

INTRODUCTION

Much of today's communication among youths takes place via online chat media in virtual communities populated by millions of anonymous members; these cyber-friends and acquaintances use a variety of chat technologies to maintain virtual relationships based on daily (if not hourly) contact (Ellison, 2007; O'Murchu, 2004). MSN Messenger, for example, reports 27 million users and AOL Instant Messenger has the largest share of the instant messaging market (52% as of 2006) (BigBlue.com); however, Facebook, the latest social networking craze, reported over 90 million users worldwide (Nash, 2008).

Unfortunately, anyone using this technology is also accessible to millions of anonymous and semi-anonymous users -- virtual strangers in a virtual playground. The most common online technologies utilized by sexual predators to contact potential victims is through e-mails, chat rooms and instant messaging, demonstrating the increased ease of gaining access to young adolescents without parental interference (Mitchell, Finkelhor & Wolak, 2001). In the war against cyber-predation and cyberbullying, parents and teachers have also turned to a variety of technologies to monitor, limit, and block their children's access to problematic Internet content (Kontostathis, Edwards, and Leatherman, 2009).

The National Center for Victims of Crime reports that 1 in 3 girls and 1 in 6 boys fall victim to a sexual predator in their lifetime. Furthermore, according to the most recent 2008 online victimization research, approximately 1 in 7 youth (ages 10- to 17-years-old) experience a sexual approach or solicitation by means of the Internet (National Center for Missing & Exploited Children, 2008). The National Center for Missing and Exploited Children (NCMEC) has set up a CyberTipLine for reporting cases of child sexual exploitation including child

pornography, online enticement of children for sex acts, molestation of children outside the family, sex tourism of children, child victims of prostitution, and unsolicited obscene material sent to a child. All referrals to the tip line are referred to appropriate law enforcement agencies -- and the magnitude of the calls is staggering. From March, 1998, when the CyberTipLine began operations, until October 27th, 2008, there were 40,353 reports of “Online Enticement of Children for Sexual Acts,” one of the reporting categories. There were 122 in the week of October 27th, 2008 alone (NCMEC, 2008).

The threat to youth is of particular interest to researchers, law enforcement and youth advocates because of the potential for it to get worse as membership in online communities continues to grow (Backstrom, 2006; Kumar, 2004; Leskovec, 2008) and as new social networking technologies emerge (Boyd, 2007). In an endeavor to prevent sexual predators from coming into contact with youths over the Internet, law enforcement and volunteer organizations, like the Federal Bureau of Investigation (FBI) and the Perverted Justice Foundation, Inc. (PJ), have implemented programs to catch sexual predators online. Perverted Justice is a non-profit group that identifies, investigates, and turns over to police adults who solicit sexual conversations online with Perverted Justice volunteers who pose as minors ranging from 10 - to 15 - years of age.

Very few researchers, however, have looked at the actual language or communicative strategies used by predators to lure children and youths into sexual relationships (Harms, 2007; Marcum, 2007). Olson et al, (2007) explored the the communicative processes of entrapment used by child sexual predators to lure their victims into sexual relationships. Their model suggests that predators engage in a cycle of entrapment whereby they gain access to victims,

groom them for sexual interaction, isolate them from their support networks, and then attempt to approach their victims to initiate and maintain a sexual relationship.

Our pilot study¹ sought to contribute to the exploration, recognition and prevention of online sexual predation by exploring the viability of Olson's face-to-face luring theory in the online predation environment. Specifically, this content analysis study by developing a coding scheme for analyzing cyberpredators' communicative luring strategies based on the model of luring communication proposed by Olson et al. (2007) This current study had two research questions:

RQ 1: Does Olson's luring theory of communication accurately describe online luring communication? Cyberpredators and face-to-face predators have different pathologies and different obstacles to overcome in approaching young victims, suggesting there may be a difference in the strategies they employ to lure minors.

RQ 2: Can a computer program learn to recognize online luring communications? As parents and authorities seek reliable technologies for monitoring and documenting approaches by predators, it would be helpful to develop a program that reads and understands and, ultimately learns, to recognize luring communications to halt it. Clearly, monitoring and alerting technologies already exist, but they are not based on communications theory.

Literature Review

Both the Olson study and the current study focus on communicative luring strategies employed by sexual predators; however, there is a difference in the types of predation that potential victims may encounter. While the term "pedophile" is often used colloquially, the term

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actually refers specifically to adults sexually interested in children who have not yet reached puberty. A “hebephile,” on the other hand, is interested in victims who have reached puberty and who show signs of secondary sexual development, like pubic hair and breasts. (Holmes and Holmes, 2009; Seto, 2008) Seto (2008) cautions, however, that it is “not clear if sexual preference for...pubescent children represents a variation of pedophilia or instead represents different paraphilias.” (p.4) There is also currently some debate about the actual deviancy or mental illness involved in being sexually attracted to a pubescent youth. The term itself, hebephilia, is not even included in the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (Franklin, 2009). Part of the concern with the use of this term is that it links psychiatric disorder with legal statutes, particularly age of consent, which vary state to state.

Internet luring offenders is a new category of sexual offense that has been created in light of the new laws designed to prevent individuals from using the Internet to lure children into child pornography or sexual assaults. The use of the Internet in sexual predation has contributed to two distinct differences between online predators and classic face-to-face predators. First, the Internet provides a measure of anonymity that allows predators to mask not only their identities, but also their true intentions from victims. Second, it provides the opportunity for predators to reach numerous victims simultaneously, regardless of geographic location (US Department of Justice, “The Electronic Frontier, 2007). Recent research suggests that luring and traveling for sexual purposes do occur, however, they typically involve adults seeking teenagers rather than young children (Seto, 2008). The same research suggests there has been a decline in the number of youths reporting online sexual solicitation, from 1 in 5 in 2000 to 1 in 7 in 2005. The authors

attributed this decline to greater awareness about this issue among young people (Wolak, Mitchell, & Finkelhor, 2007). Wolak, Finkelhor and Mitchell (2007) examined data on 129 sexual offenses that had taken place as a result of online contact. Seventy-five percent of the girls were between the ages of 13 and 15, and 75% of the offenders were over the age of 25. Most of the offenders were honest about their age, so the teenage girls knew they were meeting with an adult man. According to Hundersmarck et al (2007), “fixated” Internet offenders are consistently attracted to children, as compared to “regressed offenders.” In accordance with their classification system, the fixated offender is the most dangerous since he is solely focused on children and young adolescents, and he is also the type who is “more organized and spends time planning the offense and grooming the victim” before attempting to commit the sexual crime.

Much of the social networking research in computer science has focused on chat room data, particularly on identifying discussion thread sub-groups within a chat forum, but surprisingly few researchers have attempted to deal with the creation of specific applications for analysis and management of Internet predators or cyber-bullies. We found only two researchers who are working on Internet predation applications. Pendar (2007) has had some success when analyzing chat log transcripts in order to differentiate between the aggressor and the intended victim. Pendar (2007) reports in a pilot study for building an automatic recognition system of on-line predators that one of the major obstacles to this type of research is that there are “generally two types of on-line text chat with sexually explicit content” predator – victim, predator-law enforcement, predator-volunteer. Pendar found it is possible to distinguish automatically between a sexual predator and a pseudovictim in a chat text transcript. Their findings also suggest that the distinction between the two sides of the conversation lies not in the words they use, but the order

in which the words are arranged. Hughes (2008) has had some success in identifying child pornography distribution via peer-to-peer networks, suggesting that identifying luring communication is a pressing problem, and that natural language processing techniques can be employed to develop solutions to this problem. Kontostathis, et al, (2009) also found some success in developing an automated system for analyzing online chats between predators and pseudo-victims from Perverted Justice. This system, ChatCoder, met with moderate success in comparison to human coding findings. We have developed a prototype software application, ChatCoder (Edwards, 2008-1, Leatherman, 2008-2), that is used to assist in the analysis of chat transcripts and development of the codebook which is an essential piece of the communicative theory.

Luring Theory of Communication

The Olson et al. (2007) model of luring communication illustrates the process utilized by sexual predators to lure victims into ongoing sexual relationships. Developed using the grounded theory approach, their luring communication model suggests that predators first gain access to their victims, then hold them in a cycle of entrapment which leads, ultimately, to ongoing sexual abuse. This luring model occurs within the context of time constraints, Western cultural values, and relationships based on imbalanced power and control. The contextual framework surrounding the luring theory involves concepts of time, culture, power and control. Power and control are motivating factors for the initiation of sexual communication; the predator possesses a desire for total physical and mental dominance over the victim. Time refers to the fact that the luring process occurs over a specific period of time, and that each portion of the model occurs

during an identifiable time frame. Time also refers to the historical eras of Western culture, and the ever-changing view of sexual relationships between adults and minors in the United States.

Gaining access to the victim is required in order to begin luring behavior, and consists of individual characteristics of the predator and strategic placement near the victim; therefore, this causal construct predicts subsequent action strategies of the predator. The three properties of this construct are the predators' proclivities, the victims' vulnerabilities, and the strategic placement of predators near their victims. Vulnerable victims often have problematic family relationships and self-esteem issues. Predators, on the other hand, tend to have personal histories of sexual abuse and deviance. There are two types of strategic placement: short-term placement, designed for immediate gratification, and long-term placement meant for delayed gratification (Olson et al., 2007).

The cycle of entrapment consists of grooming victims, isolating them from family and friends, and, ultimately approaching victims for sexual relationships. Grooming, according to Harms (2007) is a "communication process by which a predator applies affinity-seeking strategies, while simultaneously engaging in sexual desensitization and information acquisition about targeted victims in order to develop relationships that result in need fulfillment" (Harms, 2007). As the predator grooms and builds deceptive trust, physical and mental isolation of the victim from their support network also occurs. The last aspect of the cycle of entrapment is "approach," which is the initial physical contact that occurs prior to the sexual acts, whereby the predator becomes a "sexual mentor" by discussing sexual contact with the victim. Ultimately, the cycle ends in ongoing sexual abuse of the victim.

The communication strategies employed in the grooming process are about need fulfillment and the three needs that these strategies fulfill are the need for inclusion, control, and affection. Guided by these three interpersonal needs, Harms proposes a coding scheme for grooming communication: affinity-seeking strategies, information acquisition, and sexual desensitization. Deception is likely to saturate the grooming dialogue; however, honest relationships are possible (Harms, 2007). The deceptive trust development process sits at the core of this cycle, and involves conversations between victims and predators designed to gain trust from the victim in misleading ways.

Methodology

This pilot study employed both computer-based and manual content analysis to answer the study's two research questions: Does Olson's luring theory of communication accurately describe online luring communication? Can a computer program learn to recognize online luring communications?

Sample

The sample for computer coding consisted of 325 transcripts of conversations between predators and volunteers from Perverted Justice; 30 transcripts were selected for manual coding by student coders. All transcripts were obtained from the Perverted Justice website between June 2008 and July 2009. Perverted Justice is a group of volunteers who pose as both girls and boys between the ages of nine and fourteen to catch and expose online predators in the act of luring young children into sexual relationships. Perverted Justice volunteers create online profiles of themselves as youths which include falsified addresses, phone numbers, ages and even pictures of children. The volunteers then place themselves on popular websites or chatrooms where

predators look for victims, engage in conversations with adults who approach them and then agree to meet the predators in person. Unbeknownst to the predators, police (and sometimes television cameras)² await them instead of their victims. To date, the organization has contributed to the arrest and conviction of over 300 online predators across the nation. The Internet conversations held between predators and Perverted Justice volunteers are only posted once the case has been tried in court and a conviction has been won. In addition, after a guilty verdict, a profile of the sexual predator is placed on the Perverted Justice website which typically includes the predator's photograph, real name, location, screenname and the online conversation that was used as evidence (www.perverted-justice.com). As of July 2009, there were 325 transcripts available on the site; therefore, the sample for the computer analysis study is a census sample.

It must be noted that there are several issues with using Perverted Justice transcripts for this analysis. First, we were unable to use these transcripts to code the victims' contributions to the conversation because they were not actual victims. The goal of Perverted Justice volunteers is to engage in and sustain conversations with predators until the arrangements to meet are set. Victims' dialogue was not coded because the Perverted Justice volunteers were not actual victims, per se, but rather adults who were attempting to maintain contact with predators long enough for them to incriminate themselves and to attempt to meet their pseudo-victims. Second, we have no way to ascertain whether or not, and to what extent, Perverted Justice volunteers

² However, Perverted Justice has also been criticized regarding their practices, particularly as a result of their collaboration with the network series "To Catch a Predator" on *Dateline* NBC (Dateline NBC, 2004). During a *Dateline* NBC sting operation, conducted with Perverted Justice and the crew of the nationally televised news show, the former Kaufman County District Attorney Louis "Bill" Conrath Jr. fatally shot himself in his home as he was about to be arrested by police for attempting to solicit a minor online (McCann, 2008). Another criticism is that volunteers, in their role as pseudo-victims, will send pictures of children to the predators in order to present themselves as a "real" minor after a telephone conversation has been initiated to arrange a meeting. This is where the organization has been criticized, even by court administrators, because this transfer of pictures invades the privacy of the children who pose for the pictures utilized in these operations.

edited the transcripts prior to posting them online. Despite these concerns, however, we used these transcripts because there is other way at this time to obtain transcripts of conversations between predators and actual victims.

Codebook Development

A hand-coding guide and a computer coding dictionary were developed in order to perform both a manual content analysis and a computer-based content analysis, respectively. Olson's luring categories – gaining access, deceptive trust development, grooming, isolation and approach - were converted into the corresponding categories for online predation by operationalizing the abstract or physical actions of face-to-face predation into online communication acts.

For the purposes of this study, *gaining access* was defined as the presence of predators in online settings, such as chatrooms, instant messaging exchanges, and online social networking sites like MySpace and Facebook as indicated by greeting phrases in the transcript (“hello,” “hi,” “what’s up?” etc.) or identifying the online location where the conversation is taking place. Deceptive trust development was separated into, and defined by, four components: personal information, information about relationships, information about favorite activities, and compliments. *Personal information* was defined as, but not limited to, victims and predators revealing their real names to each other, their actual ages, hometown and computer locations (e.g. bedroom, office, etc.), cell and/or home phone numbers, and exchanging pictures of themselves. *Relationship information* was defined as predators and victims talking about feelings and attitudes about building, maintaining, or dismantling their relationship with each other, with family and friends, and with past romantic partners and friends. *Activities* were defined as, but

not limited to, predators and victims talking about shared social behaviors like favorite musicians, movies, and hobbies they have in common or wish to introduce to the other.

Compliments were defined as, but not limited to, predators' and victims' offering praise about each other's appearance, activities, and personal information.

Olson, et al. (2007) separate grooming into two categories - communicative desensitization and reframing - both of which are designed to make victims comfortable with conversations about sex. For the purposes of this study, *communicative desensitization* was defined as discussions about sexual acts and other interpersonal physical contact (hugging, kissing, etc.), the use of vulgar sexual terms by predators in conversations with victims, and the intentionally sexualized misspelling of commonplace words (e.g., "welcum" instead of "welcome"). Perpetrators can also desensitize victims by sending and requesting pornographic images. *Reframing* was defined as altering sexuality by associating sexual acts with games, practicing or learning. *Isolation* was defined as predators' attempts to separate their victims from their families and friends by inquiring about the status of these relationships, by suggesting there are problems in these relationships, and by encouraging victims' to lie to families and friends about their activities and conversations. Finally, *approach* was defined as requests, suggestions, and /or commands by predators to meet with victims and/or to have intercourse.

Based on these luring categories, a dictionary with coding commands was created for the prototype computer application we developed, ChatCoder. The dictionary was developed by researchers after a close review of 25 transcripts and Internet sources for netspeak prior to beginning the study. We then designated key terms and phrases utilized frequently by online sexual predators into corresponding categories of the Olson et al. (2007) model.

Procedures

Age and location information was collected from the profile data provided by Perverted Justice volunteers; race was determined by predators' photos on the profile page. ChatCoder read the transcripts, comparing the words in the predators' lines to the luring terms, phrases, netspeak and emoticons in its dictionary. Lines that did not contain luring language were not coded. The dictionary was developed by researchers after a close review of 25 transcripts and Internet sources for netspeak prior to beginning the study. We then designated key terms and phrases utilized frequently by online sexual predators into corresponding categories of the Olson et al. (2007) model. Predator lines that contained luring language were coded, assigned nominal values (developed by the researchers), and summarized for import into Excel. ChatCoder also includes a Batch Code feature which codes an entire directory of 325 transcripts in approximately 10 minutes.

Two trained undergraduate students coded individual lines of predators' dialogue for the nine luring categories; predators' lines that did not contain language that fit into any of the luring categories were not coded. The ChatCoder program was given the same instructions. In addition to collecting data about the presence of luring communications, predators' personal information was recorded including screennames, real names, age, location, race, and gender as identified by Perverted Justice. Data about names, ages, race, and location as provided by predators in the transcripts was also collected.

Intercoder reliability between two student coders, and between students and ChatCoder, was calculated using Holsti's method. Reliability for the student coders ranged from 75% to

93%; however, intercoder reliability between ChatCoder and the student coders ranged from 20% to 35%. Although the intercoder reliability results for ChatCoder suggest that its findings are not reliable when compared to human coding, it must be noted that the program can only search for the terms that appear in its dictionary, while humans can make many more informed judgements about the categorization of new terms and language in transcripts. As ChatCoder's dictionary and coding algorithms grow more complex, its reliability will also improve.

FINDINGS AND DISCUSSION

Predators' ages ranged from 20 to 58, with the average age being approximately 33 years old. The majority of the predators (63%) were Caucasian, 16.6% were Hispanic, 6.6 % were African-American and 6.6 % were of Asian or Middle Eastern descent. Slightly more than half of the predators in the sample reside in California (53.3%), with Georgia, Florida, Ohio, Wisconsin each representing 6.6% of the sample. Transcripts ranged in length from 123 lines to 3490 lines.

Thirty transcripts were manually coded to answer the first research question, "Does the luring theory accurately describe online luring communication?" Table 1 shows that, based on our operationalization of Olson's luring theory, the luring concepts do appear in the transcripts, suggesting that online predators do, to a certain extent, use the same or similar communicative strategies to lure victims. All 9 of the luring concepts appear, in varying degrees, in the sample of transcripts. In addition to coding and counting the simple presence of each luring category in the sample, we also calculated the frequency of use of these luring categories across the sample of transcripts.

Personal information exchange, communicative desensitization, isolation, and approach all appear at least once in all thirty transcripts; however, gaining access, the language that was expected to launch these conversations, only appeared in 23 or 76.6% of the sample. One explanation for this unexpected finding is that some predators never actually used greeting language or discussed the social networking sites where they met their victims. Another reason for the missing gaining access codes is that coders were instructed to code the predator's first line as "gaining access" only if it preceded all victim dialogue; however, in several instances, Perverted Justice volunteers in this sample appear to have initiated contact with these predators.

Table 1: Transcripts with luring categories (n=30)

<u>Luring categories</u>	<u>#</u>	<u>%</u>	<u>Freq. per transcript</u>	
Comm. Desensitization	30	100	2329	77.63
Approach	30	100	931	31.03
Personal Info.	30	100	619	20.63
Isolation	30	100	557	18.57
Compliments	28	93.3	379	12.63
Reframing	27	90	196	6.53
Relationship Info.	26	86.6	144	4.8
Activities	25	83.3	150	5.0
Gaining access	23	76.6	24	0.8

In online luring communications, deceptive trust development was separated into four components: personal information, information about relationships, information about favorite activities, and compliments. It was anticipated that these predators invested considerable time and effort in developing deceptive relationships with minors based on the appearance of honesty (via shared personal information) and shared interests and activities. Personal information was the only luring category in deceptive trust development that appeared in all of the transcripts (100%), suggesting that all predators seek and exchange some information like names, gender,

and phone numbers with victims. It was anticipated that predators would attempt to develop friendships with their young victims by sharing stories about favorite activities (83.3%), but that does not appear to be the case. Interestingly, a majority (60%) of the predators shared their real ages with potential victims, rather than misrepresent themselves as youths, too. The predators who did lie about their age claimed to be, on average, 27 years old, still considerably older than the minors they were targeting. Ironically, despite the role of personal information in deceptive trust development, it is in this category that predators are somewhat honest about the information they share.

We were surprised by the relative infrequency of relationship information exchange (4.8 mentions per transcript) and information about favorite activities (5.0 mentions) during conversations between predators and victims, despite appearing in every almost every transcript. Compliments, however, appeared much more frequently (12.63 mentions per transcript), which is in keeping with Harms' (2007) description of affinity-seeking behaviors by predators. Predators also use compliments to play on the vulnerable self esteem of victims. For example, in one transcript, the predator ("dveightus") praises his victim's (PJ volunteer "ima_beangirl2") appearance in several pictures she has emailed him, asking if she is a model and telling her she looked "gorgeous" – typed in all caps to emphasize or shout the compliment. Requests for pictures or offers to exchange pictures are usually connected to praise or compliments from the predator to his victim; they are rarely couched as attempts to verify the victim's age or identity. In another example, the predator, ("arthinice"), first offers a potential compliment ("I bet you are a pretty girl"), before requesting a photo of his victim (PJ volunteer "sadlilgrl"). He even offers to show her a picture of himself by telling her where she can find it ("mine is on my profile if

you wanna see it”). Upon receiving her picture, the compliment is then granted (“I see 2 very pretty girls” and “you seem to be a very sweet girl”).

Communicative desensitization, appearing in 100% of the sample, and communicative desensitization phrases and terms were used, on average, about 77 times in each transcript. One reason for the preponderance of this luring category is that it includes not only discussions of sexual acts to groom the victim for actual sexual encounters, but also the exchange of intimate details about victims’ and predators’ bodies and the use sexualized spelling for commonplace words for the same purpose.

Other predators ask probing questions about their victims’ bodily development, particularly the presence of breasts and pubic hair. In particular, predators like bud448002, frequently ask if the minor has “shaved” or if they “have hair.” Questions like this suggest that the distinction between hebephilia and pedophilia may be a gray one, since predators frequently request information about body maturity without voicing a specific preference for more developed adolescent bodies. Seto (2008) cautions, however, that it is “not clear if sexual preference for...pubescent children represents a variation of pedophilia or instead represents differe paraphilias.” (p.4) There is also currently some debate about the actual deviancy or mental illness involved in being sexually attracted to a pubescent youth (Franklin, 2009).

Reframing (90%) is the other strategy utilized by sex offenders in order to further make the victim feel comfortable towards verbal sexual advances over the Internet. In our sample, despite appearing in most of the transcripts, predators only used reframing language, on average, about 7 times in a conversation with a victim. In the example below, “daddy_needs_slave”

portrays himself as a mentor or teacher in which he offers to teach the pseudo-victim (Charlotte Russe) anything she is curious (“so u want me to teach u to touch yourself”):

daddy_needs_slave (01/27/07 10:43:53 PM): so u want me to teach u to touch yourself
 Charlotte Russe (01/27/07 10:44:23 PM): long as u dont get mad if i dont do it rite
daddy_needs_slave (01/27/07 10:45:04 PM): I am not going to get mad

He repeatedly uses the terms “teach” and “learn” during this conversation to reframe and correlate sexual activities to learning experiences, where she “will know what to do.” In a sense, this situation may cause the victim to believe they are learning important information, much like victim would at school.

Isolation (18.57 mentions per transcript) appeared in all of the transcripts in this sample, demonstrating another technique regularly used by predators. We were surprised to find that only do predators encourage victims to lie to their parents, they also tell victims about the legal or criminal implications of their actions, warning the victim that they could get in trouble if caught, that they are willing to risk everything for the relationship / sexual act with the victim.

Fotophix [02:48 PM]: u home alone
 14-year-old boy [02:48 PM]: yah
Fotophix [02:48 PM]: can you go out
 14-year-old boy [02:49 PM]: ya sure

Sometimes a sexual predator (as evidenced by Fotophix) will test the physical isolation of an online victim by asking the victim if they are home by themselves or if they are permitted to physically leave their home (“u home alone,” “can you go out”). These questions allow the predator to establish the degree of physical isolation that an individual victim has from their support network.

Finally, approach appeared in all of the transcripts in this sample; predators mentioned meetings to victims approximately 31 times per conversation. In the approach category, we also

measured the length of time that elapsed between the predator’s initial greeting and the initial mention of a meeting. Over 36% (11) of all approaches in this sample occurred in the first hour of conversation; over 75% of all approaches occurred in the first 24 hours. Approximately 6% of the approaches occurred after 3 days’ worth of conversations between predators and victims; unfortunately, that meant that predators had unsupervised access to their victims for an extended period of time. Equally disturbing, of the 11 predators who made an approach statement in the 60 minutes of the conversation, 45% made their approach within the first 30 minutes of talking to the victim.

Three hundred and twenty-five (325) transcripts were coded by ChatCoder to answer the second research question, “Can a computer program learn to recognize online luring communications?” Table 2 below reports the number of transcripts that contained these luring categories and the frequency of occurrence of these categories. Gaining access appears in every transcript (100%), with communicative desensitization and approach appearing in nearly every transcript, too, 99.4% and 98%, respectively.

Table 2. Comparison of ChatCoder and Manual coding

Luring Concept	ChatCoder N=325		Manual coding n=30	
	#	%	#	%
Gaining access	325	100	23	76.6
Communicative desensitization	323	99.4	30	100
Approach	319	98	30	100
Isolation	304	93.5	30	100
Personal information	296	91	30	100
Compliments	288	88.6	28	93.3
Reframing	231	71.1	27	90
Activities	112	34.5	25	83.3
Relationship information	83	25.5	26	86.6

As Table 2 demonstrates, all predators used Olson's luring concepts, in varying degrees, in their conversations with pseudo-victims, which suggests that our program, ChatCoder, can learn to recognize the luring categories. However, the number and frequency of appearances in transcripts differs from the rates observed in manual coding, a difference that may be attributed to the reliability issues noted earlier. Unfortunately, at the time of this study, ChatCoder could only produce data findings in a batch, which precluded frequency analysis.

CONCLUSION

The physical and psychological effects of sexual predation on minors can last a lifetime, making research that can track, prevent or halt it invaluable. This pilot study sought to contribute to this vital area of study by determining the viability of Olson's face-to-face luring communication theory in an online predation environment. Our preliminary findings are promising; they suggest that our operationalization scheme is reliable for manual coding by trained coders. Unfortunately, our prototype computer program was less reliable with human coders. We are currently modifying our program; ChatCoder 2.0 is already showing significant improvement in reliability with human coders (Kontostathis et al, 2009). Future research in this project will incorporate qualitative analyses, both manual and computer-based, of the messages between predators and victims to uncover patterns of persuasion and manipulation employed by predators and patterns of compliance and avoidance used by victims.

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Reference List

- Backstrom, L. D. Huttenlocher, J. Kleinberg, and X. Lan. (2006). Group formation in large social networks: membership, growth, and evolution. In Proceedings of the 12th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (Philadelphia, PA, USA, August 20-23, 2006). KDD '06. ACM, New York, NY, 44-54. DOI=<http://doi.acm.org/10.1145/1150412>.
- BigBlue.com IM marketShare - <http://www.bigblueball.com/forums/general-other-im-news/34413-im-market-share.html>
- Boyd, D., and N. Ellison. (2007). Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication*. Volume 13, Issue 1, Pages 210 – 230. <http://www3.interscience.wiley.com/journal/117979306/home>
- Ellison N., C. Steinfield, and C. Lampe. 2007. The Benefits of Facebook "Friends:" Social Capital and College Students' Use of Online Social Network Sites *Journal of Computer-Mediated Communication*. Volume 12, Issue 4, Pages 1143 – 1168. <http://www3.interscience.wiley.com/journal/117979349/abstract>
- Franklin, K. "Hebephilia struck by third blow." In the News: Forensic Psychology, criminology, and psychology-law, June 5, 2009. Downloaded from forensicpsychologist.blogspot.com/2009/06/hebephilia-struck-by-third-blow.html.
- Harms, C.M. "Information-Seeking Tactics in Social Networking Websites: Grooming, Part II. Sex Offender Law Report, vol. 8, no. 4 (2007 June-July), pp.49-64.
- Harms, C.M. "Operational Definition and Coding Scheme: Grooming, Part I. Sex Offender Law Report, vol. 8, no. 1 (2007 December/January), pp.1-16.
- Holmes, S.T. and Holmes, R. M. (2009). Sex Crimes: Patterns and Behavior, 3rd ed. Los Angeles: Sage.
- Hundersmarck, S.F., Durkin, K.F., & DeLong, R.L. (2007). Designing a Classification System for Internet Offenders: Doing Cognitive Disorders. Mental Health Issues in the Criminal Justice System, 45(1-2), 257-275.
- Kontostathis, A., Edwards, L. Bayzick, J. McGhee, I., Leatherman, A., and Moore, K. (2009). Comparison of Rule-based to Human Analysis of Chat Logs. Unpublished research.

- Kontostathis, A., Edwards, L. Bayzick, J. McGhee, I., Leatherman, A., and Moore, K. (2009). Developing ChatCoder 2.0: Improving Computer Analysis of Cyber-Predation Conversations. Unpublished research.
- Kontostathis, A., Edwards, L. and Leatherman, A. (2009). Text Mining and CyberCrime.
- Kumar, R., J. Novak, P. Raghavan, and A. Tomkins. (2004). "Structure and evolution of blogspace." *Communications of the ACM* 47, 12 (Dec. 2004), 35-39. DOI=<http://doi.acm.org/10.1145/1035134.1035162>
- Leskovec, J., K.J. Lang, A. Dasgupta, and M.W. Mahoney. 2008. Statistical properties of community structure in large social and information networks. In *Proceeding of the 17th international Conference on World Wide Web* (Beijing, China, April 21 - 25, 2008). WWW '08. ACM, New York, NY, 695-704. DOI=<http://doi.acm.org/10.1145/1367497.1367591>
- Marcum, C. D. (2007). Interpreting the Intentions of Internet Predators: An examination of online predatory behaviors. *Journal of Child Sexual Abuse*. Vol. 16 (4), pp.99-114.
- Mitchell, K.J., Finkelhor, D., & Wolak, J. (2001). Risk Factors for and Impact of Online Solicitation of Youth. *Journal of the American Medical Association*, 285 (23), 3011-3014.
- Mitchell, K.J., Finkelhor, D., & Wolak, J. (2007). Trends in Youth Reports of Sexual Solicitations, Harassment, and Unwanted Exposure to Pornography on the Internet. *Journal of Adolescent Health*. 40, 116-126.
- National Center for Missing & Exploited Children. Internet Safety. Retrieved on June 20, 2008: <http://www.missingkids.com/>.
- Nash, K. (2008). "A Peek Inside Facebook." PCWorld http://www.pcworld.com/businesscenter/article/150489/a_peek_inside_facebook.html
- Olson, L.N., Daggs, J.L., Ellevold, B.L., & Rogers T.K.K. (2007). Entrapping the Innocent: Toward a Theory of Child Sexual Predators' Luring Communication. *Communication Theory* 17, 231-251.
- O'Murchu, 2004) O'Murchu, I., J.G. Breslin, S. Decker. 2004. Online Social and Business Networking Communities. Digital Enterprise Research Institute (DERI) Technical Report 2004-08-11. August 2004. <http://www.deri.ie/fileadmin/documents/DERI-TR-2004-08-11.pdf>.
- Pendar, N. (2007). Toward Spotting the Pedophile Telling victim from predator in text chats. In *The Proceedings of the First IEEE International Conference on Semantic Computing*: 235-241. Irvine, California.

- Perverted Justice. (date unknown). arthinice. Transcript posted to: <http://www.perverted-justice.com/?archive=Arthinice>
- Perverted Justice. (2007, January 25). daddy_needs_slave. Transcript posted to: http://www.perverted-justice.com/?archive=daddy_needs_slave
- Perverted Justice. (2006, March 9). dveightus. Transcript posted to: <http://www.perverted-justice.com/?archive=dveightus>
- Perverted Justice. (2006, September 3). FOTOPHIX. Transcript posted to: <http://www.perverted-justice.com/?archive=FOTOPHIX>
- Perverted Justice Foundation Incorporated. (2008). Perverted Justice, California: www.perverted-justice.com
- Seto, M.C. (2008). Pedophilia and Sexual Offending Against Children. Washington, D.C.: American Psychological Association.
- Turner, R.E., Edgley, C., & Olmstead, G. (1975). Information control in conversations: Honesty is not always the best policy. *Kansas Journal of Sociobiology*, 11, 69-89.
- US Department of Justice (2007). "The Electronic Frontier: The Challenge of Unlawful Conduct Involving the Use of the Internet, a Report of the President's Working Group on Unlawful Conduct on the Internet."
- Wolak, J., Finkelhor, D. and Mitchell, K. (2004). Internet-initiated Sex Crimes against Minor: Implications for Prevention Based on Findings from a National Study. *Journal of Adolescents Health*. 35:424.e11-424.e20.