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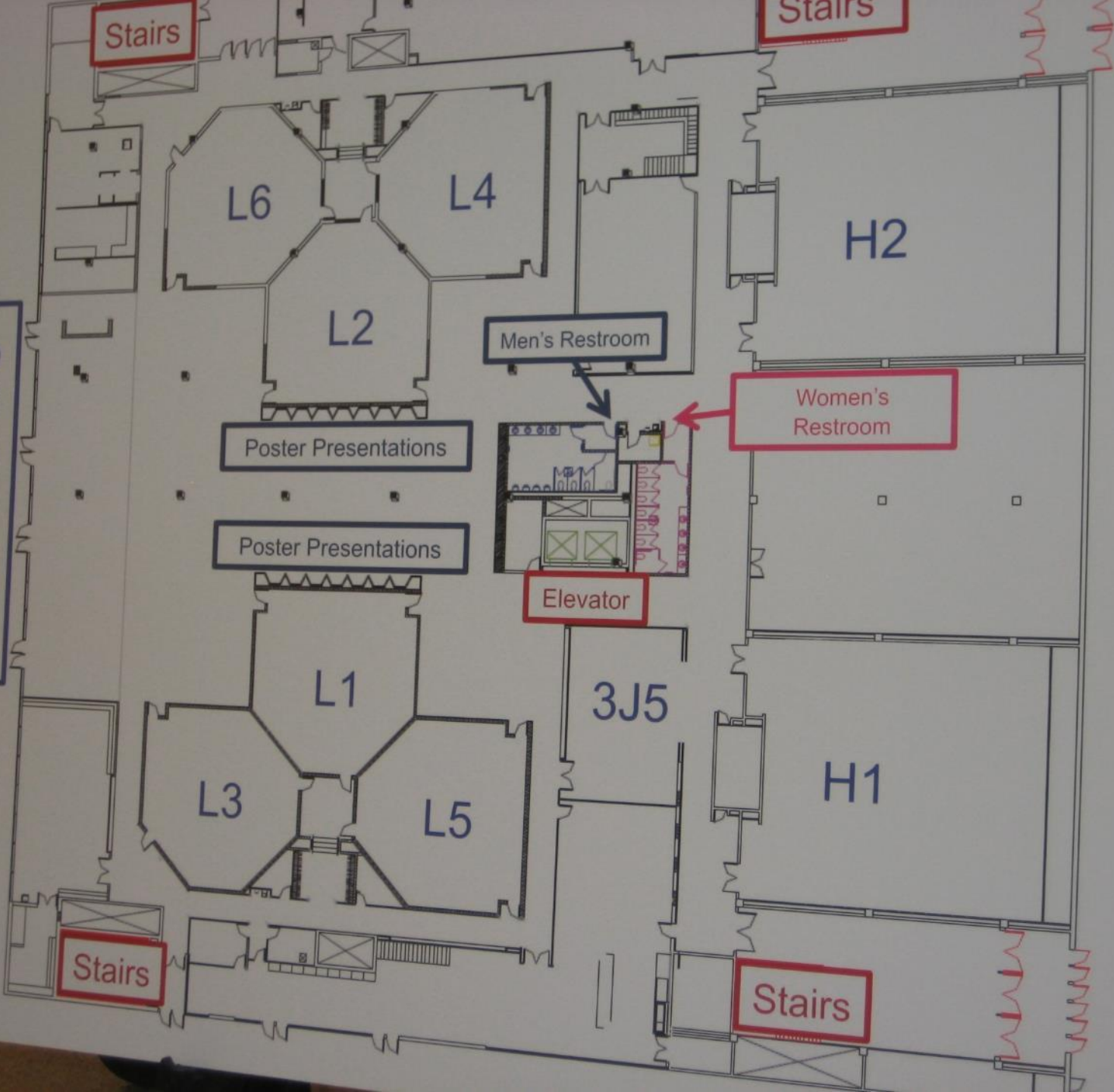
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The purpose of the Class Exemplar Program is to provide a clear and visible recognition to the great leaders of the past for a new generation of air leaders who will face new challenges in the next millennium and beyond. The Class Exemplar serves as the honorary leader of the class, setting its preeminent and character. The Class Exemplar's world of experience and pioneering leadership challenges each cadet to carry these great traditions forward as leaders in tomorrow's Air Force.

LEMAY

Influence of Solicitation Framing on Attitudes Related to Profit Giving

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Introduction

Background
 Factors influential in increasing positive feelings about alumni involvement are:
 - positive giving attitude
 - emotional attachment
 - identification & seeing shared goals with an institution (Cisler, 2001)

Setting
 Presentation of a problem used to affect the decision-making component of the scenario has been found to influence perception and subsequent behavior (Tversky & Kahneman, 1981).
 Positive solicitations utilize aspects of community & personal experience in order to influence donations.
 Content of solicitations emphasize necessity for in statistical terms.

Statistical Appeals may be more effective than statistical.
 - Paper emotional processing
 - Less accurate, but greater availability & accessibility of need
 - Leads to greater estimation of need (Berger & Smith, 1987; Smith & Berger, 1989)
 - Strong mental images, intuitive draw, stronger identification with real life than abstract references
 - Supports the evidence only trends, but not significant differences in most cases.

Other meta-analysis has found statistical framing is slightly more effective than narrative framing (Allen & Press, 1997)

- Hypotheses**
- (1) Students would be more likely to give in the future than at present.
 - (2) For current giving, statistical framing would be more effective than narrative framing.
 - (3) For projected future giving, narrative framing would be more effective than statistical framing.
 - (4) Positive emotions about giving would be greater for future than current giving.

Method

Undergraduates were recruited through the student labbers.

Design & Procedures
 Students read one of two actual-solicitation letters that the College had previously in fundraising among alumni.
 - The narrative letter portrayed a senior college student reflecting on his experience.
 - The statistical letter emphasized the low alumni giving rate.

Independent Measures
 Current future donations (\$, 10, 20, and 50 years)
 Current emotion
 Emotion about current giving
 Emotion about giving in the future

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Table 1
 Mean Likelihood of Giving at Current and Future by All Participants, and by Donors or Non-Donors with Standard Deviations in Parentheses

Appeal Type	All		Donors		Non-Donors	
	Current	Future	Current	Future	Current	Future
Narrative	1.80 (.86)	4.08 (1.76)	2.71 (1.38)	4.84 (2.0)	1.79 (.80)	3.91 (1.76)
Statistical	2.27 (.86)	3.80 (1.91)	3.50 (1.51)	3.58 (1.82)	2.08 (.84)	3.80 (1.70)

Results

- ANOVA analysis showed a significant main effect of time, $F(1, 94) = 252.74, p < .001$. Participants were more likely to donate in the future than present.
- For current donations, statistical framing was marginally more effective than the narrative.
- For future donations, narrative appeared to be slightly more effective than statistical framing (Figure 1).

- Donors vs Non-Donors**
- 15.8% Donors
 - For current donations among donors, statistical framing was slightly more effective than narrative framing.
 - For future donations, narrative framing appeared to be marginally more effective than statistical framing, $t(113)=1.90, p < .05$ (Figure 2a).
- 94.2% Non-Donors
- Statistical and narrative framing lead to the same future donation likelihood (Figure 2b).

- Emotions Associated with Giving**
- Greater intensities of positive emotions were associated with future than current donations.
 - (Delight, enthusiasm, happiness, inspiration, nostalgia, and pride).

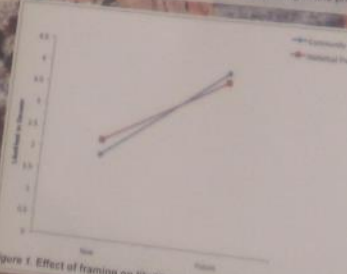


Figure 1. Effect of framing on likelihood to current and future donation

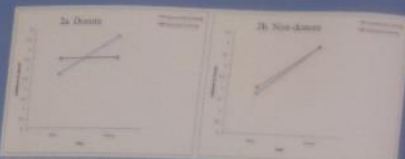


Figure 2a-b. Effect of framing on likelihood of current and future donations among donors and non-donors.

Summary

- The results confirmed our hypothesis that students were more likely to donate in the future than currently.
- The results marginally supported our hypotheses:
 - For current donations, statistical appeals were more effective than narrative.
 - For future donations, narrative appeals were more effective than statistical.
- For most participants, non-donors, the framing did not significantly influence current or future giving.
- Among donors, however, framing had a significant effect on the likelihood of giving.
 - Statistical appeals were more likely than narrative to influence current donations.
 - Narrative appeals were more likely than statistical to influence future donations.
- Emotional response over time was unaffected by the framing of the solicitation.

Discussion

- Conclusions**
- Consistent with previous research
 - students' comments in focus groups that called for greater transparency surrounding finances of the College
 - Meta-analytic studies that support statistical appeals
 - To improve donations, use strategies to get prospective donors to donate early in their relationship with an institution, despite lower likelihood of giving at that stage.

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13 Exploring the Thyroid-Disrupting Effects of Developmental Exposure to Polybrominated Diphenyl Ethers on Reference Memory in Rats

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Introduction
Polybrominated Diphenyl Ethers (PBDEs) are a class of flame-retardant chemicals that are widely used in consumer products. PBDEs are known to be endocrine-disrupting chemicals, and have been shown to affect thyroid function in rats. The present study was designed to investigate the effects of developmental exposure to PBDEs on reference memory in rats.

Method
Male Sprague-Dawley rats were exposed to PBDEs during development. The rats were then tested on a reference memory task. The results of the task are shown in the graph below.

Results
The results of the reference memory task are shown in the graph below. The graph shows the number of errors made by the rats in the task. The rats that were exposed to PBDEs during development made significantly more errors than the control rats.

Discussion
The results of this study suggest that developmental exposure to PBDEs can disrupt reference memory in rats. This finding is consistent with the known effects of PBDEs on thyroid function. The present study provides further evidence that PBDEs are endocrine-disrupting chemicals that can affect cognitive function in rats.

Figure 1: Reference Memory Task Results

Group	Mean Number of Errors
Control	~1.5
Low Dose	~2.5
High Dose	~3.5

Figure 2: PBDE Chemical Structure

C1=CC=C(C=C1)C2=CC=C(C=C2)C3=CC=C(C=C3)C4=CC=C(C=C4)C5=CC=C(C=C5)C6=CC=C(C=C6)C7=CC=C(C=C7)C8=CC=C(C=C8)C9=CC=C(C=C9)C10=CC=C(C=C10)C11=CC=C(C=C11)C12=CC=C(C=C12)C13=CC=C(C=C13)C14=CC=C(C=C14)C15=CC=C(C=C15)C16=CC=C(C=C16)C17=CC=C(C=C17)C18=CC=C(C=C18)C19=CC=C(C=C19)C20=CC=C(C=C20)C21=CC=C(C=C21)C22=CC=C(C=C22)C23=CC=C(C=C23)C24=CC=C(C=C24)C25=CC=C(C=C25)C26=CC=C(C=C26)C27=CC=C(C=C27)C28=CC=C(C=C28)C29=CC=C(C=C29)C30=CC=C(C=C30)C31=CC=C(C=C31)C32=CC=C(C=C32)C33=CC=C(C=C33)C34=CC=C(C=C34)C35=CC=C(C=C35)C36=CC=C(C=C36)C37=CC=C(C=C37)C38=CC=C(C=C38)C39=CC=C(C=C39)C40=CC=C(C=C40)C41=CC=C(C=C41)C42=CC=C(C=C42)C43=CC=C(C=C43)C44=CC=C(C=C44)C45=CC=C(C=C45)C46=CC=C(C=C46)C47=CC=C(C=C47)C48=CC=C(C=C48)C49=CC=C(C=C49)C50=CC=C(C=C50)C51=CC=C(C=C51)C52=CC=C(C=C52)C53=CC=C(C=C53)C54=CC=C(C=C54)C55=CC=C(C=C55)C56=CC=C(C=C56)C57=CC=C(C=C57)C58=CC=C(C=C58)C59=CC=C(C=C59)C60=CC=C(C=C60)C61=CC=C(C=C61)C62=CC=C(C=C62)C63=CC=C(C=C63)C64=CC=C(C=C64)C65=CC=C(C=C65)C66=CC=C(C=C66)C67=CC=C(C=C67)C68=CC=C(C=C68)C69=CC=C(C=C69)C70=CC=C(C=C70)C71=CC=C(C=C71)C72=CC=C(C=C72)C73=CC=C(C=C73)C74=CC=C(C=C74)C75=CC=C(C=C75)C76=CC=C(C=C76)C77=CC=C(C=C77)C78=CC=C(C=C78)C79=CC=C(C=C79)C80=CC=C(C=C80)C81=CC=C(C=C81)C82=CC=C(C=C82)C83=CC=C(C=C83)C84=CC=C(C=C84)C85=CC=C(C=C85)C86=CC=C(C=C86)C87=CC=C(C=C87)C88=CC=C(C=C88)C89=CC=C(C=C89)C90=CC=C(C=C90)C91=CC=C(C=C91)C92=CC=C(C=C92)C93=CC=C(C=C93)C94=CC=C(C=C94)C95=CC=C(C=C95)C96=CC=C(C=C96)C97=CC=C(C=C97)C98=CC=C(C=C98)C99=CC=C(C=C99)C100=CC=C(C=C100)

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Exploring the Thyroid-Disrupting Effects of Polybrominated Diphenyl Ethers

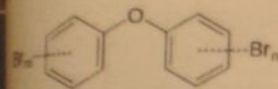
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Environmental Exposures
Memory in Rats
Margaret Seay
CO

Introduction

Polybrominated Diphenyl Ethers (PBDEs)?

Substituted to polymers in consumer products (e.g., plastics, furniture)
Different congeners
Based on the number of bromines present on the two aromatic rings

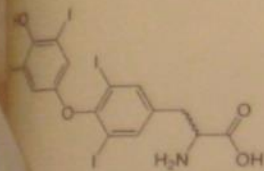


Environment

Compounds that contain different congeners
Susceptible to environmental degradation
Consumer products, causing leakage into the surroundings
(e.g., air, water and sediment)
Dust, inhalation, dust ingestion and skin contact
Accumulate in humans because they are lipophilic
PBDEs found in human tissue, milk, and blood have increased by a factor of 10 over 20 years

Effects

Structurally similar in structure to the thyroid hormone thyroxine (T4)



Report by competing with T4 for the thyroid receptor

Adults
Increased thigmotaxis
60 mg/kg/day and 30 mg/kg/day
(LT4) supplementation
Induces hypothyroidism
Poor memory
Poor reference memory

Methods

DE-71 and Levothyroxine Exposure

- Five treatment groups:
 - High dose DE-71 (60 mg/kg/day), low dose DE-71 (30 mg/kg/day), LT4 supplementation, low dose DE-71 with LT4 supplementation, and control
- PND 6-12
 - Pups administered orally either LT4 (6 µg/kg of body weight) or vehicle
 - After LT4 administration, pups administered orally DE-71

Morris Water Maze (MWM)



- Open circle
- Escape platform
- Overhead visual cue
- Visual cue

Behavioral Testing

- PND 21: p
- PND 21-22
- PND 30-31
- Upon completion of the MWM, pups were tested on the Visible Platform Task (VPT)
- Reference memory
- Working memory
- Two-way choice
- Reference memory
- Working memory
- Pre-test

Visible Platform Task

- Significant interaction between treatment and sex
- Post hoc tests revealed that the high dose DE-71 group had significantly poorer performance than the control group (p < 0.05)
- Significant interaction between treatment and sex
- Post hoc tests revealed that the high dose DE-71 group had significantly poorer performance than the control group (p < 0.05)



Predicting Homicide among Individuals with Schizophrenia

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Psych...

3K1

Lectinar 1

Schizophrenia and Homicide

Schizophrenia is a mental disorder characterized by severe cognitive, behavioral and social impairment. These impairments can cause an individual to be unable to distinguish between real and unreal experiences. (American Psychiatric Association, 2000)

Symptoms of Schizophrenia:

- Positive Symptoms**
 - Delusions
 - Auditory hallucinations
 - Disorganized speech/behavior
 - Inappropriate affective response
 - Catatonic behavior
- Negative Symptoms**
 - Flat affect
 - Loss of speech
 - Lack of motivation

Chronic schizophrenia

- Delusions and hallucinations without disorganized behavior and flat affect.
- It is the most violent subtype of schizophrenia

Schizophrenia and Homicide Statistics

- Schizophrenia affects 1.5 percent of people around the world (Goldner, Somers, & Singh, 2004)
- Individuals with schizophrenia account for only 4.2 percent of homicides in the United States (Goldner et al., 2004)
- Schizophrenia makes an individual 10 times more likely to commit homicide than a non-schizophrenic (Eronen, Tiihonen, & Hakola, 1996)

Contributing to Homicidal Behavior

Some individuals metabolize too little dopamine leaving an excess of dopamine in the brain (PFC) associated with aggressive and homicidal action in schizophrenia (Koller et al., 1999; Szeles et al., 2003)



Delusions

- A belief which a person holds despite evidence to the contrary as a result of stress (Joyal et al.)
- 86 percent of individuals with schizophrenia, with no comorbid disorder, committed assault due to psychotic delusions (Joyal et al.)
- In people with schizophrenia, **paranoid thoughts/persecutory delusions** believe in a homicidal manner in order to defend themselves. (Valevski et al., 1999)

Hallucinations

- A hallucination is a perception in the absence of a stimulus (Valevski et al.)
- Hallucinations in schizophrenia are usually auditory although they can also take the visual form.
- Individuals with schizophrenia who committed homicide reported hearing commanding voices telling them to behave homicidally.

Victims

- 86 percent of homicidal offenders with schizophrenia had a personal or professional relationship with their victim (Joyal et al.)
- It is unlikely that individuals with schizophrenia will attack a stranger without provocation (i.e., psychotic delusions or confrontation) and predisposition for aggressive behavior (Lewis et al.)
- Expressed emotion (EE)** of family members can place emotional stress on the individual through the family's critical attitudes (Vanoliev, Vuelic, & Bobington, 1994; Moline, Singh, Morris, & Meltzer, 1992)
- Individuals may attack a family member by whom she/he threatened by due to that family member's criticism and other emotional assaults.
- These type of victims may also be due to the availability of the victim to the person with schizophrenia.

Environmental factors

- Lewis et al. (1985) found that exhibiting all of the following factors made boys with probable schizophrenia more likely to display homicidal behavior in the future.
 - A history of physical abuse
 - Living in a household where a first-degree relative exhibits symptoms of psychosis
 - Previous aggressive/assaultive behavior.
 - Psychiatric hospitalization

Comorbid Antisocial Personality Disorder (APD)/Psychopathy

- APD and psychopathy** are mental disorders characterized by a lack of remorse, impulsivity, violation of social norms, not comprehending the consequences of actions, and manipulation of others (Joyal, Pukonen, Pavalis, and Tiihonen, 2004; Nolan, Volavka, Mory, and Cocoz, 1999)
- Individuals with comorbid APD/psychopathy and schizophrenia are at risk for:
 - Impulsively committing homicide
 - Not understanding the consequences for their homicidal behavior
 - Feeling little to no guilt or remorse for their homicidal behavior

Comorbid Substance Abuse

- Alcoholism and other substance abuse** is more common among individuals with schizophrenia than in the general population. (Angermeyer, 2000; Joyal et al.; Nolan et al.)
- The self-medication hypothesis** (Cisewski, Mattoo, Basu, & Singh, 2002):
 - People use substances to alleviate distressing emotional states.
 - People with schizophrenia use psychoactive drugs and alcohol to improve symptoms of schizophrenia.

- Comorbid alcoholism and schizophrenia makes an individual 17 times more likely to commit homicide than a healthy individual (Eronen, et al.)
- Comorbid substance abuse makes an individual 18.8 times more likely to commit a violent offense compared to individuals with schizophrenia (Angermeyer)

Delusions/Hallucinations

- Delusions**
 - A belief which a person holds despite evidence to the contrary as a result of stress (Joyal et al.)
 - 86 percent of individuals with schizophrenia, with no comorbid disorder, committed assault due to psychotic delusions (Joyal et al.)
 - In people with schizophrenia, **paranoid thoughts/persecutory delusions** believe in a homicidal manner in order to defend themselves. (Valevski et al., 1999)
- Hallucinations**
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Treatment

- Antipsychotic medications**
 - Risperidone and haloperidol target the dopamine receptors and help in reducing positive and negative symptoms of schizophrenia (Marder & Marder, 1994)
- Vocational Rehabilitation**
 - Used to enable an individual with physical and mental disabilities to become productive employment in order to integrate that individual into society (Lehman, 1995).
 - Vocational rehabilitation allows individuals with schizophrenia to gain self-esteem and reduce financial burden.
- Donepezil, Risperidone and Work Performance**
 - A case study found that donepezil treatment in conjunction with risperidone increased concentration, clarity of thought, reading and work performance (MacEwan, Eronen, Khazdhal, & Wikton, 2001).

Conclusions

- Homicidal behavior among individuals with schizophrenia is rarely the result of a single factor but is the collaborative effort of environment, genetics and brain circumstances.
- Comorbidity of schizophrenia, APD/Psychopathy and/or substance abuse seems to create the largest risk factor for homicidal behavior in an individual with schizophrenia. (Angermeyer, Eronen et al., Joyal et al., Nolan et al.)
- Improving the quality of life of people with schizophrenia through antipsychotic medication and vocational rehabilitation may reduce the amount of homicide by these individuals (Lehman, MacEwan et al., Marder et al.)

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Schizophrenia and Homicide

Schizophrenia is a mental disorder characterized by severe cognitive, behavioral and social impairments. These impairments can cause an individual to be unable to distinguish between real and unreal experiences. (American Psychiatric Association, 2000)

Signatures of Schizophrenia

- | | |
|--|---|
| Positive Symptoms | Negative Symptoms |
| <ul style="list-style-type: none"> • Delusions • Auditory hallucinations • Disorganized speech/behavior • Inappropriate affective response • Catatonic behavior | <ul style="list-style-type: none"> • Flat affect • Loss of speech • Lack of motivation |

Paranoid schizophrenia

- Delusions and hallucinations without disorganized behavior and flat affect
- It is the most common subtype of schizophrenia

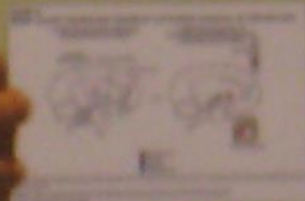
Schizophrenia and Homicide Statistics

- Schizophrenia affects 1.5 percent of people around the world (Gidycz, Wisniewski, & Meehan, 2004)
- Only 0.2 percent of the 1.5 percent exhibit homicidal behavior (Mullen, Mullen, & Burgess, 2005)
- Individuals with schizophrenia account for only 4.2 percent of homicides in the United States (Gidycz et al., 2004)
- Schizophrenia makes an individual 10 times more likely to commit homicide than a healthy individual (Gidycz, Coble, & Mullen, 2004)

Factors Contributing to Homicidal Behavior

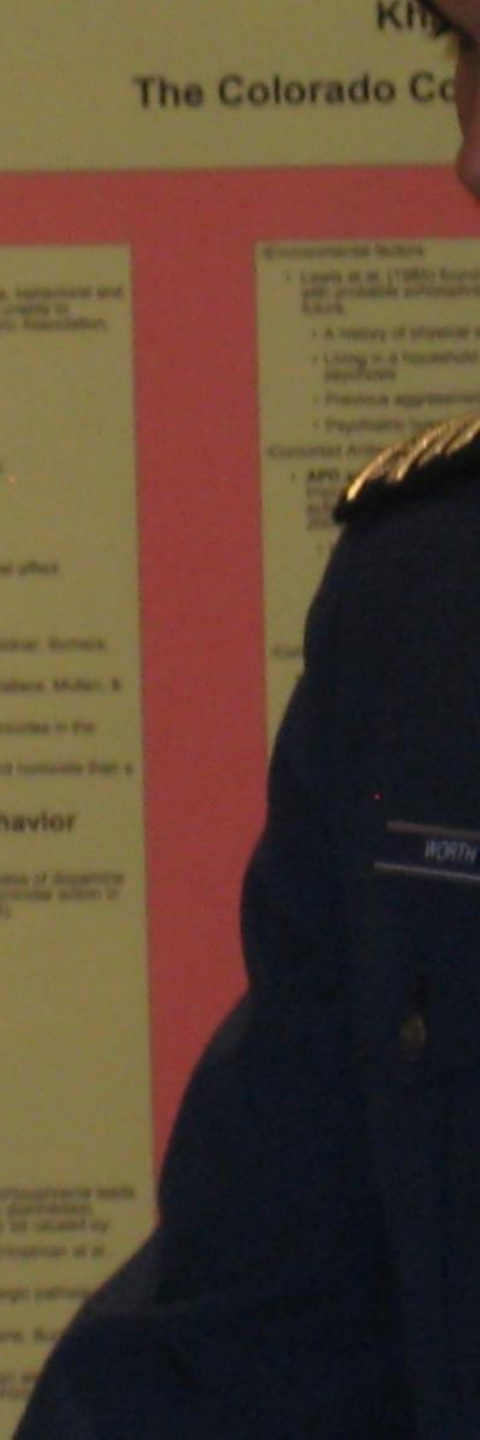
Genetics

Higher genetic vulnerability for this disorder leads to a higher risk of homicide in the individual (Gidycz et al., 2004). Individuals with aggressive and psychotic symptoms of schizophrenia are more likely to commit homicide (Gidycz et al., 2004; Mullen et al., 2005).



Abnormalities

- The frontal lobe activity in individuals with and without schizophrenia leads to aggressive and impulsive behavior, such as homicide, due to dysfunction in the frontal lobe (Gidycz et al., 2004; Gidycz et al., 2005). This behavior can be caused by:
- Impaired connectivity between the inferior frontal structures (Carpman et al., 2005)
- Over activity in the PFC caused by hyperactivity of dopaminergic pathways (Burgel, 2004; Mullen et al., 2005)
- Decreased orbital frontal lobe and parietal lobe activity (Paine, 2007)
- An individual with schizophrenia and frontal abnormalities has an increased likelihood of committing homicide (Gidycz et al., 2004)





COLORADO COLLEGE
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Levothyroxine Supplementation to Attenuate the Effects of Exposure to Polybrominated Diphenyl Ethers on Sustained Attention in Rats

Alison B. Rhoads

The Colorado College, Colorado Springs, CO

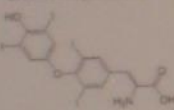


Introduction

PBDEs are flame retardants used in polymer products (e.g., polystyrene, polyethylene, PVC, and polycarbonate), based on the number (1-10) and position of bromine rings (Figure 1a).

Concerns about their presence in the environment has raised concerns about their potential effects on wildlife and humans.

Structure of Thyroxine (T4)



Exposure routes include diet and inhalation.

Because of their persistence and bioaccumulative, high levels have been detected in wildlife and humans.

PBDEs are found in developing infants, as a result of their presence in breast milk and house dust.

Do PBDEs Affect Attention?

Structure of PBDEs is similar to that of thyroid hormone (Figure 1b).

Interference with the development of neurotransmitter systems involved in attention during early life may be a result of exposure to environmental stimuli.

Exposure to PBDEs during early life may cause brief but significant reductions in the ability to sustain attention, which could cause permanent aberrations in attention.

Developmental exposure to PBDEs in rats probably exposed to the PBDEs (Birnbaum et al., 2005).

Effects of developmental DE-71 exposure on sustained attention in rats exposed rats with levothyroxine.

Procedure and Testing Timeline



Method

Subjects

• 80 male Long-Evans rats were selected from 12 litters. Each of the five pups per litter was assigned to one of the five treatment groups.

• For each litter, five pups were selected for behavioral testing. Each pup was randomly assigned to a different treatment group and tattooed to enable identification.

DE-71 and Levothyroxine Treatment

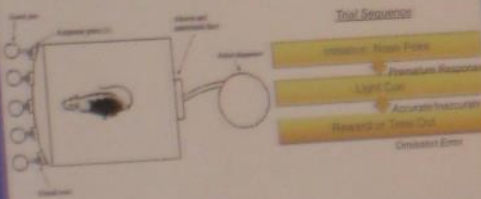
• Rats were fed DE-71 (20 or 60 mg/kg body weight/day), dissolved in corn oil, from postnatal days 6-12. Control animals received corn oil alone.

• On the same days, half of the DE-71 exposed rats were administered a levothyroxine (LTX) supplement (0.1 µg/kg body weight/day) 30 minutes prior to DE-71 exposure.

• All treatments were administered orally via a feeding tube attached to a syringe. The LTX was administered approximately 30 minutes prior to the DE-71 corn oil.

Apparatus and Behavioral Testing

Cognitive testing was conducted with four 5-choice serial reaction testing chambers (Med Associates, Inc.). The rats were trained to initiate a trial by nosepoking into the alcove, to then turn around and nosepoke response into one of the five ports on the adjacent wall, and to receive a reward pellet in the alcove.



Visual Learning Task (data not shown)

For each trial, one of the response ports was randomly illuminated for 15 s or until a response was made, whichever came first. A nose poke into the illuminated port constituted a correct response. Criterion was 80% for 2 out of 3 sessions.

Sustained Attention Task

The visual cue was 1 s in duration and appeared unpredictably, with a randomized pre-cue delay of 0, 3, or 6 s. Animals were on this task for 10 sessions.

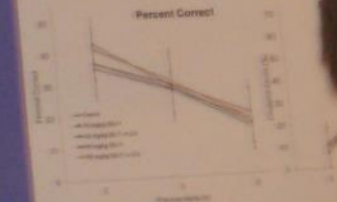
This task required the animal to sustain attention across the five ports for an indeterminate period of time before the cue appeared.

Dependent Measures

- **Percentage Correct:** Overall performance
- **Premature Responses:** Indicative of poor inhibitory control
- **Accuracy and Omission Errors:** Showed lapses of attention
- **Latency Measures:** Used to measure motivation and information processing speed

Results

- Overall, percent correct decreased and omission errors increased with DE-71 exposure, indicating that the task effectively assessed sustained attention (both $p < .001$), indicating that the task effectively assessed sustained attention.
- However, no main effects of DE-71 or LTX treatment were found on accuracy or latency measures (all $p > .05$). There were also no interactions between DE-71 and LTX on any measure.



Percentage of correct responses and omission errors on the Sustained Attention Task for each of the treatment groups. Error bars = +1 SD.

Discussion

Summary / Conclusions

- **Effects of DE-71 on Sustained Attention:** Exposure to doses of 30 and 60 mg/kg/day of DE-71 during early life in rats yields attentional effects in a similar exposure paradigm. A chronic DE-71 dosage of 60 mg/kg/day yields attentional effects in a similar exposure paradigm.
- **Effects of LTX supplementation:** It is unclear if LTX supplementation yields any benefit to DE-71 exposed pups.

Limitations / Future Directions

- Future research should utilize a more complex attentional paradigm. A chronic DE-71 dosage of 60 mg/kg/day yields attentional effects in a similar exposure paradigm.
- Changes in task parameter and outcome.

Selected References

- Dinocoll, L. L., Gibson, A. M., & Hines, R. (2006). The effects of DE-71 on learning, attention and memory. *Behavioral Brain Research*, 171, 101-103. doi:10.1016/j.bbr.2006.11.003
- Dufour, B. (2006). Postnatal PBDE exposure and attention in rats. *Toxicological Sciences*, 91, 101-103.



Levothyroxine Supplementation to Attenuate the Effects of Exposure to Polybrominated Diphenyl Ethers on Sustained Attention in Rats

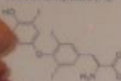
Alison B. Rhoads
The Colorado College, Colorado Springs, CO

Introduction

PBDEs are flame retardants used in polymer products (e.g., plastics, foams, adhesives, sealants), based on the number (1-10) and position of bromine atoms (Figure 1a).

These compounds have raised concerns about their potential effects on the developing brain.

Structure of thyroxine (T4)



Thyroid Disruption

High levels have been detected in...

...in developing infants, as a result of...

Attention?

...is similar to that of thyroid hormone (Figure 1b).

...the development of neurotransmitter systems involved in processing of environmental stimuli.

...produces brief but significant reductions in the...

...which could cause permanent alterations in...

...in rats prenatally exposed to the PBCE...

... (Soto et al., 2005)

...effects of developmental DE-71 exposure...

...in prenatally exposed rats with levothyroxine...

Testing Timeline

Method

Subjects

- 80 male Long-Evans rats were selected from 12 litters. Each of the five pups per litter was assigned to one of the five treatment groups.
- For each litter, five pups were selected for behavioral testing. Each pup was randomly assigned to a different treatment group and tattooed to enable identification.

DE-71 and Levothyroxine Treatment

- Rats were fed DE-71 (0 or 50 mg/kg body weight/day), dissolved in corn oil, from postnatal days 0-12. Control animals received corn oil alone.
- On the same days, half of the DE-71 exposed rats were administered a levothyroxine (LTA) replacement (5 mg/kg body weight/day) 30 minutes prior to DE-71 exposure.
- All treatments were administered orally via a feeding tube attached to a syringe. The LTA was administered approximately 30 minutes prior to the DE-71 corn oil.

Apparatus and Behavioral Testing

Cognitive testing was conducted with four 5-choice serial reaction testing chambers (Med Associates, Inc.). The rats were trained to infuse a trial by nosepoking into the active, to then turn around and nosepoke response into one of the five ports on the adjacent wall, and to receive a reward pellet in the active.



Rat Response

- Inactive Nose Poke
- Premature Response
- Light Touch
- Accurate Response
- Reward or Time Out
- Omission Error

Visual Learning Task (data not shown)

For each trial, one of the response ports was randomly illuminated for 15 s or until a response was made, whichever came first. A nose poke into the illuminated port constituted a correct response. Criterion was 80% for 2 out of 3 sessions.

Sustained Attention Task

The visual cue was 1 s in duration and appeared unpredictably, with a randomized pre-cue delay of 0, 3, or 6 s. Animals were on this task for 10 sessions.

This task required the animal to sustain attention across the five ports for an indeterminate period of time before the cue appeared.

Dependent Measures

- **Percentage Correct:** Overall performance
- **Premature Responses:** Indicator of poor inhibitory control
- **Accuracy and Omission Errors:** Shown signs of attention
- **Latency Measures:** Used to measure motivation and information processing speed

Results

Overall, percent correct decreased with DE-71 exposure (both $p < .001$), indicating that...

However, no main effects of DE-71 or LTA were seen on any of the other dependent measures (all $p > .05$). The interaction between DE-71 and LTA was significant for the sustained attention task.



Percentage of Attention Task

Summary

• Effects of DE-71 exposure on sustained attention were attenuated by LTA.

• DE-71 exposure reduced performance on the sustained attention task.

• LTA treatment did not affect performance on the sustained attention task.

• The interaction between DE-71 and LTA was significant for the sustained attention task.

• The interaction between DE-71 and LTA was not significant for the other dependent measures.

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Effects of Acute Postnatal Exposure to DE-71 on Five Port Visual Discrimination Learning in Rats

Maggie Seay
The Colorado College, Colorado Springs, CO

Introduction

DE-71 (2,3,7,8-tetrachlorodibenzo-p-dioxin) is a potent thyroid disruptor. It is known to alter thyroid hormone levels, which can affect brain development. The thyroid gland is essential for normal brain development, and disruption of thyroid function can lead to cognitive deficits. DE-71 is a potent thyroid disruptor, and it is known to alter thyroid hormone levels, which can affect brain development. The thyroid gland is essential for normal brain development, and disruption of thyroid function can lead to cognitive deficits.

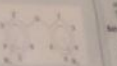


Figure 1: Chemical structure of DE-71 (2,3,7,8-tetrachlorodibenzo-p-dioxin).

DE-71 was administered to rats in a single dose of 100 mg/kg on postnatal day 10. The rats were then tested on a five-port visual discrimination task. The results showed that DE-71 exposure led to a significant decrease in the number of correct responses compared to the control group.

The results of this study suggest that acute postnatal exposure to DE-71 can lead to cognitive deficits in rats. This is likely due to the disruption of thyroid function, which is essential for normal brain development. Further research is needed to determine the underlying mechanisms of these effects.

The study was conducted in a laboratory setting. The rats were housed in pairs and given access to food and water ad libitum. The testing was conducted in a sound-attenuated chamber. The results were analyzed using a two-tailed t-test.

The study was funded by the Colorado College. The author would like to thank the following individuals for their assistance: [Names].

References:
1. Seay, M. (2010). Effects of acute postnatal exposure to DE-71 on five port visual discrimination learning in rats. Unpublished manuscript, Colorado College.

2. [Reference]

3. [Reference]

4. [Reference]

5. [Reference]

Method

Subjects: Twenty-four Sprague-Dawley rats were used in this study. They were divided into four groups based on their exposure to DE-71 and their sex. The groups were: Control (n=6), DE-71 (n=6), Control + LTA (n=6), and DE-71 + LTA (n=6). The rats were housed in pairs and given access to food and water ad libitum.

Procedure: The rats were trained on a five-port visual discrimination task. They were presented with two different visual stimuli and had to choose the correct one to receive a food reward. The task was repeated until the rat achieved a 75% correct response rate. The rats were then tested on the same task after being exposed to DE-71 or LTA.

Statistical Analysis: The data were analyzed using a two-tailed t-test. A p-value of less than 0.05 was considered statistically significant.

Results: The DE-71 group showed a significant decrease in the number of correct responses compared to the control group. This effect was not observed in the LTA group.

Conclusion: Acute postnatal exposure to DE-71 can lead to cognitive deficits in rats. This is likely due to the disruption of thyroid function, which is essential for normal brain development.

References: [List of references]

Figure 1: Bar graph showing the number of correct responses for each group. The DE-71 group shows a significantly lower number of correct responses compared to the control group.

Figure 2: Line graph showing the percentage of correct responses over time for each group. The DE-71 group shows a slower rate of learning compared to the control group.

Figure 3: Line graph showing the percentage of correct responses over time for each group. The LTA group shows a similar rate of learning to the control group.

Figure 4: Line graph showing the percentage of correct responses over time for each group. The DE-71 + LTA group shows a similar rate of learning to the control group.

Results

The DE-71 group showed a significant decrease in the number of correct responses compared to the control group. This effect was not observed in the LTA group. The results suggest that acute postnatal exposure to DE-71 can lead to cognitive deficits in rats.

The DE-71 group also showed a slower rate of learning compared to the control group. This suggests that acute postnatal exposure to DE-71 can lead to impaired learning in rats.

The LTA group showed no significant differences in the number of correct responses or the rate of learning compared to the control group. This suggests that LTA does not affect cognitive function in rats.

The DE-71 + LTA group showed no significant differences in the number of correct responses or the rate of learning compared to the control group. This suggests that LTA can rescue the cognitive deficits caused by DE-71.

The results of this study suggest that acute postnatal exposure to DE-71 can lead to cognitive deficits in rats. This is likely due to the disruption of thyroid function, which is essential for normal brain development.

The results of this study suggest that LTA can rescue the cognitive deficits caused by DE-71. This suggests that thyroid function is essential for normal brain development.

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Discussion

The results of this study suggest that acute postnatal exposure to DE-71 can lead to cognitive deficits in rats. This is likely due to the disruption of thyroid function, which is essential for normal brain development. The results also suggest that LTA can rescue the cognitive deficits caused by DE-71.

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References

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2. [Reference]

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Conclusion

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12

Game Theoretic Modelling of Gas Pricing

COX Alex Blair
and Geographical Sciences, USAF
Technician, USAF

Results Comment

Using backward induction, we have shown that the optimal strategy for the gas company is to set the price at 1.50, and for the consumer to buy 1.50 units of gas.

Conclusions

• The gas company's optimal strategy is to set the price at 1.50, and for the consumer to buy 1.50 units of gas.

Implications and Future Work

• This model can be used to analyze other markets where there is a dominant player and a smaller player.

References

• [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]



Effects of Acute Postnatal Exposure to DDT on Five Port Visual Discrimination in Rats

Maggie Seaton
The Colorado College, Colorado

Introduction

DDT is a persistent organic pollutant (POP) that has been shown to have neurotoxic effects in rats. The present study was designed to test the hypothesis that acute postnatal exposure to DDT would impair visual discrimination in rats.

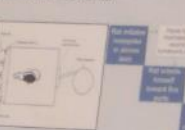


Figure 1: Structure of DDT

Behavioral Testing

Behavioral testing was conducted in a standard chamber (see below) on 10 rats that were exposed to DDT during their pregnancy.

Five Port Visual Discrimination Task



1. Rat enters chamber and sees a light. 2. Rat presses one of the five ports. 3. Rat receives a reward (e.g., food pellet) if it presses the correct port. 4. Rat receives a punishment (e.g., electric shock) if it presses the incorrect port. 5. Rat is released from the chamber.

Rats completed the task after receiving 80% correct for 2 out of 3 consecutive days.

Results

There was no significant difference in the number of trials between the DDT and control groups.

Visual Discrimination Task

There was no main effect of treatment on the number of trials and no effect of treatment on the number of trials to reach criterion (80% correct) in 20 trials (see Figure 2). There was a main effect of treatment on the number of trials to reach criterion in 10 trials (see Figure 2).

Trials to Criterion



Figure 2: Differences between number of trials to reach criterion between DDT and control groups. *p < 0.05.

Maggie Seaton
The Colorado College
Colorado



Quantitative neuromorphology in cetacea: Bottlenose dolphin (*Tursiops truncatus*), north Atlantic humpback whale (*Balaenoptera acutorostrata acutorostrata*), and humpback whale (*Megaptera novaeangliae*)

Caroline Janeway¹, Courtney Townsend², Camilla Benti³, Bridget Wicinski⁴, Patrick Hof⁵, Chet Sherwood⁶, and Bob Jaeger⁷

¹Department of Psychology, Colorado College, Colorado Springs, CO 80903; ²Department of Neuroscience and Behavioral Biology, State University of New York, Stony Brook, NY 11794; ³Department of Psychology, State University of New York, Stony Brook, NY 11794; ⁴Department of Psychology, State University of New York, Stony Brook, NY 11794; ⁵Department of Psychology, State University of New York, Stony Brook, NY 11794; ⁶Department of Psychology, State University of New York, Stony Brook, NY 11794; ⁷Department of Psychology, State University of New York, Stony Brook, NY 11794



Quantitative neuromorphology in cetacea: Bottlenose dolphin (*Tursiops truncatus*), north Atlantic minke whale (*Balaenoptera acutorostrata acutorostrata*), and humpback whale (*Megaptera novaeangliae*)

Caroline Janeway¹, Courtney Townsend², Camilla Butti³, Bridget Wicinski¹, Patrick Hof¹, Chet Sherwood¹, and Bob Jacobs¹

¹Department of Quantitative Neuromorphology, Psychology, Colorado College, Colorado Springs, CO 80903. ²Department of Neuroscience and Friedman School of Neuroscience, New York University, New York, NY 10029. ³Anthropology, George Washington University, Washington, DC 20052.

Abstract

Results: Dolphin (Figs. 2-3)
Number of basal neurons: total cortex (n = 22), total cortex (n = 22), total cortex (n = 22)
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Results: Minke Whale (Figs. 4-5)

Number of basal neurons: total cortex (n = 22), total cortex (n = 22), total cortex (n = 22)
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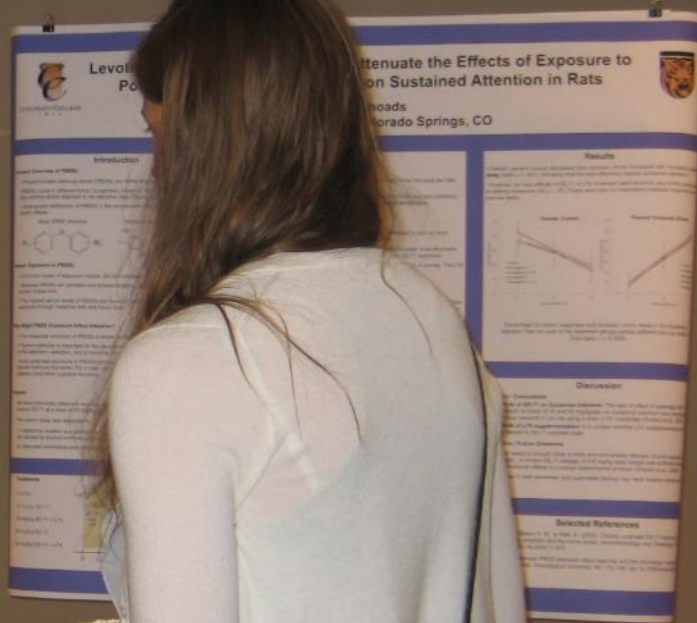
Results: Humpback Whale

Number of basal neurons: total cortex (n = 22), total cortex (n = 22), total cortex (n = 22)
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Thyroid-Disrupting Effects of Developmental Exposure to Dosed Diphenyl Ethers on Reference Memory in Rats

Andrew Franco, Lori Driscoll, Alison Rhoads, Margaret Seay
The Colorado College, Colorado Springs, CO



Method Continued

DE-71 and Levothyroxine Exposure

- Five treatment groups:
 - High dose DE-71 (60 mg/kg/day); low dose DE-71 (30 mg/kg/day); high dose DE-71 with LTX supplementation; low dose DE-71 with LTX supplementation; control
- PND 6-12:
 - Pups administered orally either LTX (5 µg/kg of bodyweight) or distilled water
 - After LTX administration, pups administered either 60 mg/kg, 30 mg/kg, or control

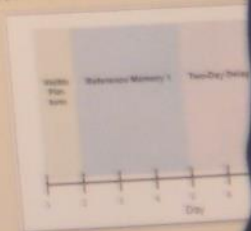
Morris Water Maze (MWM)



- Open circular pool (Fisher Associates, Inc.) measuring 150 cm by 63.5 cm
- Escape platform with a diameter of 15.2 cm can be used depending on the task
- Overhead video camera (Mini Associates, Inc.)
- Visual cues (e.g., posters, bookshelf) surrounding the pool

Behavioral Testing

- PND 21: pups washed
- PND 21-30: pups housed in pairs
- PND 30-60: administered a series of food-restricted automated behavioral tests
- Upon completion, rats given ad libitum diet of chow
- PND 60-65 (approximately): reference memory and spatial learning tests:
 - Visible Platform Task (1 session, 4 trials)
 - Reference Memory 1 (2 sessions, 4 trials)
 - Fixed platform location elevated 3 cm above the water
 - Different fixed platform location lowered 1 beneath the water
 - Two-Day Delay (No sessions)
 - Reference Memory 2 (1 session, 4 trials)
 - Same fixed platform location (as Reference Memory 1)
 - Probe Trials (1 session, 1 trial)
 - No platform present



Dependent Measures

- Visible Platform Task: escape latency, path length, proximity, percentage of time spent in the quadrant nearest to the platform
- Reference Memory Task: escape latency, path length, proximity, percentage of time spent in the quadrant nearest to the platform
- Probe Trial: platform crossing



3K1

Lectinar 1

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Little nose dolphin (*Tursiops truncatus*), north Atlantic minke whale (*Balaenoptera borealis*), and humpback whale (*Megaptera novaeangliae*)

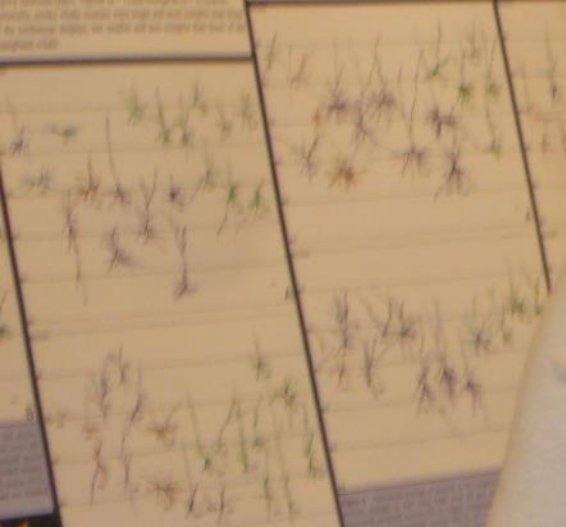
Buntz¹, Bridget Wozniak², Patrick Hof³, Chet Storrison¹, and Bob Jacobs¹

¹Colorado Springs, CO 80903, ²Department of Neurosciences and Trindaman Brain Institute, Anthropology, George Washington University, Washington, DC 20052

Support: NIH T32NS042001



Results: White Whale (Fig. 1A)
The skull of the white whale is characterized by its large size and the presence of a prominent, rounded, and slightly flattened rostrum. The skull is covered in a dense covering of small, rounded, and slightly flattened tubercles. The skull is covered in a dense covering of small, rounded, and slightly flattened tubercles. The skull is covered in a dense covering of small, rounded, and slightly flattened tubercles.

Results: Humpback Whale (Fig. 1B)
The skull of the humpback whale is characterized by its large size and the presence of a prominent, rounded, and slightly flattened rostrum. The skull is covered in a dense covering of small, rounded, and slightly flattened tubercles. The skull is covered in a dense covering of small, rounded, and slightly flattened tubercles. The skull is covered in a dense covering of small, rounded, and slightly flattened tubercles.



Levothyroxine Supplementation to Attenuate the Effects of Exposure to Polybrominated Diphenyl Ethers on Sustained Attention in Rats

Alison B. Rhoads
The Colorado College, Colorado Springs, CO

Introduction

Polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) are toxic pollutants that can be found in the environment. They are known to be neurotoxic and can affect the brain. PCBs and PAHs are also known to be endocrine disruptors and can affect the thyroid gland. Levothyroxine (L-T4) is a synthetic thyroid hormone that is used to treat hypothyroidism. It is also known to be neuroprotective and can improve cognitive function. The present study was designed to test the hypothesis that L-T4 supplementation would attenuate the effects of PCB and PAH exposure on sustained attention in rats.

Method

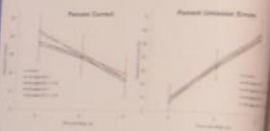
Subjects
 - 24 male Long-Evans rats were selected from 12 litters. Each of the five pups per litter was assigned to one of the five treatment groups.
 - The rats were selected for behavioral testing based on sex and genotype, assigned to a different treatment group and housed in a temperature-controlled environment.

PCB and Levothyroxine Treatment
 - Rats were fed 200 ppb PCB (Aroclor 1248) and 100 ppb L-T4 (levothyroxine sodium) in their chow from postnatal day 21 to 21. Control animals received only chow.
 - In the same litter, half of the PCB-treated rats were administered a levothyroxine (L-T4) treatment (200 ppb L-T4) in their chow from postnatal day 21 to 21.
 - All rats were administered L-T4 in a feeding tube administered in a syringe. The L-T4 was administered approximately 30 minutes prior to the PCB treatment.

Cognitive and Behavioral Testing
 Cognitive testing was conducted with the 4-month-old rats using the Sustained Attention Test (SAT). The SAT was used to measure the ability to sustain attention over time. The SAT was conducted in a sound-attenuated chamber. The rats were trained to respond to a tone by pressing a lever. The SAT was conducted in a sound-attenuated chamber. The rats were trained to respond to a tone by pressing a lever. The SAT was conducted in a sound-attenuated chamber. The rats were trained to respond to a tone by pressing a lever.

Results

Control animals performed significantly better than PCB-treated rats on the SAT. L-T4 supplementation significantly improved SAT performance in PCB-treated rats. The interaction between PCB and L-T4 was significant. The interaction between PCB and L-T4 was significant. The interaction between PCB and L-T4 was significant.



Percentage of correct responses and omission errors made in the Sustained Attention Test for each of the treatment groups across different pre-trial cues. Error bars = ±1 SEM.

Discussion

The present study was designed to test the hypothesis that L-T4 supplementation would attenuate the effects of PCB and PAH exposure on sustained attention in rats. The results of the present study support this hypothesis. L-T4 supplementation significantly improved SAT performance in PCB-treated rats. The interaction between PCB and L-T4 was significant. The interaction between PCB and L-T4 was significant. The interaction between PCB and L-T4 was significant.

Selected References

Davidson, L.L., Olson, A.M., & Paul, A. (2008). Effects of PCBs on sustained attention in rats. *Behavioral and Brain Research*, 188, 117-125.



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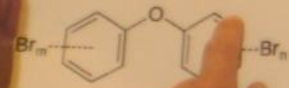
Exploring the Thyroid Effects of Developmental Exposure to Polybrominated Diphenyl Ethers (PBDEs)

Effects of Developmental Exposure to Polybrominated Diphenyl Ethers (PBDEs) on Reference Memory in Rats

Matthew P. ... Rhoads, Margaret Seay
The University of Colorado Springs, CO

Introduction

Polybrominated Diphenyl Ethers (PBDEs)?
Added to polymers in consumer products (e.g., plastics, furniture)
Chemical congeners
Classified based on the number of bromines present on the two aromatic rings



Environment

Structures that contain bromine are resistant to environmental degradation
Found in dust, air, water and soil
Enter the body through diet, inhalation, and dermal contact
PBDEs found in humans and animals
PBDEs found in humans and animals
PBDEs found in humans and animals

Effects

Similar in structure to thyroid hormones

Interfere with thyroid hormone action

Thyroid dysfunction is problematic for proper development

Processes that depend on intact thyroid function

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Reference memory

Continued

Low dose DE-71 (30 mg/kg/day), high dose DE-71 with thyroidectomy, control

•PBDEs
•Pregnancy
•Adipose tissue
•Milk
•Water

Morrison et al. (2001) found that PBDEs were found in human breast milk and adipose tissue

Visible Platform Task

•Significant trial x treatment interaction
•Post hoc tests revealed that the low dose DE-71 group performed significantly better than the high dose DE-71 group on the visible platform task
•Marginally significant trial x treatment interaction for the high dose DE-71 group

•Post hoc tests revealed that the low dose DE-71 group performed significantly better than the high dose DE-71 group on the visible platform task

•The high dose DE-71 group performed significantly worse than the low dose DE-71 group on the visible platform task

•The high dose DE-71 group performed significantly worse than the low dose DE-71 group on the visible platform task

•The high dose DE-71 group performed significantly worse than the low dose DE-71 group on the visible platform task

•The high dose DE-71 group performed significantly worse than the low dose DE-71 group on the visible platform task

•The high dose DE-71 group performed significantly worse than the low dose DE-71 group on the visible platform task

•The high dose DE-71 group performed significantly worse than the low dose DE-71 group on the visible platform task

•The high dose DE-71 group performed significantly worse than the low dose DE-71 group on the visible platform task

•The high dose DE-71 group performed significantly worse than the low dose DE-71 group on the visible platform task

•The high dose DE-71 group performed significantly worse than the low dose DE-71 group on the visible platform task

Quantitative neuromorphology in cetacea: Bottlenose dolphin (*Tursiops truncatus*), north Atlantic minke whale (*Balaenoptera acutorostrata acutorostrata*), and humpback whale (*Megaptera novaeangliae*)

Caroline Janeway¹, Courtney Townsend², Camilla Butt³, Bridget Wicinski³, Patrick Hof³, Chen Sherwood³, and Bob Jacobs³

¹Quantitative Neuromorphology, Psychology, Colorado College, Colorado Springs, CO 80903, ²Department of Neuroscience and Friedman Brain Institute, School of Medicine, New York, NY 10029, ³Anesthesiology, George Washington University, Washington, DC 20052.

Results Bottlenose Dolphin (Figs. 1-3) Results Mink Whale (Figs. 4-5) Results Humpback Whale (Figs. 6-8)



Discussion

The results of this study show that the neural branching patterns of the three cetacean species are highly similar, suggesting a common evolutionary origin for these patterns. The complexity of the dendritic trees is similar across all three species, indicating that the neural circuitry underlying these patterns is conserved. The micrographs show that the cellular structure of the brain tissue is also similar across all three species, further supporting the idea of a common evolutionary origin.

12 Game Theoretic Modelling of Gas Prices

CSI Area 1000
Department of Economics and Geological Sciences, USAF3
Department of Social Sciences, USMA

Abstract
This paper presents a game theoretic model of gas prices in the United States. The model is based on the fact that gas prices are determined by the interaction of supply and demand, and the fact that the supply of gas is limited. The model is solved using backward induction, and the results are compared to actual data.

Keywords
Game theory, gas prices, supply and demand, backward induction.

Figure 1
A line graph showing the relationship between gas prices and supply and demand. The x-axis is labeled 'Supply' and the y-axis is labeled 'Price'. The graph shows a downward-sloping demand curve and an upward-sloping supply curve, with their intersection representing the equilibrium price and quantity.

Figure 2
A diagram showing the structure of a game tree. The tree starts with a root node where a player chooses between two actions. This leads to two different nodes for the second player, who then chooses between two actions. The tree continues to a third player and finally to a terminal node.

Figure 3
A diagram showing the structure of a game tree, similar to Figure 2 but with different branching.

Figure 4
A bar chart showing the results of the game. The x-axis is labeled 'Player' and the y-axis is labeled 'Payoff'. There are four bars representing the payoffs for each player in the different states of the game.

References
1. [Author], [Year], [Title], [Journal].
2. [Author], [Year], [Title], [Journal].

Effects of Acute Postnatal Exposure to DE-71 on Five Port Visual Discrimination Learning in Rats

Maggie Seay
The Colorado College, Colorado Springs, CO

Introduction
The present study was designed to determine if acute postnatal exposure to DE-71 (a neurotoxicant) affects visual discrimination learning in rats. Rats were exposed to DE-71 from postnatal day (PND) 10 to PND 15. The rats were then tested on a five-port visual discrimination task. The results showed that rats exposed to DE-71 during this period performed significantly worse on the task compared to control rats.

Method
Subjects: Male Sprague-Dawley rats, PND 10.
Treatments: DE-71 (0.5 mg/kg, 1 mg/kg, 2 mg/kg, 4 mg/kg) and Control (saline).
Procedure: Rats were tested on a five-port visual discrimination task. The task required the rats to learn to discriminate between two different visual stimuli (e.g., a red and a green port) and to respond accordingly. The number of trials and the number of errors were recorded. The task was repeated until the rats reached a criterion level of performance.

Results
The results showed that rats exposed to DE-71 during the postnatal period performed significantly worse on the five-port visual discrimination task compared to control rats. The number of trials required to reach the criterion level of performance was significantly higher for the DE-71 exposed rats. The number of errors made during the task was also significantly higher for the DE-71 exposed rats.

Figure 1
A bar chart showing the number of trials required to reach the criterion level of performance for rats in each treatment group. The y-axis is labeled 'Trials to Criterion' and the x-axis is labeled 'Treatment'. The bars represent the mean number of trials for each group: Control (approx. 15), DE-71 0.5 mg/kg (approx. 25), DE-71 1 mg/kg (approx. 30), DE-71 2 mg/kg (approx. 35), and DE-71 4 mg/kg (approx. 40).

Figure 2
A line graph showing the percentage of correct responses over time for rats in each treatment group. The y-axis is labeled 'Percentage Correct' and the x-axis is labeled 'Trials'. The lines represent the mean percentage of correct responses for each group: Control (approx. 80%), DE-71 0.5 mg/kg (approx. 70%), DE-71 1 mg/kg (approx. 65%), DE-71 2 mg/kg (approx. 60%), and DE-71 4 mg/kg (approx. 55%).

Figure 3
A bar chart showing the number of errors made during the task for rats in each treatment group. The y-axis is labeled 'Number of Errors' and the x-axis is labeled 'Treatment'. The bars represent the mean number of errors for each group: Control (approx. 10), DE-71 0.5 mg/kg (approx. 15), DE-71 1 mg/kg (approx. 20), DE-71 2 mg/kg (approx. 25), and DE-71 4 mg/kg (approx. 30).

Discussion
The results of this study indicate that acute postnatal exposure to DE-71 during the period of rapid brain development (PND 10-15) significantly impairs visual discrimination learning in rats. The degree of impairment was dose-dependent, with higher doses of DE-71 resulting in greater impairment. These findings suggest that DE-71 may be a neurotoxicant that affects the development of the visual system in rats.

References
1. [Author], [Year], [Title], [Journal].
2. [Author], [Year], [Title], [Journal].

Maggie Seay
The Colorado College
Colorado Springs, CO



BEHAVIORAL TRAITS OF COLLEGE 43 STUDENTS: ON CAMPUS?

Columbine High School
Response Time
00:10:00

Average Duration of
Active Shooting
00:12:00

Tiff
Department of Crim

Smith*
Springs - CSURF 2011

ABSTRACT

The research focuses on the behavior of college students that identify with the behavioral characteristics commonly found among serial and rampage killers. The purpose of this study was to determine the frequency of these characteristics among a sample of college students attending a south-western university. A survey was administered through an online survey system and included a list of bias traits found among rampage and serial killers. The findings reveal the number of students that reported having high risk behavioral traits. The study also examines gender differences in relation to the behavioral traits. Suggestions for identifying high risk students and implications for public safety are offered.

CONCLUSION

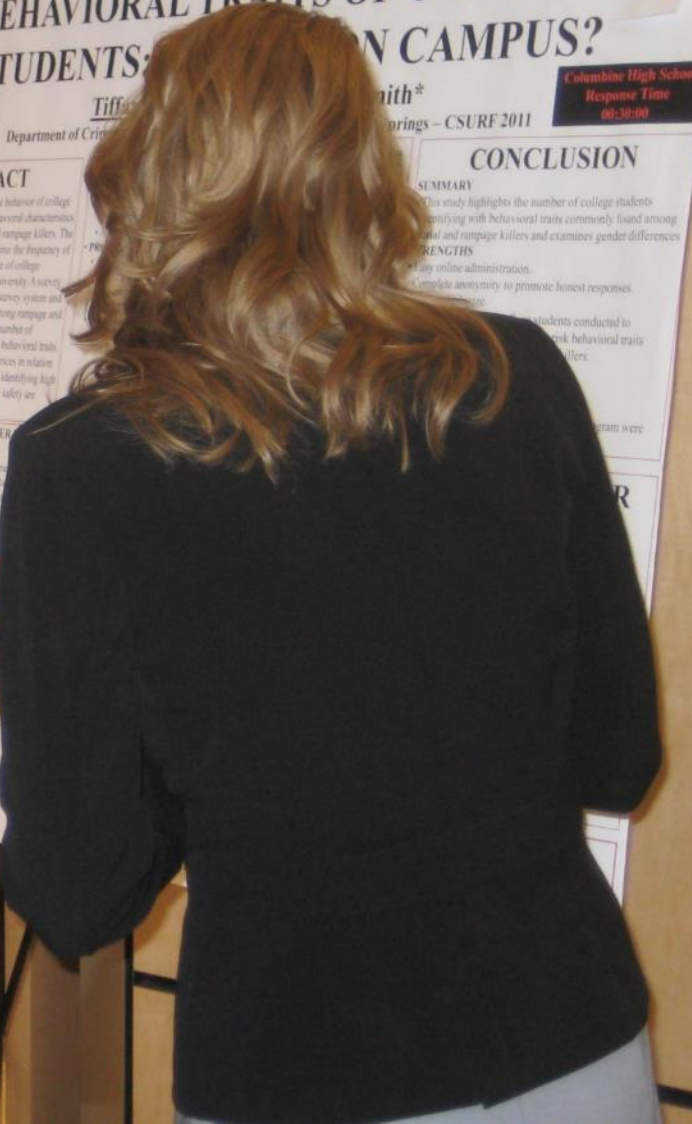
SUMMARY
This study highlights the number of college students identifying with behavioral traits commonly found among serial and rampage killers and examines gender differences.

STRENGTHS
• Easy online administration.
• Complete anonymity to promote honest responses.

WHAT IS AN ACTIVE SHOOTER/RAMPAGE SHOOTER?

According to the U.S. Department of Homeland Security, an active shooter is someone who is actively engaged in killing or attempting to kill people in a crowded and populated area, such as a school, workplace, shopping mall, or concert. The active shooter is usually located within the area and there is no particular motive or ideology. (U.S. Department of Homeland Security, 2011)

Colorado Springs
Industry Panelists
Research Forum



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Developmental-Disrupting Effects of Developmental Exposure to Diphenyl Ethers on Reference Memory

James, Lori Driscoll, Allison Rhoads, Margaret S. ...
Colorado College, Colorado Springs, CO

Abstract

Developmental exposure to diphenyl ethers (DPEs) disrupts reference memory in rats. This study examined the effects of DPEs on reference memory in rats.

Subjects were divided into four groups: Control, DPE (100 ppm), DPE (200 ppm), and DPE (400 ppm). All groups were tested on a reference memory task.

Results showed that DPE exposure significantly impaired reference memory performance in a dose-dependent manner.

These findings suggest that developmental exposure to DPEs may have adverse effects on cognitive function.

Further research is needed to elucidate the underlying mechanisms of DPE-induced memory impairment.

This research was supported by the National Institute of Environmental Health Sciences (NIEHS).

Correspondence: James, Colorado College, Colorado Springs, CO.

Keywords: diphenyl ethers, reference memory, developmental exposure, rats.

References: [List of references]

Supporting Information: [Link to supporting information]

Conflict of Interest: [Statement of conflict of interest]

Disclaimer: [Disclaimer statement]

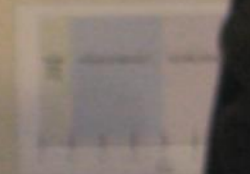
Copyright: [Copyright information]

Published online: [Publication date]

DOI: [DOI number]

Received: [Date received]

Accepted: [Date accepted]





Insulin Receptor Signaling:
Effects of Inhibitors in the Tyrosine Kinase Signaling Pathway

Abstract: Insulin receptor signaling is a complex process involving the activation of tyrosine kinases and the recruitment of various signaling molecules. Inhibitors of this pathway can lead to insulin resistance and diabetes. This poster discusses the effects of various inhibitors on the insulin receptor signaling pathway and the resulting cellular responses.

Neuromorphology in cetacea: Bottlenose dolphin (*Tursiops truncatus*), north Atlantic minke whale (*Balaenoptera acronotus*), and humpback whale (*Megaptera novaeangliae*)

Abstract: Cetaceans exhibit a wide range of neuroanatomical adaptations that support their aquatic lifestyle. This poster compares the neuroanatomy of three cetacean species: the bottlenose dolphin, the north Atlantic minke whale, and the humpback whale. The study focuses on the brain, olfactory bulbs, and other neural structures, highlighting the differences and similarities between these species.

Authors: [Names of researchers]

Keywords: Cetaceans, Neuroanatomy, Brain, Olfactory bulbs, Bottlenose dolphin, North Atlantic minke whale, Humpback whale.



Levothyroxine Supplementation to Attenuate the Effects of Polybrominated Diphenyl Ethers on Sustained Attention

Alison B. Rhoads
The Colorado College, Colorado Springs, CO

Introduction

General Overview of PBDEs

- Polychlorinated biphenyls (PCBs) and brominated biphenyls (PBDEs) are toxic chemicals used in general structure of PCBs and in different forms (congeners), based on the number of Cl and position of the chlorine atoms attached to the biphenyl ring (Figure 1).
- An increased distribution of PBDEs in the environment has raised concerns about their health effects.

Brain PBDEs Studies

- Brain PBDEs studies
- Structure of Biphenyl (Cl)

Human Exposure to PBDEs

- Common routes of exposure include diet and inhalation
- Because PBDEs are lipophilic and bioaccumulative, high levels have been detected in human breast milk
- The highest levels of PBDEs are found in developing infants, as a result of exposure through maternal milk and breast milk

Do High PBDE Exposure Affect Attention?

- The collective weight of PBDEs in milk is not a good measure (Figure 2)
- Typical numbers are reported for the development of attention-deficit hyperactivity disorder (ADHD) and comorbidity of attentional deficit
- Early animal studies exposure to PBDEs produced significant reductions in the spatial working memory (SWM) task, which could have potential clinical implications for ADHD and other cognitive deficits

Purpose

We have previously observed learning deficits in rats previously exposed to the PBDEs mixture CB-71 and a suite of 16 congeners (Schecter et al., 2005).

The current study was designed to:

- 1) determine whether any attention-reducing effects of levothyroxine were observed by thyroid hormone exposure
- 2) determine whether learning deficits were attenuated by levothyroxine exposure

Experiments

Experiment 1

Group	CB-71	Levo	Levo + CB-71
CB-71	100	100	100
CB-71 + Levo	100	100	100
Levo	100	100	100
Levo + CB-71	100	100	100

Method

Subjects

- All male Long-Evans rats were obtained from 12 litters, each of 12 pups, and assigned to one of the five treatment groups.
- The pups were first kept with parents for 2 weeks and then assigned to a different treatment group with levothyroxine.

CB-71 and Levothyroxine Treatment

- Rats were fed CB-71 (100 or 200 mg/kg) or levothyroxine (100 or 200 mg/kg) for the same 6-week span of the 18-week study.
- CB-71 treatment (100 mg/kg) was given in the form of a 10% solution in the drinking water.
- All treatments were administered daily from 10:00 AM to 10:00 PM.
- See associated supplemental materials for details.

Apparatus and Behavioral Task

Cognitive flexibility was assessed using the Wisconsin General Testing Apparatus (WGTA) (Milner, 1963). The WGTA is a computerized version of the Wisconsin General Testing Apparatus (WGTA) (Milner, 1963).





COLORADO COLLEGE

€0.50 Coin Analysis with XRF and Cluster Observation Analysis Finds Differences in Minting Processes, and €0.50 Coin may find use as Inexpensive Calibration Disk.

Ian Warrington, Chris Johnson, Nate Bower, Murphy Braslow
The Colorado College Department of Chemistry and Biochemistry, Colorado Springs, CO

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COLORADO COLLEGE

Introduction:

Euro coins make fine "hardy goods," a compound comprised of 94% Cu, 8% Zn, 3% Al, and 7% Sn. The European Union mints Euro at 19 locations across Europe. These elements of Ni, Sn, Fe, Ni, Cr, and Ag provide the most variance between coins, and are often contaminants picked up during the minting process. To prevent counterfeiting, all Euro should have identical chemical compositions, regardless of the mint. Even with a denomination as small as €0.50, counterfeits are common when financial profit is at stake. In 2009, approximately 172,000 counterfeit Euro coins were pulled out of circulation, including 14,500 €0.50 coins. This experiment analyzed the composition of elements in €0.50 coins, using XRF spectroscopy (X-ray fluorescence spectroscopy) and multivariate analysis to determine the trends and similarities among coins from different mints.

The other goal of this experiment is to determine whether or not €0.50 coins could be used as "calibration disks" for portable XRF's. Portable XRF's are not as accurate or comprehensive as laboratory for most XRF's and due to the fact of a variation in the detection limits (DL), they fail in the detection of lighter elements such as aluminum. While portable XRF's are not as accurate in their analysis, the ability to perform in situ analysis greatly enhances the ability of archaeologists, forensic scientists, or other researchers to rapidly collect data without laboratory aid. Calibration is vital to these instruments, however calibration disks are expensive, it has been suggested in previous literature that due to their ready availability and the consistency in their chemical composition, that €0.50 coins could be used as a cheap alternative to a calibration disk.

This study involves around €0.50 coins, minted between 1999 and 2010. €0.50 coins were analyzed by XRF technology. The resulting data was analyzed with Matlab 15 Statistical software.

Procedure:

100 €0.50 coins from the International Coin Gallery in Colorado Springs and 15 mints across Europe that produce Euro are collected from various locations. The minting locations included are Athens, Berlin, Brno, Copenhagen, Dublin, London, Madrid, Munich, Paris, Rome, Stockholm, and Vienna. These 15 mints represent the majority of Euro coins in circulation across Europe. The five minting locations that are not in the United States, we attempted to obtain coins from. We were unable to obtain coins from the highest grade coins were obtained from the International Coin Gallery in Colorado Springs. These targets were analyzed for each coin. These targets were analyzed for each coin. These targets were analyzed for each coin. These targets were analyzed for each coin.

Target for each target

Target	Value
1	100
2	100
3	100
4	100
5	100

Results: Cluster Observation Analysis

Dendrograms were used to determine the similarity between coins in a cluster analysis of observations. For our cluster analysis we analyzed for six trace elements in the coin. These elements are Cu, Sn, Fe, Co, Ni, and Ag. Analysis of the six trace elements provided diverse separation of coins, by mint. (See Fig. 1)



From Fig. 1, it is clear that some mints group more effectively than others. These individual minting locations are hard to read. Just for patterns such as cluster grouping towards the right hand side and Dublin grouping towards the left hand side of the dendrogram. The coins that were most tightly clustered by mint are those from Brussels, Dublin, Utrecht, and Vienna. A detailed analysis with data only from coins from these four mints, showed much improved separation. (See Fig. 2). The grouping in our dendrograms may not always relate directly to the minting location, but may also be related to the coin's age, the way it was produced, if coins from a minting location were produced in multiple locations, slight "nest" some grouping between mints, although the year-based grouping is not quite the same. (See Fig. 3)

By performing XRF and cluster analysis, we were able to determine the differences between coins. This was demonstrated by the separation of a currency from the other coins within the range of composition.

Calibration disks: Use of €0.50 coins as calibration disks for portable XRF's was more effective with specific elements than other calibration disks. These coins have high XRF values for Cu, Zn, Ni, Fe, Co, and Ag. (See Table 1). Due to these "high" values, a portable XRF for Cu, Zn, Ni, Fe, Co, and Ag, would expect that high XRF values for these elements and vice versa. Detection limits for XRF were approximately 100 ppm for Cu, Zn, Ni, Fe, Co, and Ag, and 1000 ppm for Ni, Co, and Ag. (See Table 1). These XRF values are portable XRF for Cu, Zn, Ni, Fe, Co, and Ag. (See Table 1). These XRF values are portable XRF for Cu, Zn, Ni, Fe, Co, and Ag. (See Table 1).

Table 1. Average element concentrations

Element	Mean	SD	DL
Average Standard Deviation	10000.00	80.0000	100.0000
Copper	10174.00	16.0000	100.0000
Zinc	8200.00	10.0000	100.0000
Nickel	1000.00	10.0000	100.0000
Iron	1000.00	10.0000	100.0000
Co	1000.00	10.0000	100.0000
Ag	1000.00	10.0000	100.0000

These XRF values are portable XRF for Cu, Zn, Ni, Fe, Co, and Ag. (See Table 1). These XRF values are portable XRF for Cu, Zn, Ni, Fe, Co, and Ag. (See Table 1). These XRF values are portable XRF for Cu, Zn, Ni, Fe, Co, and Ag. (See Table 1).



