entrenchment unlikely. Hence, we can refer to them as "disposable": very effective for the ongoing situation and action, but not usable out of that particular context.

## 8 Conclusions

In sum, we have argued against the referential view of metonymy, suggesting instead that metonymic language requires conceptual integration networks for meaning construction to unfold. Following Langacker, we claim that rather than using one term to *refer* to another, metonymy is a reference point construction that involves the use of one term to make mental contact with another. Moreover, we suggest that the three sorts of metonymies catalogued by Nunberg can be arrayed on a continuum of context-dependence that affects both the generalizability of the metonymic trigger term as an effective reference point for the target, as well as the degree of blending between the trigger and the target. Predicate transfer metonymies obey Langacker's salience principles, and thus can be extended beyond the immediate context. In contrast, because indexicals and occurrent metonymies both rely on contextual factors for their salience, they are not as generalizable.

Finally, we propose that the different linguistic properties of predicate transfer, deferred indexical reference, and occurrent metonymies mark varying degrees of fusion in the blend. Deferred indexical reference involves almost no blending of the trigger and the target, and is reflected in the fact that the linguistic properties of these terms are appropriate for the target term. Predicate transfer involves extensive blending of the trigger and the target such that linguistic properties of the trigger term dominate. Occurrent metonymies, whose context-dependence is intermediate between predicate transfer and deferred indexical reference metonymies, involve an intermediate amount of trigger-target blending whose presence is manifested by linguistic properties somewhat intermediate between the trigger-heavy predicate transfer and the target-heavy deferred indexical reference.

## Acknowledgments

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## References

- Barcelona, A. (2000). *Metaphor and Metonymy at the Crossroads: A Cognitive Perspective*. Berlin: Mouton de Gruyter.
- Bowdle, B.F. & Medin, D.L. (in press). Reference-point reasoning and comparison asymmetries, *Journal of Experimental Psychology: General*.
- Coulson, S. & Oakley, T. (2003). Metonymy and conceptual blending. In Klaus-Uwe Panther & Linda L. Thornberg (Eds.), *Metonymy and Pragmatic Inferencing* (pp. 59-88). Amsterdam: John L. Benjamins.
- Croft, W. (1993). The role of domain in the interpretation of metaphors and metonymies, *Cognitive Linguistics*, 4, 335-370.

- Fauconnier, G. (1994). *Mental Spaces*. New York: Cambridge University Press.
- Fauconnier, G. & Turner, M. (1996). Blending as a central process of grammar. In A. Goldberg (ed.), *Conceptual Structure, Discourse, and Language* (pp 113-130). Stanford University: Center for the Study of Language and Information (CSLI).
- Fauconnier, G. & Turner, M. (1998). Conceptual integration networks, *Cognitive Science*, 22, 133-187.
- Fauconnier, G. & Turner, M. (1999). Metonymy and conceptual integration. In Panther & Radden (eds.), *Metonymy in Language and Thought* (pp. 77-90). Amsterdam and Philadelphia: John Benjamins.
- Fauconnier, G. & Turner, M. (2002). *The Way We Think: Conceptual Blending and the Mind's Hidden Complexities*. New York: Basic Books.
- Gibbs, R.W. (1999). Speaking and thinking with metonymy. In Panther & Radden (eds.), *Metonymy in Language and Thought* (pp. 61-76). Amsterdam and Philadelphia: John Benjamins.
- Grady, J., Oakley, T. & Coulson, S. (1999). Conceptual blending and metaphor. In G. Steene & R. Gibbs (eds.), *Metaphor in Cognitive Linguistics* (pp. 101-124). Amsterdam and Philadelphia: John Benjamins.
- Lakoff, G. & Johnson, M. (1980). *Metaphors We Live By*. Chicago: University of Chicago Press.
- Langacker, R. (1991). *Foundations of Cognitive Grammar*. Palo Alto: Stanford University Press.
- Langacker, R. (1999). *Grammar and Conceptualization*. Berlin: Walter de Gruyter.
- Nunberg, G. (1995). Transfer of meaning, *Journal of Semantics*, 1, 109-132.
- Rosch, E. (1975). Cognitive reference points, *Cognitive Psychology*, 7, 532-547.
- Panther, K.U. & Radden, G. (1999). Towards a theory of metonymy. In Panther & Radden (eds.), *Metonymy in Language and Thought* (pp. 17-59). Amsterdam and Philadelphia: John Benjamins.
- Panther, K.U. & Radden, G. (1999). *Metonymy in Language and Thought*. Amsterdam and Philadelphia: John Benjamins.
- Turner, M., & Fauconnier, G. (1999). A mechanism of creativity, *Poetics Today*, 20, 397-418.
- Warren, B. (1999). Aspects of referential metonymy. In Panther & Radden (eds.), *Metonymy in Language and Thought* (pp. 121-135). Amsterdam and Philadelphia: John Benjamins.